

Determinants of monetary penalties for environmental violations

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ABSTRACT

This research investigates the likely determinants of monetary penalties for poor environmental performance. We retrieve data from Bloomberg on the monetary penalties imposed on companies in the European Union (EU) found to have performed poorly in corporate social responsibility (CSR), and particularly in the environmental aspects of CSR. Our primary findings reveal that firms with high levels of greenhouse gas and hazardous waste emissions are more likely to receive monetary penalties. On the other hand, firms that invest in green supply chain practices and disclose environment-related matters avoid monetary penalties more. We also find that firms having executive compensation linked with environmental compliance face more monetary penalties. This finding adds a new dimension to the voluminous research on executive compensation that has investigated primarily the effects of cash and stock option-based compensation schemes on pay-performance sensitivities. Copyright © 2017 John Wiley & Sons, Ltd and ERP Environment

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Introduction

THIS RESEARCH INVESTIGATES THE LIKELY DETERMINANTS OF MONETARY PENALTIES FOR POOR ENVIRONMENTAL PERFORMANCE, a component of corporate social responsibility (CSR) behaviour. Our study is motivated by a paucity of research on the regulatory interventions, in the form of actual monetary penalties, for poor CSR behaviour. CSR reflects the extent to which a firm actively responds to a host of stakeholder demands, including those of shareholders, employees, suppliers, customers and the broader community (Freeman, 1984; Hillman and Keim, 2001; Rowley and Berman, 2000). CSR demands might include ensuring pollution-free environments, workplace diversity and good working conditions for employees, support for education and housing, and high-quality products.

Much of the prior literature on CSR has investigated the likely determinants of firm-level CSR behaviour and the consequences of such behaviour (Mattingly, 2015; Orlitzky *et al.*, 2003; Wang *et al.*, 2015). Predominantly based on agency and stakeholder theory, some studies have argued that employing valuable firm resources to engage in CSR

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results in significant managerial, rather than financial, benefits for firms' shareholders (Freeman, 1984; Wartick and Cochran, 1985; Wood, 1991). Other scholars have argued that CSR can have a positive impact by providing better access to valuable resources (Cheng *et al.*, 2014; Cochran and Wood, 1984), attracting and retaining higher-quality employees (Greening and Turban, 2000; Turban and Greening, 1997), allowing for better marketing of products and services (Fombrun, 1996; Moskowitz, 1972), and contributing toward the gaining of social legitimacy (Hawn *et al.*, 2011). Recent evidence suggests that firms with better CSR practices enjoy a lower cost of capital (Dhaliwal *et al.*, 2011; El Ghouli *et al.*, 2011), are prone to lower crash risk (Kim *et al.*, 2014) and report better quality earnings compared with firms with poor CSR practices (Kim *et al.*, 2012). Although it is insightful to understand the revenue implications of CSR performance, inadequate attention has been given to understanding the implications of poor CSR behaviour in terms of regulatory interventions, e.g. the imposition of monetary penalties for CSR violators.

From a legitimacy theory perspective, good corporate citizenship in the form of positive CSR practices legitimizes firms' operations in the eyes of the stakeholders: an advantage of paramount importance for the organization's survival. Market transactions internalize reputation costs emanating from poor CSR practices, and such considerations should motivate firms to comply with environmental rules (Cohen, 1998). Furthermore, enhancement of the corporate image through responsible CSR practices should also motivate managers to be CSR proactive (Henriques and Sadorsky, 1996). Despite the benefits associated with good CSR practices, concerns about CSR have grown considerably in the last two and half decades amongst the business press, business and political leaders, customers, suppliers, community groups and government (Bernardi and Stark, 2016). Many companies over the years have been found to have damaged the environment, failed to provide a satisfactory workplace environment for employees, violated human rights and manufactured and sold unsafe products.¹ The dramatic growth in the number of institutes and mutual funds screening stocks on the basis of positive CSR behaviour encourages corporations to be socially responsive.

Why do firms engage in poor CSR practices despite the benefits associated with being good corporate citizens? First, compliance with CSR is regulation driven, and managers may not be aware of the benchmark for compliance. Second, an agency theory perspective suggests that firms exist to generate economic returns rather than to solve societal problems, and their shareholders may care less about the community and environment as long as the firms generate positive economic returns. Devinney (2009) argues that corporations are naturally socially conservative and, hence, will not experiment unless they can see a clear profit from the endeavour.

Given the possibility of poor CSR behaviour, stakeholders would demand that regulators sanction violators, as reputation concerns alone appear to be insufficient (Karpoff *et al.*, 2005). The extent to which these violations have been subject to regulatory penalty remains a matter of grave concern. Vogel (2010) raised the concern that regulatory failures at the global and national level are pervasive in large measures, because neither global firms nor national governments have developed adequate mechanisms to govern many of the negative social and environmental impacts effectively. Empirical research, too, has provided scant evidence that explains the imposition of penalties on some firms, the magnitude of such penalties and the consequences of regulatory penalties. An exception is Karpoff *et al.* (2005), who find that firms violating environmental laws suffer a significant value loss: a consequence suggesting that environmental violations are disciplined largely through legal and regulatory, rather than reputational, penalties. The sanctioning of poor CSR practices also assures stakeholders that their interests are protected. Rousseau (2009) identifies the circumstances of the offense, characteristics of the offenders and indirect political and institutional effects as determinants of the imposition of monetary penalties for environmental offenses.

We retrieve data from Bloomberg on the amounts of penalties imposed on companies domiciled in the EU for poor environmental performance including inadequate environmental disclosures. Our primary findings reveal that firms with high levels of greenhouse gas (GHG) and hazardous waste emissions are more likely to be met with monetary penalties. On the other hand, firms that score high on environmental disclosures and invest more in green

¹In a recent report of a product safety breach, the Environmental Protection Agency (EPA) accused Volkswagen of installing sophisticated stealth software that enabled 'clean diesel' versions of its Passat, Jetta, Golf and Beetle models to detect when they were being tested and emit less polluting exhaust than they would in real-world driving conditions. The agency indicates that the defeat devices allowed these models to belch out up to 40 times the allowed amounts of harmful fumes in order to improve driving performance. Legal experts say that Volkswagen is likely to face significant legal problems, including criminal charges, to the tune of approximately \$18 billion (Hotten, 2015).

supply chain practices face lesser penalties. We also find that firms with executive compensation linked to environmental performance incur more monetary penalties. This rather conflicting finding may be due to managers' myopic behaviour with respect to short-term performance, which is negatively affected by an increase in CSR investment. This finding adds a new dimension to the voluminous research on executive compensation that has primarily investigated the effects of cash and stock option-based compensation schemes on pay-performance sensitivities.

Existing literature concerning compliance with social and environmental regulations suggests that individuals and firms comply with rules because they either fear detection of violations and punishments, or feel social pressure to comply (Winter and May, 2001). We argue that, while motivation is likely to be important for compliance, motivation alone is insufficient if regulators lack enforcement power. Although some of our results confirm prior expectations, e.g. more penalties for higher GHG and toxic waste emission, we believe that our findings provide insights that may be valuable for countries yet to introduce and/or strengthen the penalty regime. For example, our evidence that imposition of monetary penalties does not necessarily deter poor environmental performance can inform other countries about the usefulness of a penalty regime.

The remainder of this paper proceeds as follows. The following section discusses the regulatory environment of enforcements against violation of the environmental disclosure regulations in the EU. It should, however, be noted that EU regulations do not just embrace compliance with environmental disclosures but also take a broader CSR compliance perspective. The next section reviews the existing literature on environmental compliance and develops the hypotheses. The sample selection process, measurement of variables and research models are specified in the fourth section. The fifth section presents the empirical results, and the last section concludes.

EU Regulations on Compliance with Environmental Disclosure

In the past 30 years, the EU has adopted a substantial and diverse range of environmental regulations to ensure environmental compliance by EU firms. Recently, on 29 September 2014, the EU Council adopted a new directive concerning the disclosure of non-financial and diversity information by large companies and groups. The new directive imposes a 'report or explain' obligation on large companies. The reporting obligation applies to public-interest entities having more than 500 employees, i.e. approximately 6000 large companies and groups across the EU.² The companies concerned are required to disclose in their non-financial reports their existing policies on environmental, social, employee, human rights, anti-corruption and bribery matters, including a description of the outcomes of their policies, relevant non-financial key performance indicators and the main risks related to these matters. The EU legislation covers all environmental sectors, including water, air, nature, waste, noise and chemicals, and others that deal with cross-cutting issues such as environmental impact assessment, access to environmental information, public participation in environmental decision-making and liability for environmental damage.

Historically, Europe has more CSR consistent values, norms and perceptions than other areas of the world (Mullerat, 2013). European corporations have tended to hold stronger and broader approaches to stakeholder relations, and a network is being established to help many companies share and diffuse relevant information about CSR including environmental compliance. In 1999, a European Parliament resolution called for a binding code of conduct to govern EU companies' environmental, labour and human rights compliance world-wide. In the Lisbon Summit 2000, EU heads of state included CSR in the agenda, and the resolution included a commitment to make Europe the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion by 2010. As a consequence, in 2002, the European Parliament voted for new legislation to require companies to publicly report annually on their social and environmental performance, to make board members personally responsible for these practices and to establish legal jurisdiction against European companies' abuses in developing countries.

The UK pioneered the environmental regulations of individual EU countries. In 2000, the UK government appointed a minister for CSR and created pressure on UK companies to disclose more environmental reporting.

²http://ec.europa.eu/finance/company-reporting/non-financial_reporting/index_en.htm

The UK's Climate Change Act of 2008 has created a new approach to managing and responding to climate change. The Act sets legally binding GHG emission reduction targets for 2020 (reducing GHG emissions by 34%), and for 2050 (by at least 80%) (Mullerat, 2013). Later, a number of codes of conduct were introduced in France, Germany, Denmark and Italy to fight against climate change, preserve biodiversity and promote ecological development, among many other objectives.

To ensure effective monitoring and enforcement, the UN Secretary-General proposed an environmental justice system. The proposal suggested an EU court for the most extreme, egregious cases of environmental, social, human or labour rights violations by European-based businesses or their subsidiaries, subcontractors or business partners. A recent report³ published by the European Commission illustrates that a total of 334 environmental violations occurred in 2014, 31% of them relating to waste disposal. The report also indicates that, among the EU member countries, Greece had the highest infringement occurrence, with a total of 36 violations. Because of the cross-country variation in the environmental compliance initiatives in the EU, the preceding discussion provides a good justification for conducting our research using the EU context.

Literature Review and Hypotheses Development

Both legitimacy and reputation theory suggest that firms have an innate propensity to be socially responsible, as this enhances business reputation and stakeholder awareness. Positive CSR practices have been shown to have generated positive performance effects (Cochran and Wood, 1984; McGuire *et al.*, 1988; Nelling and Webb, 2009; Peloza, 2006). Despite the benefits associated with positive CSR, firms often violate CSR, in particular the environmental safety ethos. A possible reason for such violation could be the existence of a market where public attention to CSR engagements, scrutiny of compliance and managerial private benefits may all be lacking (Prior *et al.*, 2008). Prior *et al.* (2008) argue that managers pursue different objectives through CSR activities, such as favourable media coverage, legitimacy from the community and less scrutiny from employees and investors. While McGuire *et al.* (2003) acknowledge that compensation (salary and bonus) is a prime motivating factor to encourage CEOs to focus on CSR activities, they fail to find any significant relationship between compensation and CSR performance. Mahoney and Thorn (2006) find that firms with CSR weaknesses pay larger salaries and have more long-term incentives than those with stronger CSR. Some academic researchers indicate a positive link between CSR and financial performance (Cochran and Wood, 1984; Kim *et al.*, 2012) as well as a favourable impact of CSR on financial reporting quality (Gargouri *et al.*, 2010; Kim *et al.*, 2012; Scholtens and Kang, 2013). However, the managerial opportunism theory suggests that managers engage in CSR activities to conceal corporate misconduct (Hemingway and MacLagan, 2004).

Burby and Paterson (1993) argue that compliance with social and environmental regulations depends on the intent and ability of the regulatee to comply. Scholars argue that compliance is greater where regulated entities think there is a strong likelihood of a fine being imposed for a given violation (Burby and Paterson, 1993). Gunningham *et al.* (2005) suggest that supply chain pressure, managerial styles and the desire for publicity influence environmental and social compliance.

Of the CSR violations, environmental crime pertinent to the violation of environmental compliance has received enormous regulatory scrutiny (Cohen, 1992; McMurry and Ramsey, 1986). Empirical research finds that firms engaged in environmental violations are penalized by both market and governmental enforcements. For example, Karpoff *et al.* (2005) document that environmental law-violating firms suffer significant losses in market value and the losses are of similar magnitude to the legal penalties imposed. Given the significant penalties associated with environmental violations, firms will likely have invested resources in remediating pollution.

Economists have offered a number of theories to explain why profit-driven firms voluntarily engage in costly pollution reduction efforts. Arora and Gangopadhyay (1995) argue that firms want to attract a clientele of 'green consumers', willing to pay more for goods produced in an environmentally friendly way. Voluntary pollution reductions may also deter lobbying by environmental groups for tighter regulatory standards (Maxwell *et al.*,

³<http://ec.europa.eu/environment/legal/law/statistics.htm>

2000), spur tighter environmental standards that raise rivals' costs (Innes and Bial, 2002; Salop and Scheffman, 1983), avoid future environmental liability and/or deter boycotts by environmental interest groups (Baron, 2001; Innes, 2006; Innes and Bial, 2002).

However, voluntary actions alone undertaken by companies to demonstrate environmental compliance have not proved successful. Williamson *et al.* (2006) argue that policies aimed at promoting voluntary actions based on a business case will fail, as such practices are perceived as optional and expensive. Similarly, a study of SMEs' attitudes towards environmental issues found a common theme emerging from interviews that self-regulation will not work – economic interest will always prevail over environmental interests (Tilley, 2000). Evidence supporting the argument that regulatory penalties matter include Muoghalu *et al.* (1990), who find that defendant firms suffered significant losses in lawsuits involving hazardous waste disposal. Laplante and Lanoie (1994) found significant negative market adjustments for Canadian owned firms listed on the NYSE when a suit settlement was announced. Research on the market reaction to the Union Carbide mishap has found a significantly negative reaction to firms operating in the same chemical industry (Blacconiere and Northcut, 1997). Patten (1992b) examines the effect of the *Exxon Valdez* oil spill on the annual report environment disclosure of petroleum firms other than Exxon, and finds a significant increase in environmental disclosure within the industry. This, however, was more pronounced for firms with relatively few environmental disclosures, implying that investors perceived such disclosures as a signal of firms' commitment to mitigating (minimizing) future regulatory costs.

Despite the efforts made by researchers to understand the regulatory implications of environmental violation, evidence so far has been indirect, as is clear from market reaction studies. We incorporate actual monetary penalties (a direct measure of regulatory penalty) in our research setting. Some of the determinants we use in our study have not been investigated before, e.g. investment in environmental compliance (cost of environmental conservation and staff training), green supply chain management and environmental compliance-linked executive bonus schemes. In the following discussion we develop our hypotheses.

Environmental Disclosures and the Amount of Penalties

Recently, corporations have been facing significant compliance pressures for enhanced environmental performance, and corporate involvement in environment-related activities has occasioned both a need and a demand for compliance from society (Wiseman, 1982). Increased environmental disclosures change perceptions and increase firm exposure (Patten, 1992a). Since a firm operates within society, voluntary environmental disclosure legitimizes its environmental management and prevents social and government penalties (Berthelot *et al.*, 2003). Waddock and Graves (1997) show that investors target environmentally admirable companies who do not incur a financial penalty. The findings of Cormier and Magnan (1999) suggest that firms are voluntarily disclosing their level of environmental compliance and initiating policies to address the concerns of investors and other stakeholders. Firms that issue environmental reports intend to meet the information needs of the general public (Simnett *et al.*, 2009), which increases a firm's reputation and reduces litigation risk (Dhaliwal *et al.*, 2011). We hypothesize the following.

H1: The amount of penalties for poor environmental performance is lower for firms with extensive environmental disclosures compared with firms with poor environmental disclosures.

Environmental Compliance-Linked Compensation Policies and the Amount of Penalties

Jensen and Meckling (1976) argue that appropriate compensation for CEOs is one of the most important governance tools for ensuring that management interests are aligned with those of shareholders. However, extant research in general has found managers to be guilty of managing earnings to maximize their compensation (Beneish, 1999; Burns and Kedia, 2006; Efendi *et al.*, 2007). For example, Bartov and Mohanram (2004) find evidence of earnings management leading up to option exercises. Cheng and Warfield (2005) find that stock option exercises and holdings provide incentives for firms to meet or beat earnings targets. Bergstresser and Philippon (2006) find that firms make more aggressive assumptions in their defined benefit pension plans during the period

in which they exercise their options. However, compensating managers in terms of environmental compliance may provide incentives for managers to focus more on long-term value creation by being good corporate citizens instead of concentrating on short-term profit/wealth maximization. Berrone and Gomez-Mejia (2009) argue that, to improve performance, firms should reward their executives for environmental actions that confer greater legitimacy. Monetary incentives in the form of environmental compliance-linked executive compensation could ensure proactive environment management to avoid government fines, negative publicity and potentially huge liability costs (Hunt and Auster, 1990). Such compensation, therefore, reduces the incidence of negative environmental actions and, therefore, monetary penalties. However, such schemes could also promote managerial self-serving interests that lead to over-investments in environmental compliance actions: an outcome detrimental to the interests of stakeholders and likely to create a competitive disadvantage (Bénabou and Tirole, 2010).

H2: *Managerial compensation linked to environmental compliance goals reduces the amount of penalties.*

Supply Chain Strength

Rapid environmental deterioration over the last few decades has dramatically increased consumer awareness of environmental problems. Stakeholders, too, have become more critical towards firms' reactive environmental policies. Therefore, a growing number of companies are developing company-wide environmental programs and green products. For example, reducing packaging and waste, assessing vendors on their environmental performance, developing more eco-friendly products, reducing carbon emissions associated with transport of goods and, in some instances, improving environmental supply have all been seen as beneficial, as these programs can reduce costs and improve organizational performance (Carter *et al.*, 2000). Freestone and McGoldrick (2008) find that consumers are assumed to purchase environmentally friendly products due to a strong self-interest in perceiving themselves as green consumers, and to avoid feeling guilty (Steenhaut and Van Kenhove, 2006). A non-green supply chain could incur costs, not only through the loss of sales but also through the imposition of huge litigation fees and the reduction of manufacturing output (Sanchanta and Takahasi, 2010). Sarkis *et al.* (2011) posit that a green supply chain reduces both the risk of higher costs from fines and the risk of lower sales due to reputation loss and changes in consumer preference. Using small and medium-scale enterprises, Starcher (2005) refers to statistics indicating that over half of UK retailers have codes of conduct for their suppliers and further claims that '...supply chain pressures are proving to be a more powerful force for social and environmental change than local regulation' (p. 23). Supply chain pressure was found to be the most effective driver for environmental change in a study of SMEs in Hong Kong (Studer *et al.*, 2008). However, Jørgensen and Knudsen (2006) argue that many suppliers viewed these environmental compliance-related buyer requirements as an additional administrative burden, resulting in a box-ticking approach. We argue that firms initiating green supply chain environmental policy have a lower risk of environmental violation and, hence, are less likely to be penalized. Therefore, we hypothesize as follows.

H3: *Green supply chain management policies reduce the amount of penalties for poor environmental performance.*

GHG Emission, Hazardous Waste Issues and Regulatory Penalties

There is growing scientific evidence of the effects of GHG emissions on global warming (Lashof and Ahuja, 1990; Mohajan, 2011). Given the ubiquitous nature of GHGs, it is natural to expect that companies violating the GHG emission limit will face regulatory penalties. The reporting of GHG emissions is not standardized and exists, largely, as a voluntary activity (Federation of European Accountants, 2009). Some scholars even argue that 'climate change disclosure is still in a primitive stage of development' (Smith *et al.*, 2008, p. 470). Stafford (2002, 2003) examines the impact of a revised penalty policy for hazardous waste regulation and finds a significant increase in penalties post-regulation. Alberini and Austin (1999) analyse the pattern of spills and accidents involving chemicals

and evidence that strict liability rules were associated with reductions in the severity and frequency of toxic releases, but the effect varied by firm size. We hypothesize as follows.

H4: *GHG emissions, hazardous waste and disposal of more toxic waste increase the amount of monetary penalties.*

CSR Investments and Monetary Penalties

Although highly desirable, CSR investments, including environmental compliance initiatives, are costly, and there remain divergent views on the desirability of such investments. Proponents argue that CSR involvement generates a number of benefits as discussed above, and inadequate engagement in CSR may endanger organizational legitimacy (Kondra and Hinings, 1998; Salancik and Pfeffer, 1978). Opponents, however, argue that CSR involvement, e.g. an environmental compliance initiative, is a waste of scarce resources and hence is detrimental to shareholders' interests (Bénabou and Tirole, 2010; Friedman, 1970; Preston and O'Bannon, 1997). Despite these alternative perspectives, there appears to be a consensus that CSR investments are value generating in the long run. McWilliams and Siegel (2001) develop a simple theoretical model in which two firms sell identical goods, except that one company decides to add an additional CSR-targeted feature to its product, expecting this feature to be valued by some consumers. This firm-based model proposes that managers conduct a cost-benefit analysis to determine the level of resources to devote to CSR activities. Firms with a relatively large investment in positive CSR activities, e.g. prevention of pollution, investing in R&D for solutions to environment-friendly product development and implementing an environmental management system, demonstrate good corporate citizenship. Positive CSR activities, in turn, reduce environmental offences and meet with lower monetary penalties. We develop the following hypothesis.

H5: *Larger investment in CSR is likely to reduce the amount of penalties for poor environmental performance.*

Since the main objective of regulatory enforcement is to deter firms from engaging in environmental offences in the future, it is important to consider the behaviour of firms after the imposition of monetary penalties. Prior research provides mixed evidence on this important issue. Magat and Viscusi (1990) examine plant compliance with water pollution regulations in the US pulp and paper industry between 1982 and 1985 and find that an increase in inspection increases firms' compliance with regulation. Similar evidence is reported by Laplante and Rilstone (1996), who use data from plants in the pulp and paper industry in Quebec. However, Helland (1998) analyses the US pulp and paper industry with respect to water pollution regulation and finds that *compliance rates are not affected by the inspections*. However, the evidence suggests that non-compliance appears to encourage inspections. Stretesky *et al.* (2013) suggest that the relationship between penalties (EPA-administered monetary penalties) and toxic releases is weak at best. Lavelle and Coyle (1992) examine the US EPA enforcement for potential race and class bias, and evidence that the average fine for violating federal environmental laws was higher in white, compared with minority, zones.⁴ If actual monetary penalties are effective in making firms comply with regulations, then we should observe positive environmental compliance behaviour post-sanction. We develop the following hypothesis.

H6: *Imposition of monetary penalties in the current period improves environmental compliance in the future as reflected in a lower amount of future penalties.*

⁴Other studies that do not directly examine the determinants of monetary penalties include that by Gray and Deily (1996), who find little evidence that firm characteristics are associated with the enforcement of air pollution regulations and a firm's compliance decisions. Using a sample of the 329 largest companies in the UK, Liao *et al.* (2014) evidence that board gender diversity and an independent environmental committee enhance GHG emission disclosure. Finally, Wang *et al.* (2014) find a positive correlation between GHG emission and future performance for a sample of 69 Australian public companies. This finding is inconsistent with the theoretical prediction of a negative association between the two.

Research Method

Research Design

We estimate the following regression specifications to examine the possible determinants of monetary penalties (test of H1–H5). We use two different measures of penalties for poor environmental performance as our dependent variables: the natural logarithm of environmental fines imposed for violations (LN_FINE) (log of actual fine amounts reported in million Euros) and a dummy variable coded 1 for observations with environmental fines, and 0 otherwise (FINE_D).

$$\begin{aligned} \text{LN_FINE}_{i,t} = & \gamma_0 + \gamma_1 \text{E_SCORE}_{i,t} + \gamma_2 \text{ESG_BONUS}_{i,t} + \gamma_3 \text{ENV_SUPMGT}_{i,t} + \gamma_4 \text{LN_GHG}_{i,t} \\ & + \gamma_5 \text{LN_WASTE}_{i,t} + \gamma_6 \text{LN_HAZARD}_{i,t} + \gamma_7 \text{CSR_INVEST}_{i,t} + \gamma_8 \text{SIZE}_{i,t} + \gamma_9 \text{ROA}_{i,t} \\ & + \gamma_{10} \text{MTB}_{i,t} + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} \text{LN_FINE}_{i,t} = & \gamma_0 + \gamma_1 \text{E_SCORE}_{i,t} + \gamma_2 \text{ESG_BONUS}_{i,t} + \gamma_3 \text{ENV_SUPMGT}_{i,t} + \gamma_4 \text{LN_GHG}_{i,t} \\ & + \gamma_5 \text{SIZE}_{i,t} + \gamma_6 \text{ROA}_{i,t} + \gamma_7 \text{MTB}_{i,t} + \varepsilon \end{aligned} \quad (2)$$

$$\begin{aligned} \text{FINE_D}_{i,t} = & \gamma_0 + \gamma_1 \text{E_SCORE}_{i,t} + \gamma_2 \text{ESG_BONUS}_{i,t} + \gamma_3 \text{ENV_SUPMGT}_{i,t} + \gamma_4 \text{LN_GHG}_{i,t} \\ & + \gamma_5 \text{LN_WASTE}_{i,t} + \gamma_6 \text{LN_HAZARD}_{i,t} + \gamma_7 \text{CSR_INVEST}_{i,t} + \gamma_8 \text{SIZE}_{i,t} + \gamma_9 \text{ROA}_{i,t} \\ & + \gamma_{10} \text{MTB}_{i,t} + \varepsilon \end{aligned} \quad (3)$$

$$\begin{aligned} \text{FINE_D}_{i,t} = & \gamma_0 + \gamma_1 \text{E_SCORE}_{i,t} + \gamma_2 \text{ESG_BONUS}_{i,t} + \gamma_3 \text{ENV_SUPMGT}_{i,t} + \gamma_4 \text{LN_GHG}_{i,t} \\ & + \gamma_5 \text{SIZE}_{i,t} + \gamma_6 \text{ROA}_{i,t} + \gamma_7 \text{MTB}_{i,t} + \varepsilon \end{aligned} \quad (4)$$

Equations (1) and (3) regress the dependent variable on one independent variable at a time. Equations (2) and (4) are comprehensive models that include the determinants of penalties in a single specification. Given a high correlation among LN_GHG, LN_WASTE and LN_HAZARD, we only include LN_GHG in our regression specifications. Our results remain qualitatively similar if we include either LN_WASTE or LN_HAZARD. We do not include CSR_INVEST in the comprehensive model because there are only 223 valid observations available for this variable.

E_SCORE is the score based on the extent of a company's environmental disclosures. The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg. ESG_BONUS is a dummy variable coded 1 if the executive compensation is linked with environmental compliance goals and 0 otherwise, ENV_SUPMGT is a dummy variable coded 1 if the company has implemented any initiatives to reduce the environmental footprint of its supply chain and 0 otherwise, LN_GHG is the natural logarithm of greenhouse gas emission in million tons, LN_WASTE is the log value of the total amount of waste the company discards both hazardous and non-hazardous in thousands of metric tons, LN_HAZARD is the log value of the amount of hazardous waste the company discards in thousands of metric tons and CSR_INVEST is the log value of the cost of environmental conservation and other environmental initiatives undertaken during the normal course of business during the financial year. We expect the coefficients γ_1 , γ_3 and γ_5 to be negative and γ_4 to be positive in the regression equation (2). Consistent with the competing arguments developed for H2, we do not predict the sign and significance of ESG_BONUS.

We also control for a number of firm-specific variables. We control firm size (SIZE), measured as the natural logarithm of total assets, as larger companies, presumably due to visibility concerns, would engage less in environmental violations. Alternatively, given the scale of their operations, it might be that larger firms would be involved in

greater environmental violations. We include firm profitability and growth opportunities proxied by ROA and MTB respectively, as non-directional control variables. We argue that firms with higher profitability (ROA) are potentially more likely to invest in environmental compliance activities, owing to their better financial performance and, therefore, we expect a negative association with LN_FINE. Firms with better growth opportunities (MTB) may embrace positive environmental compliance activities because of their need to tap external resources to finance the growth opportunities.

Firms from industries with a bad reputation for environmental compliance can be expected to receive higher amounts of penalties (Kagan and Scholz, 1984; Peters and Romi, 2013), and therefore we control different industries in the regression model. Jenkins and Yakovleva (2006) note that companies operating in environmentally sensitive industries such as mineral extraction, oil & gas, chemicals and forestry are more likely to provide social and environmental disclosures. King and Lenox (2000) identify that chemical industries have a bad reputation due to a higher rate of emission and toxicity.

To test H6, we develop the following regression specifications:

$$E_SCORE_{i,t+1} = \gamma_0 + \gamma_1 LN_FINE_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 ROA_{i,t} + \gamma_4 MTB_{i,t} \quad (5a)$$

$$ESG_BONUS_{i,t+1} = \gamma_0 + \gamma_1 LN_FINE_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 ROA_{i,t} + \gamma_4 MTB_{i,t} \quad (5b)$$

$$ENV_SUPMGT_{i,t+1} = \gamma_0 + \gamma_1 LN_FINE_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 ROA_{i,t} + \gamma_4 MTB_{i,t} \quad (5c)$$

$$LN_GHG_{i,t+1} = \gamma_0 + \gamma_1 LN_FINE_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 ROA_{i,t} + \gamma_4 MTB_{i,t} \quad (5d)$$

$$LN_HAZARD_{i,t+1} = \gamma_0 + \gamma_1 LN_FINE_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 ROA_{i,t} + \gamma_4 MTB_{i,t} \quad (5e)$$

$$LN_WASTE_{i,t+1} = \gamma_0 + \gamma_1 LN_FINE_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 ROA_{i,t} + \gamma_4 MTB_{i,t} \quad (5f)$$

$$CSR_INVEST_{i,t+1} = \gamma_0 + \gamma_1 LN_FINE_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 ROA_{i,t} + \gamma_4 MTB_{i,t} \quad (5f)$$

Dependent variables are one-year-ahead values. Variables are defined as before.

Sample

We start with an initial sample of 5249 firm-year observations over the years 2004–2014 from the European 500 Index taken from Bloomberg. The Bloomberg database consists of financial and non-financial information including business market news. Bloomberg has global coverage on 10 major sectors and over 130 industries with in-depth analysis and data sets on industries, companies and credit, government, economic, litigation and non-financial reporting practices. Our sample period starts in 2004 since reporting of penalties in Euros began from 2004

onwards. Our choice of the EU setting is driven by the fact that the EU is argued to have instituted the most extensive environmental laws (Jordan, 2012). The European 500 index includes 16 different countries. Although the database comprises 5249 firm-year observations during this sample period, most of the relevant data fields are missing, which introduces a selection bias to our sample selection. We compared the average size (log of the total assets) of the firm-year observations with non-missing penalty data with observations that did not report any values. Untabulated results reveal that the former group is significantly larger (average size is 10.15) than the latter group (average size is 9.31), a difference that is significant, $p < 0.001$ (t -statistic 8.38). The former group is also more leveraged than the latter group (t -statistic 1.82, $p < 0.10$) but has fewer growth opportunities (t -statistic 2.27).

However, we could only conduct regression analyses using the non-missing data, hence we started with the number of maximum observations available under the 'fines' column. We deleted all missing observations, because these imply that Bloomberg did not cover these entities or, even if they did, the fine amount was missing, either because the companies in question were not being sanctioned (a 0 should then have appeared) or no data at all was reported (a N/A should have appeared). However, Bloomberg reported N/A in all these missing data fields. A total of 4501 firm-year observations with missing monetary penalty data were deleted, leaving a final sample size of 748 firm-year observations. Our sample comes from 13 different industry categories. The hardware & software industry has the largest representation in our sample (a total of 123 firm-year observations). Banks & financial institutions are included in our sample because of their financing role in green investment. Consistent with Wilmshurst and Frost (2000), we identify firms from automobile, metal & mining, chemical, oil & gas, manufacturing goods, energy, consumer goods and real estate industries as environmentally sensitive. Table 1 shows further details of the country and industry-wise sampling spread.

Results

Descriptive Analysis

Table 2 Panel A presents descriptive statistics for all the variables used in this research. Descriptive statistics reveal that about 43% of the firm-year observations in our database received monetary penalties. The average penalty was 0.63 million Euro. The average environmental disclosure score (E_SCORE) is 46.89, with a large variation among sample observations, as is evident from a high standard deviation. This score ranges from 0 to 100, with higher scores representing greater disclosures. Eighty-two per cent of the firm-year observations had policies in place to reduce environmental footprints along the supply chain, while only 18% of the firm-year observations had bonus schemes in place that were linked to firms' ESGs. Average GHG, WASTE and HAZARD amounted to 88 854, 8488 and 380.64 thousand metric tons respectively. Sample firms are large, moderately profitable (an average ROA of 5%) and high-growth firms (average MTB ratio is 2.59).

Correlation Analysis.

Table 2 Panel B reports the results of bivariate correlation analysis. The correlation between LN_FINE and E_SCORE is significantly positive (0.10, $p < 0.01$). Environmental compliance-linked executive compensation (ESG_BONUS) is positively correlated with LN_FINE (0.06, $p < 0.10$). Both these findings seem counterintuitive, since higher E_SCORE and the existence of ESG_BONUS signal proactive initiatives and hence should result in fewer penalties. The amounts of penalties are lower when firms initiate environmental compliance with their supply chain network (ENV_SUPMGT) (−0.17, $p < 0.01$). Also, the correlation between greenhouse gas emission (LN_GHG) and LN_FINE is positive (coefficient = 0.19, $p < 0.01$), consistent with expectation.

Mean Difference Test

Table 2 Panel C reports differences in variables between firms penalized for environmental violation (FINE = 1) and non-penalized firms (FINE = 0). The results show that firms receiving penalties emit higher levels of GHGs, and dispose more toxic and hazardous waste. Firms receiving monetary penalties for poor environmental performance

Panel A. Industry-wise sample distribution

SIC ⁶	Industry name	Frequency	Proportion
0001	Automotive	33	0.04
0002	Metal & mining	36	0.05
0003	Banks & financial institutions	86	0.11
0004	Chemical and oil & gas	72	0.10
0005	Manufacturing goods	55	0.07
0006	Energy	63	0.08
0007	Pharmaceuticals & biotechnology	65	0.09
0008	Consumer goods	93	0.12
0009	Hardware & software	123	0.16
0010	Media	11	0.01
0011	Real estate	38	0.05
0012	Retail	12	0.02
0013	Miscellaneous	61	0.08
	Total	748	1.00

Panel B. Countrywide sample distribution

Country	Observations	% of firm years
UK	238	0.32
Germany	43	0.06
Spain	71	0.09
France	110	0.15
Finland	29	0.04
Sweden	42	0.06
Norway	13	0.02
Belgium	3	0.00
Switzerland	56	0.07
Italy	79	0.11
Portugal	11	0.01
Netherlands	37	0.05
Greece	2	0.00
Austria	14	0.02
Total	748	1.00

Table 1. Industry and country distribution

⁶Sector Identification Codes (SICs) are manually matched across different countries based on the industry name.

make more CSR-related investments (t -statistic of difference in mean 5.71, $p < 0.01$). There is no significant difference in E_SCORE between the penalized and non-penalized firms.

Regression Results

Table 3 reports the results for Equations (1) and (2). Our dependent variable is LN_FINE. We include one independent variable at a time in testing Equation (1) and report the results in Table 3 Columns (1)–(7). The regression result of the comprehensive model is presented in Column (8).

Column (1) reveals a positive and significant association (0.035, t -statistic = 2.11, $p < 0.05$) between LN_FINE and E_SCORE, suggesting that firms with more environmental disclosures receive higher monetary penalties for poor environmental performance compared with firms with poor environmental disclosures. The finding may be consistent with the impression management literature, which argues that compliance is often motivated, constructed and maintained through the use of ‘symbolic actions’ (Dowling and Pfeffer, 1975). Bansal and Kistruck (2006) posit that firms use impression management in the presence of stakeholders’ expectation to maintain an appearance of action

Panel A. Descriptive statistics										
Variable	N	Mean	S.D.	0.25	Median	0.75	(7)	(8)	(9)	(10)
LN_FINE	748	4.72	5.64	38.75	47.32	55.81				
FINE (million Euro)	748	0.63	5.00	0.00	0.00	0.03				
FINE_D	748	0.43	0.50	0.00	0.00	1.00				
E_SCORE	748	46.89	13.48	38.76	52.48	55.81				
ESG_BONUS	748	0.18	0.38	0.00	0.00	0.00				
ENV_SUPMGT	748	0.82	0.39	1.00	1.00	1.00				
LN_GHG	748	13.59	2.48	11.64	13.47	15.34				
LN_WASTE	748	11.5	3.06	9.41	11.2	13.05				
LN_HAZARD	748	8.66	2.72	7.22	8.85	10.75				
CSR_INVEST	223	3.93	2.14	2.64	3.99	5.24				
SIZE	748	10.15	1.69	8.89	10.12	11.24				
ROA	748	0.05	0.07	0.01	0.04	0.08				
MTB	748	2.59	2.13	1.14	1.95	3.17				
Panel B. Correlation analysis										
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
LN_FINE (1)	1.00									
FINE_D (2)	0.32	1.00								
E_SCORE(3)	0.10	0.02	1.00							
ESG_BONUS(4)	0.06*	0.06*	−0.07*	1.00						
ENV_SUPMGT(5)	−0.17	−0.11	0.26	0.06*	1.00					
LN_GHG(6)	0.19	0.26	0.34	0.15	0.00	1.00				
LN_WASTE(7)	0.29	0.28	0.42	0.04	−0.06*	0.36	1.00			
LN_HAZARD(8)	0.08**	0.34	0.36	0.08**	−0.05	0.37	0.59	1.00		
SIZE(10)	0.17	0.06*	0.36	−0.05	0.08**	0.19	0.13	0.10	1.00	
MTB(11)	−0.14	−0.10	−0.09**	−0.07*	0.02	0.00	0.02	−0.02	−0.26	1.00
ROA(12)	−0.06*	−0.02	−0.07*	−0.01	−0.06*	−0.01	0.04	0.02	−0.27	0.51
Panel C. Mean comparison										
Variables	FINE =1	FINE =0	t-test	N						
E_SCORE	52.27	51.11	1.51	748						
LN_GHG	15.28	12.32	17.11***	748						
LN_WASTE	13.17	10.41	13.57***	748						
LN_HAZARD	9.59	7.75	7.75***	748						
CSR_INVEST	4.57	2.76	5.71***	223						
SIZE	10.26	10.05	1.61	748						
ROA	0.05	0.05	0.45	748						

(Table 2 continued)

Panel A. Descriptive statistics					
Variable	N	Mean	S.D.	0.25	0.75
MTB	2.38	2.78	−2.64**	748	

Table 2. Descriptive statistics, correlation analysis and univariate test

Variable definition: LN_FINE, log value for the total amount of environmental fines paid by the company in the period, in millions; E_SCORE, score based on the extent of a company's environmental disclosures (the score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg); ESG_BONUS, executive compensation linked with environmental compliance goals, a value assigned as '1', otherwise '0'; ENV_SUPMGT indicates the company has implemented any initiatives to reduce the environmental footprint of its supply chain, a value assigned as '1', otherwise '0'; LN_GHG, log value of greenhouse gas emission in million tons; LN_WASTE, log value of total amount of waste the company discards, both hazardous and non-hazardous, in thousands of metric tons; LN_HAZARD, log value of the amount of hazardous waste the company discards, in thousands of metric tons; CSR_INVEST, cost of environmental conservation and other environmental initiatives undertaken during the normal course of business during the financial year; SIZE, log value of firm total assets; MTB, ratio of firm's market to book value; ROA, proportion of firm's net income to total assets.

Bold are significant at $p < 0.01$.

**, and *Significant at $p < 0.05$ and $p < 0.10$ respectively.

Correlation analysis is based on the full sample of 745 firm-year observations. Untabulated correlation between LN_FINE and CSR_INVEST (a sample size of 223 firm-year observations) reveals a highly significant positive correlation (correlation 0.47, $p < 0.01$).

Univariate test among variables of interest portioned on the basis of penalized (FINE_D = 1) or not penalized (FINE_D = 0).

$\text{LN_FINE}_{i,t} = \gamma_0 + \gamma_1 \text{ESCORE}_{i,t} + \gamma_2 \text{ESG_BONUS}_{i,t} + \gamma_3 \text{ENV_SUPMGT}_{i,t} + \gamma_4 \text{LN_GHG}_{i,t} + \gamma_5 \text{LN_WASTE}_{i,t} + \gamma_6 \text{LN_HAZARD}_{i,t} + \gamma_7 \text{CSR_INVEST}_{i,t} + \gamma_8 \text{SIZE}_{i,t} + \gamma_9 \text{ROA}_{i,t} + \gamma_{10} \text{MTB}_{i,t} + \varepsilon$								
$\text{LN_FINE}_{i,t} = \gamma_0 + \gamma_1 \text{E_SCORE}_{i,t} + \gamma_2 \text{ESG_BONUS}_{i,t} + \gamma_3 \text{ENV_SUPMGT}_{i,t} + \gamma_4 \text{LN_GHG}_{i,t} + \gamma_5 \text{SIZE}_{i,t} + \gamma_6 \text{ROA}_{i,t} + \gamma_7 \text{MTB}_{i,t} + \varepsilon \quad (2)$								
Variables	(1) LN_FINE	(2) LN_FINE	(3) LN_FINE	(4) LN_FINE	(5) LN_FINE	(6) LN_FINE	(7) LN_FINE	(8) LN_FINE
E_SCORE	0.035** [2.11]	—	—	—	—	—	—	0.004*** [2.62]
ESG_BONUS	—	1.780*** [3.49]	—	—	—	—	—	0.018 [0.44]
ENV_SUPMGT	—	—	−1.547*** [−3.15]	—	—	—	—	−0.110*** [−2.79]
LN_GHG	—	—	—	1.415*** [14.07]	—	—	—	0.008* [1.70]
LN_HAZARD	—	—	—	—	0.856*** [9.99]	—	—	—
LN_WASTE	—	—	—	—	—	0.779*** [7.38]	—	—
CSR_INVEST	—	—	—	—	—	—	0.993*** [4.29]	—
SIZE	0.928*** [6.20]	0.876*** [6.35]	0.856*** [6.21]	−0.015 [−0.10]	0.469*** [3.15]	1.162*** [6.31]	1.195*** [2.94]	0.013 [1.20]
MTB	−0.399*** [−3.69]	−0.388*** [−3.62]	−0.389*** [−3.55]	−0.207** [−2.07]	−3.23*** [−3.15]	−0.219* [−1.69]	−0.659 [0.30]	−0.008 [−1.03]
ROA	−7.739*** [−2.21]	−6.630* [−1.89]	−7.713*** [−3.51]	−4.211* [−1.81]	−4.575* [−1.83]	−10.498* [−1.75]	−5.224 [−0.81]	−0.063 [−0.25]
Constant	−3.136 [−0.83]	−3.601 [−0.96]	−2.470 [−0.65]	−17.847*** [−7.73]	−10.344*** [−4.60]	−11.482*** [−4.22]	−3.060 [−0.65]	−0.184 [−0.62]
Industry FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	748	748	748	748	748	748	223	748
Adj. R ²	0.26	0.28	0.27	0.49	0.37	0.34	0.46	0.61

Table 3. Regression analysis of the determinants of the amount of penalties

Robust t-statistics in brackets.

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$

Variable definitions in Panel A, Table 2.

in a way that is consistent with social value and norm. Similarly, Marquis and Qian (2013) evidence that firms use CSR reporting as a symbolic practice without significant substance. Barnea and Rubin (2010) argue that environmental disclosure could be a source of agency costs, because a firm's insiders have an incentive to incur investments in environmental disclosures beyond financially optimal levels in order to gain reputational benefits.

With respect to H2, we find a significantly positive association between the amount of penalties and ESG_BONUS (1.780, t -statistic = 3.49, $p < 0.001$). This finding is contrary to H2. However, our findings appear to be consistent with those of McGuire *et al.* (2003), who argue that long-term incentives in the form of ESG-linked bonuses are risky in terms of payoffs, and are usually suppressed by financial performance pressure in the short run. CEOs are concerned with maximizing their wealth, and sacrifice the long-term benefits to be derived from environmental compliance. Berrone and Gomez-Mejia (2009) consider such schemes as 'symbolic', as they find that firms with an explicit environmental pay policy do not reward environmental strategies more than firms without such an explicit policy.

In regards to H3, we find that a green supply chain management policy (ENV_SUPMGT) has a negative association with monetary penalties (−1.547, t -statistic = −3.15, $p < 0.01$). The result is consistent with existing research, which suggests that environmental compliance within the corporate supply chain enhances the production of superior-quality products (Green *et al.*, 1996; Pil and Rothenberg, 2003), and hence reduces environmental risk (Green *et al.*, 1996). Consistent with our expectation (H4), we find that the coefficients on LN_GHG, LN_HAZARD and LN_WASTE are significantly positive (Columns (4)–(6)). This is confirming prior expectations that firms that visibly harm the environment are penalized more than firms that do less harm to the environment. Finally, we investigate whether CSR investment (CSR_INVEST) is likely to reduce monetary penalties, and find a positive association between LN_FINE and CSR_INVEST (0.993, t -statistic = 4.29, $p < 0.01$). The result is contrary to our hypothesized negative association between the two. A plausible reason for this counterintuitive finding may be the fact that investments to ensure sustainable environmental compliance are often long term and irreversible in nature (Bansal and Kistruck, 2006). Therefore, a positive association does not necessarily reflect the failure of CSR investments.

Column (8) presents a more comprehensive analysis of the determinants of monetary penalties for poor environmental performance by including E_SCORE, ESG_BONUS, ENV_SUPMGT and LN_GHG in the same regression model. We do not include CSR_INVEST because of the small number of valid observations. Results reveal the coefficients on ENV_SUPMGT to be negative and significant (−0.11, $p < 0.01$), whilst that on LN_GHG is positive and significant (0.008, $p < 0.10$). Untabulated results show positive and significant coefficients on LN_HAZARD and LN_WASTE when included in the model instead of LN_GHG (coefficients 0.04 and 0.02 respectively, both significant at $p < 0.01$). The coefficient on E_SCORE is positive and significant (0.004, $p < 0.01$), consistent with the result in Column (1). The coefficient on ESG_BONUS, though positive, is insignificant in the multiple regression models.

As mentioned in the research design section, we use two proxies for monetary penalties: actual monetary penalties, and a dummy variable denoting whether companies are sanctioned or not irrespective of the actual penalty amount. We report results using the latter measure in Table 4. Since the dependent variable is a binary variable, we use logistic regression estimation. We use FINE_D as the dependent variable and use the same set of independent variables to test H1–H5. We only provide results based on the comprehensive model in Column (8). We find negative and significant coefficients on E_SCORE (−0.017, z -statistic = −2.25, $p < 0.05$) and ENV_SUPMGT (−0.362, z -statistic = −1.70, $p < 0.10$). On the other hand, the coefficient on LN_GHG is positive and statistically highly significant (0.378, z -statistic = 7.38, $p < 0.01$). The coefficient on ESG_BONUS, although positive, is insignificant. Taken together, our logistic regression results are generally consistent with the OLS results.

Changes in Firm Behaviour After the Imposition of Penalties for Poor Environmental Performance

Table 5 reports the regression result for H6. We hypothesized that if regulation, in our case the imposition of monetary penalties, is effective in curbing poor environmental performance, then firms would take actions to improve environmental compliance performance in the subsequent periods. However, we note with concern that the variables representing environmental degradation, LN_GHG_{*t+1*}, LN_HAZARD_{*t+1*} and LN_WASTE_{*t+1*}, continue to document an increasing trend following the imposition of monetary penalties (coefficients 1.15, 0.75 and 1.74 with associated t -statistics of 2.74, 3.43 and 4.83 respectively, all significant at $p < 0.01$). Our findings cast doubt on the effectiveness of regulatory enforcements in the EU with respect to forcing companies to comply with

$\text{FINE}_{i,t} = \gamma_0 + \gamma_1 \text{EScore}_{i,t} + \gamma_2 \text{ESGBonus}_{i,t} + \gamma_3 \text{ENVSupMgt}_{i,t} + \gamma_4 \text{LNHG}_{i,t} + \gamma_5 \text{LNWaste}_{i,t} + \gamma_6 \text{LNHAZARD}_{i,t} + \gamma_7 \text{CSRInvest}_{i,t} + \gamma_8 \text{SIZE}_{i,t} + \gamma_9 \text{ROA}_{i,t} + \gamma_{10} \text{MTB}_{i,t} + \varepsilon$							
$\text{FINE_D}_{i,t} = \gamma_0 + \gamma_1 \text{E_Score}_{i,t} + \gamma_2 \text{ESG_BONUS}_{i,t} + \gamma_3 \text{ENV_SUPMGT}_{i,t} + \gamma_4 \text{LN_GHG}_{i,t} + \gamma_5 \text{SIZE}_{i,t} + \gamma_6 \text{ROA}_{i,t} + \gamma_7 \text{MTB}_{i,t} + \varepsilon$							
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FINE_D	FINE_D	FINE_D	FINE_D	FINE_D	FINE_D	FINE_D
E_SCORE	-0.017** [-2.04]	-	-	-	-	-	-0.017** [-2.25]
ESG_BONUS	-	0.700** [2.76]	-	-	-	-	0.332 [1.51]
ENV_SUPMGT	-	-	-0.540** [-2.24]	-	-	-	-0.362* [-1.70]
LN_GHG	-	-	-	0.808*** [8.96]	-	-	0.378*** [7.38]
LN_HAZARD	-	-	-	-	0.358*** [5.89]	-	-
LN_WASTE	-	-	-	-	-	0.419*** [7.52]	-
CSR_INVEST	-	-	-	-	-	-	-
SIZE	0.306*** [4.06]	0.288*** [4.11]	0.257*** [3.74]	0.247** [2.09]	0.398*** [3.98]	0.105 [1.27]	0.046 [0.98]
MTB	-0.192*** [-3.25]	-0.181*** [-3.07]	-0.188*** [-3.16]	-0.075 [-1.50]	-0.068 [-0.91]	-0.171** [-2.65]	-0.133*** [-2.90]
ROA	-3.051* [-1.82]	-2.566 [-1.51]	-2.912* [-1.73]	-0.041 [-0.01]	-5.771* [-1.74]	-1.22 [-0.63]	0.880 [0.65]
Constant	-15.951 [-0.02]	-16.647 [-0.03]	-14.667 [-0.03]	-12.088*** [-6.59]	-8.089*** [-5.23]	-7.18*** [-5.23]	0.004 [-0.01]
Industry FE	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes	yes
Observations	748	748	748	748	748	748	748
Pseudo R ²	0.21	0.23	0.21	0.40	0.27	0.30	0.09

Table 4. Logistic regression of the determinants of penalties

Robust t-statistics in brackets.

*** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$

Variable definitions in Panel A, Table 2.

$$\begin{aligned} \text{E_SCORE}_{i,t+1} &= \gamma_0 + \gamma_1 \text{LN_FINE}_{i,t} + \gamma_2 \text{SIZE}_{i,t} + \gamma_3 \text{ROA}_{i,t} + \gamma_4 \text{MTB}_{i,t} \quad (5a) \\ \text{ESG_BONUS}_{i,t+1} &= \gamma_0 + \gamma_1 \text{LN_FINE}_{i,t} + \gamma_2 \text{SIZE}_{i,t} + \gamma_3 \text{ROA}_{i,t} + \gamma_4 \text{MTB}_{i,t} \quad (5b) \\ \text{ENV_SUPMGT}_{i,t+1} &= \gamma_0 + \gamma_1 \text{LN_FINE}_{i,t} + \gamma_2 \text{SIZE}_{i,t} + \gamma_3 \text{ROA}_{i,t} + \gamma_4 \text{MTB}_{i,t} \quad (5c) \\ \text{LN_GHG}_{i,t+1} &= \gamma_0 + \gamma_1 \text{LN_FINE}_{i,t} + \gamma_2 \text{SIZE}_{i,t} + \gamma_3 \text{ROA}_{i,t} + \gamma_4 \text{MTB}_{i,t} \quad (5d) \\ \text{LN_HAZARD}_{i,t+1} &= \gamma_0 + \gamma_1 \text{LN_FINE}_{i,t} + \gamma_2 \text{SIZE}_{i,t} + \gamma_3 \text{ROA}_{i,t} + \gamma_4 \text{MTB}_{i,t} \quad (5e) \\ \text{CSR_INVEST}_{i,t+1} &= \gamma_0 + \gamma_1 \text{LN_FINE}_{i,t} + \gamma_2 \text{SIZE}_{i,t} + \gamma_3 \text{ROA}_{i,t} + \gamma_4 \text{MTB}_{i,t} \quad (5f) \\ \text{CSR_INVEST}_{i,t+1} &= \gamma_0 + \gamma_1 \text{LN_FINE}_{i,t} + \gamma_2 \text{SIZE}_{i,t} + \gamma_3 \text{ROA}_{i,t} + \gamma_4 \text{MTB}_{i,t} \quad (5g) \end{aligned}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	E_SCORE _{t+1}	ESG_BONUS _{t+1}	ENV_SUPMGT _{t+1}	LN_GHG _{t+1}	LN_HAZARD _{t+1}	LN_WASTE _{t+1}	CSR_INVEST _{t+1}
LN_FINE	-1.453 [-1.37]	-0.015 [-0.33]	-0.060 [-1.58]	1.153*** [2.74]	0.750*** [3.43]	1.739*** [4.83]	0.595*** [3.23]
SIZE _t	2.620*** [11.26]	-0.021** [-2.03]	0.012 [1.16]	0.400*** [4.28]	0.167*** [3.44]	0.230*** [2.88]	0.819*** [5.50]
MTB _t	0.068 [0.36]	-0.003 [-0.29]	-0.346 [-1.46]	0.226*** [2.69]	0.094** [2.15]	0.056 [0.78]	-3.681 [-1.09]
ROA _t	22.902*** [3.94]	-0.330 [-1.17]	0.012* [1.74]	-0.865 [-0.33]	2.449* [1.82]	3.670* [1.66]	0.195** [2.31]
Constant	4.284 [0.53]	0.162 [0.42]	0.511*** [3.28]	-4.969 [-1.40]	-0.707 [-0.38]	-1.527 [-0.50]	-4.590** [-2.51]
Industry FE	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes	yes
Observations	551	551	551	551	551	551	182
Adjusted R ²	0.42	0.08	0.14	0.16	0.14	0.18	0.69

Table 5. Monetary penalties and subsequent environmental compliance behaviour

Robust *t*-statistics in brackets.

****p* < 0.01

***p* < 0.05

**p* < 0.10

Variable definitions in Panel A, Table 2.

environmental regulations (at least in our sample). However, a caveat is in order. The sanction does not necessary imply a change in organizations' behaviour in the very next period, since any such changes need time to take effect and thus the effect may occur in future periods beyond one year. Hence, it might be useful to investigate the impact of monetary penalties on environmental compliance over a longer time horizon. However, we are unable to do this because of a rather small sample size. We therefore leave it for future research.

Additional Analysis

Industry Affiliation and Monetary Penalties

Our baseline sample includes cases from financial institutions (e.g. banks, investment funds, insurance companies) (*n* = 86). However, poor environmental compliance by firms from these sectors is less of a concern because of the nature of their business operations. We therefore reran our regression equations (1)–(4) excluding these observations. Untabulated regression results using LN_FINE as the dependent variable reveal that the coefficients on ESG_BONUS (0.07, *p* < 0.10) and LN_GHG (0.05, *p* < 0.01) are positive and significant, while that on ENV_SUPMGT is negative and significant (*p* < 0.05). The results support H3 and H4 but are contrary to H2, which is consistent with our main findings. When we use FINE_D as the dependent variable, we find a negative and significant coefficient on E_SCORE (-0.016, *p* < 0.05), which is consistent with

H1. Results for ENV_SUPMGT (H3) (-0.43 , $p < 0.10$) and LN_GHG (H4) (0.15 , $p < 0.01$) are consistent with our primary findings.

Repeat Offenders and Monetary Penalties for Poor Environmental Performance

We conduct an additional test to examine the determinants of monetary penalties for poor environmental performance for a subset of firms that experience such penalties in two consecutive years, repeat offenders.⁵ A total of 48 firms met this criterion. Untabulated results show that the main findings reported in Table 3 and 4 are partially supported for this subset of firms. The coefficient on LN_GHG (H4) (0.038 , $p < 0.01$) and that on E_SCORE (H1) (-0.005 , $p < 0.01$) are consistent with the hypotheses. In addition to the repeat offender group of firms, we also prepared a separate category of firms that have incurred environmental violations only once (a total of 31 firms) and rerun the regression with consistent evidence.

Taken together, the findings from the additional analyses are generally consistent with the reported findings in our primary analyses.

Discussion and Conclusion

Although many empirical studies have examined firms' decisions to participate in voluntary environmental programs and the consequences of these decisions on financial reporting, relatively few researchers have examined the determinants of monetary penalties for environmental violations. This paper uses secondary data from 14 EU countries to examine the possible determinants of monetary penalties. We consider environmental disclosures, environmental compliance-linked managerial compensation policies, environment-friendly supply chain management, GHG emission and other toxic waste disposal, and finally CSR investments including investments in environmental compliance programs as some of the possible determinants of the amount of monetary penalties.

We find evidence that environment-friendly supply chain management and environmental disclosures reduce the amount of penalties whilst GHG emissions as well as toxic disposals increase penalties. Environmental compliance-linked managerial compensation policies increase penalties, which is contrary to hypothesis. We also find that the amount of penalties increase for firms investing in CSR-related activities.

This research has several implications for regulators. Knowledge of the corporate environmental penalties associated with disclosure practices, managerial incentives and CSR-oriented investments is important for the development of additional regulation that might promote a CSR-friendly business environment. While most of the regulations relating to environmental compliances are voluntary in practice, Peters and Romi (2013) find that simply creating additional reporting requirements will not necessarily lead to real change in regulatory enforcement. Regulators might suggest that firms initiate multiple approaches, including higher levels of disclosure, a low-emission strategy and more investment in environmental disclosure activities to improve environmental compliance. The findings from this research might be used to promote green supply chain management to eliminate business risk. While reputation is of significant concern to business, trading partners have recently been demanding more environmentally friendly products and declining operations with companies who have questionable reputations (Gunningham *et al.*, 2005). With regard to such concerns, this research contributes to an understanding of the link between the absence of green supply chain practices and regulatory risk.

In regards to managerial policy implications, this research is beneficial to understand the positive association between managerial incentive and environmental penalties. Executives face potentially severe non-financial personal risk if the environmental performance of a firm is poor. This might act as a catalyst for designing environmental compliance-linked compensation schemes. However, our evidence suggests that such schemes fail to motivate managers to be responsible for minimizing environmental violation as doing so would adversely impact short-term profit targets.

From a regulatory perspective, regulation can focus on the supply side, i.e. disclosure practices, managerial incentive schemes and CSR investment policies. However, all these are firm-specific choices, and hence mandating

⁵We thank an anonymous reviewer for suggesting this analysis.

regulation could bring unwanted consequences. Instead, stricter regulations with respect to monitoring and enforcement of sanctions would be more appropriate. However, regulation is costly and often fraught with political interests. Therefore, determining and mandating the optimum amount of monetary penalties may not be feasible. This is also reflected in our findings that sanctions do not guarantee compliance with good CSR behavior.

Despite the potential importance of our findings, this study suffers from several weaknesses related to generalizability. First, we examined only 16 European countries over a limited period of time. Thus, the sample of firms we studied may not represent all legislative environments. Second, using a sample of US firms, Karpoff *et al.* (2005) evidence that stock price reduces following penalties for environmental violations. We suggest event analysis as a future research initiative to investigate market reaction following penalties for poor environmental performance. Finally, firms might engage themselves in improving community awareness as part of reputation building following an environmental violation. Future research could examine corporate engagement in community awareness activities when a firm has a previous track record of such violations.

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