Do Auditors care about clients' compliance with environmental regulations?

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Abstract

Prior research shows that corporate environmental risk affects stock price, cost of capital and analyst behavior. This study extends the literature by examining the relation between corporate environmental risk and audit effort as proxied by audit fees. We argue that environmental regulations create compliance risk for companies in many industries. We hypothesize that auditors will increase audit effort to ensure compliance with the applicable environmental regulations and that complexity in environmental regulations affects the complexity in audit engagements, hence audit effort. We characterise corporate environmental compliance risk using different environmental performance proxies and the complexity of applicable environmental regulations. Using a longitudinal data from 2000 to 2012, we find that audit fees were higher for clients with higher environmental compliance risk. Specifically, our analyses indicate that complexity in the applicable environmental regulations has a positive impact on audit fees. The findings in this study provide direct evidence that corporate environmental compliance risk affects audit effort. Auditors appear to exercise more effort when auditing clients facing environmental compliance risk and charge higher audit fees for those operating in complex environmental regulatory environments.

I. Introduction

Securities regulators and accounting standard setters have been concerned about the impact of corporate environmental liability on the quality and reliability of financial statements for a long time (Securities Exchange Commission (SEC) 1993, Financial Accounting Standards Board (FASB) 2001, Government Accountability Office (GAO) 2004, Chadick et al 1993). Existing studies show that poor corporate environmental performance not only damages firms' reputation as good corporate citizens but also contributes to future operational risk and poor financial performance (Clarkson et al. 2011, Flammer 2013). Anecdotal evidence indicates that firms with high environmental risk may face contingent environmental liability in future remediation and incur substantial capital outlays to comply with increasingly more stringent environmental regulations.[1] To respond to investors' concerns about material misstatements in financial reports due to corporate environmental risk, the International Standards on Auditing (ISA 240) requires auditors to identify risks associated with significant accrued environmental remediation liabilities. Auditors are also required to ensure that their clients are in compliance with environmental regulations that may be fundamental to the operating aspects of the business, to an entity's ability to continue its business, and to avoid material penalty due to violation (ISA 250). These mandates indicate that auditors must consider a wide range of corporate environmental risk factors and exercise more effort when auditing clients with complex environmental compliance issues. There is scant empirical study that seeks to establish such direct evidence.

[1] As an example of how environmental risk exposure may impact a firm's financial reporting and future financial performance, Dairyland Power Cooperative disclosed that it reached an agreement with the EPA on June 29, 2012 that requires the company to invest approximately $150 million in pollution control technology. The company must also spend $5 million on environmental mitigation projects and pay a civil penalty of $950,000. The Company stated that the impact of mandated $150 million investment on future earnings remains uncertain until both the timing and successful implementation of the investment is determined in the future. It is conceivable that the auditor of the Company must assess the related compliance issues and the financial impact of this legal settlement in its future audit engagement with the Company.

On the other hand, the auditor's responsibility is limited to undertaking specified audit procedures to help identify non-compliance with those laws and regulations that may have a material effect on the financial statements (ISA 250). To ensure compliance with the existing environmental regulations, auditors must assess the client's aggregated compliance risk in the context of all applicable environmental risk factors. One could argue that auditors may exercise more effort for clients that face more complex environmental regulations and the complexity of applicable environmental regulations for audit clients should affect the design of audit procedures and have a direct impact on audit engagements and audit fees. Thus, the mandate on auditors' responsibility to ensure compliance with applicable environmental regulations creates an interesting empirical setting to examine whether corporate environmental risk affects auditor behavior and if it does, how.

This study examines the following two related research questions: (1) Does corporate environmental risk affect audit effort? (2) If it does, what contribute to the increase in audit effort; the complexity in the overall corporate environmental compliance risk or incremental magnitude of environmental risk, such as, the level of toxic emissions and number of incidents of non-compliance with specific environmental regulations? The first research question explores the impact of corporate environmental risk on auditor behavior in general and it seeks to establish direct evidence that auditors consider environmental compliance risk in audit engagement. The second research question examines how auditors assess the aggregated compliance risk when clients face complex environmental regulations and it seeks to shed light on how complexity in environmental regulations affects audit task complexity.

Using a large longitudinal sample of U.S. public companies from the 2000 to 2012, we find consistent evidence that corporate environmental compliance risk has a significant and positive

impact on audit effort as proxied by audit fees. We develop two sets of empirical measures that capture compliance risk with applicable environmental regulations in five different areas: (1) the toxic chemicals released to the environment as reported to the Toxic Releases Inventory database (TRI), (2) Superfund liabilities identified in the National Priority List of Superfund Sites, (3) total CO_2 and CO_2 equivalent emissions, (4) total waste materials produced, and (5) estimated costs for all environment-related violations, including penalty, fines, lost court cases and future settlements. The first set of empirical measures capture the compliance risk with individual environmental regulations and the second set captures the overall complexity in applicable environmental regulations. Our empirical models control for other known factors that affect audit fees in the existing literature. The results indicate that auditors charge higher fees for firms with environmental compliance risk in each of the five environmental risk areas. Further analyses reveal a complex and non-linear relation between audit fees and individual environmental risk proxies. Specifically, we find that auditors charge higher audit fees for clients facing more environmental regulations and with higher aggregated compliance risk. We also find that the complexity in corporate environmental regulations increases the likelihood of a going-concern opinion and bankruptcy risk. This finding enhances our argument that environmental compliance risk may increase inherent business risk and auditors consider corporate environmental compliance risk. As further corroborating evidence, we find that auditors increase audit fees for clients with significant environmental compliance risk in 2004, following the issuance of a GAO report calling for the SEC to improve the quality and transparency in corporate environmental disclosure in the U.S.. Finally, to assess the robustness of our findings in an international setting, we extend our analysis to a subset of non-US sample firms and our main results still hold. Overall, the findings in this study suggest that corporate environmental

compliance risk affects auditor behavior. Our results are robust and consistent with auditors increasing audit effort for clients with more complex environmental compliance risk.

Our study makes the following contributions. First, we extend prior research on the relation between business risk and audit fees. Much of the existing research focuses on litigation risk, such as Bell et al. (2001), Francis (1984), Seetharaman et al. (2002), and Simunic and Stein (1996). More recent studies such as Lyon and Maher (2005) examine the impact of business risk on audit fees. We extend this literature by exploring the impact of environmental compliance risk on audit fees. We characterize corporate environmental compliance risk based on the existing applicable environmental regulations in five different areas using actual pollution and environmental compliance data. This characterization allows us to examine the impact of both individual environmental risk factors and aggregated compliance risk with the applicable environmental regulations on auditor effort. In addition, although one could argue that corporate environmental risk may increase the inherent business risk, our analysis indicates that corporate environmental compliance risk affects auditor effort beyond the inherent business risk as implied in the existing literature.

Second, this study also contributes to the environmental accounting research. The existing literature in this area shows that non-financial environmental performance information can be value-relevant (Barth and McNichols 1994; Hughes 2000; Clarkson et al. 2004; Sharfman and Fernando 2008; Plumlee et al. 2009; etc.). Recent study shows that financial analysts impound corporate environmental risk exposure into their earnings forecasts and stock recommendations (Dhaliwal et al. 2012, De Franco et al. 2013). Since auditors also play a critical role in safeguarding the capital market institution, we would expect an increased assurance effort from auditors to protect investors from corporate environmental risk. Although

existing auditing standards mandate auditors to exercise more effort for clients with environmental compliance risk as discussed earlier, to the best of our knowledge, we are not aware of any studies that examine the relationship between auditor effort and corporate environmental compliance risk. This study seeks to provide direct evidence that auditors play an assurance role in the capital market by increasing audit effort when auditing firms with environmental compliance risk, consistent with the requirements of the existing auditing standards.

The rest of the article is organized as follows. Section II reviews the existing literature and develops our hypotheses. Section III discusses the sample selection and key research design. Section IV presents our primary empirical results while V discusses additional analyses and the robustness checks. Section VI concludes.

II. Literature Review and Hypothesis Developments

This study relates to the two strands of research literature, the environmental accounting literature and the audit fee literature. The existing literature in environmental accounting finds that corporate environmental performance affects firm valuation, future financial performance, and the cost of capital (Cormier et al. 1993, Barth and McNicholes 1994, Cormier and Magnan 1997, Hughes 2000, and Clarkson et al. 2004, Connors and Silva-Gao 2009, Dhaliwal et al. 2011, Clarkson et al. 2011, Schneider 2011, Flammer 2013). Recent studies indicate that corporate environmental performance also affect firms' capital expenditures, the design and strength of corporate governance, credit risk, earnings volatility, and analyst behavior (Schneider 2011, Dhaliwal et al. 2012, De Franco et al. 2013, Lam and Li 2013). This line of research implies that corporate environmental risk increases future operational uncertainty and default risk and

analysts impound corporate environmental risk into their earnings forecasts and stock recommendations.[2] Interestingly, there is no study that examines the role of auditor assurance with respect to corporate environmental risk exposure. To the extent that environmental risk can adversely impact future financial performance and operational uncertainty, auditors ought to ensure that the financial impact of corporate environmental risk is properly recognized and communicated to investors. This study fills the void in the literature and examines the role of auditors in safeguarding investors from corporate environmental risk. Specifically, we examine whether auditors exercise increased effort when auditing firms facing complex environmental regulations. We use audit fees to proxy for auditor effort because in a competitive audit market, audit fees should reflect the expected costs of auditing hours and implied business risk (Bell et al. 2001). To the extent that environmental regulations create compliance risk[3] and increase future spending, companies facing complex environmental regulations will have higher inherent risk and control risk. Auditors must increase audit effort and complexity in audit engagements to ensure an acceptable level of audit risk.[4] We argue and expect that auditors will increase audit effort and charge a higher fee accordingly for clients with higher environmental compliance risk.

Simunic (1980) pioneers the empirical research on audit fees. He presents a production view of the audit process and shows that audit fees are affected by client size, operating complexity, and client risk. Subsequent research provides consistent evidence supporting the

[2] As an example of environmental risk exposure contributing to operating uncertainty, see a Wall Street Journal article on Oct 31, 2013 titled "Barrick Gold Puts South American Project on Hold." Barrick Gold decided to suspend the construction of its massive $8.5 billion Pascua-Lama mine mainly because of the uncertainty over legal and other environmental regulatory requirements and poor outlook for metal prices. http://online.wsj.com/news/articles/SB10001424052702303843104579169342595551968

[3] Compliance risk refers to the aggregated adverse impact to firms' future operations and financial prospect as a result of violating applicable environmental regulations.

[4] Audit risk refers to the likelihood of a material misstatement in the financial report that is not discovered in an audit engagement. We use audit engagements to refer the complete auditing process broadly, including audit planning, testing of controls, substantiation or fieldwork, exit or finalization, etc..

effect of these determinants on audit fees (Hay et al. 2006, DeFond and Zhang 2013). Existing research in auditing also shows that audit clients with higher perceived business risk, mostly litigation risk, incur higher audit fees (Palmrose 1988, Simunic and Stein 1996, Seetharaman et al. 2002). The business risk of audit clients refers to the client's continued survival and well-being (Lyon and Maher 2005). It contributes directly to audit risk (the risk of an audit failure). The auditor is paid a fee to attest to the assertions contained in the client's financial statements, and presumably the fee reflects the works the auditor must perform to reduce the audit risk to an acceptable level. In a competitive equilibrium, audit fees should reflect the expected costs of auditor's effort and future litigation risk as a result of an audit failure (Bell et al. 2001). This study extends the existing auditing literature and explores whether corporate environmental compliance risk affects audit fees. We argue that corporate environmental compliance risk increases audit complexity above and beyond the existing auditing mandate for companies without such risk. We hypothesize that rational auditors should increase audit effort to ensure compliance with the existing environmental regulations, resulting a higher audit fee for audit clients facing more complex environmental regulations.

There are also institutional factors that motivate our hypothesis about the relation between corporate environmental compliance risk and audit fees. As discussed earlier, ISA (240) requires auditors to identify risk associated with significant accrued environmental remediation liabilities. For firms operating in the natural resources and other high polluting sectors, Financial Accounting Standards Board (FASB) 143 mandates companies to estimate future site reclamation liability and formally recognize such estimates on the balance sheet as Asset Retirement Obligations (ARO).[5] For US firms named as a potentially responsible party in the

[5] International Accounting Standards (37) contains similar requirements for the recognition of future environmental

National Priority List of Superfund Sites by the U. S. Environment Protection Agency (EPA), they must provide either provisions for estimated future cleanup liability or proper footnote disclosure of such contingent liabilities (Barth and McNichols 1994, Barth et al. 1997).[6] To provide assurance services against material misstatements arising from future environmental liabilities as discussed above, auditors must possess knowledge about the applicable environmental regulations and industry expertise to evaluate such liabilities and must put more hours into the auditing process to ensure environmental liabilities not being misreported. In addition, firms operating in high polluting sectors face a wide range of environmental regulations with compliance obligations that can significantly impact their future operations and financial health. For example, under the Emergency Planning and Community Right-to-Know Act (EPCRA), the EPA requires U.S. facilities with more than ten employees to track over 650 toxic chemicals that pose a threat to human health and the environment. Companies that manufacture, process, or otherwise use these chemicals above certain thresholds must keep track of and report annually to the EPA how much each chemical is released to the environment or managed through recycling, energy recovery and treatment.[7] To ensure full compliance with the TRI reporting requirement, auditors need to ensure that company's environmental management systems can track and monitor the flow of these chemicals in the production process reliably and accurately.

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cleanup obligations.

[6] The magnitude of total corporate Superfund liability is staggering with an estimate of about $150 billion to clean up all Superfund sites (Barth et al 1997). In a recent instance, the EPA disclosed in a press release on February 7, 2014 that AVX Corporation agreed to pay over $366 million to clean up contamination in Massachusetts's New Bedford Harbor, the largest single-site cash settlement in Superfund history.

[7] The information submitted by facilities to the EPA becomes a publically available database called the Toxics Release Inventory or TRI. Further information about the TRI program can be obtained from the following EPA web site http://www2.epa.gov/toxics-release-inventory-tri-program

Modern corporations also face a plethora of environmental regulations and violations of existing environmental regulations may trigger enforcement activities that could either endanger the existing business operations or result in significant future compliance obligations and penalty.[8] ISA (250) mandates auditors to ensure that their clients are in compliance with environmental regulations that may be fundamental to the operating aspects of the business, to an entity's ability to continue its business, or to avoid material penalty due to violations. This assurance mandate implies that audit engagements with clients facing environmental regulations will be more complex and require more knowledge about the relevant environmental regulations and firm-specific environmental risk factors.[9] In addition to validating managers' estimates for future cleanup obligations as discussed above, auditors must also ensure that their clients implement appropriate internal environmental risk management control systems to avoid future violations that may trigger material compliance costs. Failure to identify material mistakes in firms' future environmental liability estimates and material weakness in firms' environmental risk control mechanisms will increase the audit risk. The above institutional details suggest that auditors may charge a higher fee for clients with environmental compliance risk to compensate for increased auditor effort.

On the other hand, corporate environmental compliance risk may not have material impact on audit engagements. In the U.S., when it comes to annual reports to shareholders and

[8]In 2013, EPA's enforcement activities resulted in criminal sentences requiring violators to pay more than $4.5 billion in combined fines, restitution and court-ordered environmental projects, and more than $1.1 billion in civil penalties. To put this number in a proper context, the proposed EPA budget for 2015 is $7.890 billion.

[9] Violations of environmental regulations may create earnings shocks for firms with high environmental compliance risk. For example, the EPA and the U.S. Department of Justice announced on August 20, 2012 that they fined Sinclair Oil Corporation $3.8 million for violations of air pollution limits at refineries in Casper and Sinclair, Wyoming. The company must also spend approximately $10.5 million on additional pollution control equipment to reduce emissions of nitrogen oxides (NOX) by approximately 24 tons per year, sulfur dioxide (SO2) by approximately 385 tons per year, and particulate matter by approximately 59 tons per year. See footnote 1 for another example of material obligations resulting with violating existing environmental regulations.

related financial statements, an auditor is liable only if they do not act in "good faith" – which has been taken to mean that auditors engage in outright fraud or commit gross negligence tantamount to fraud.[10] Therefore, auditors have limited responsibility to detect violations of environmental laws. Moreover, the audit risk arising from environmental regulation compliance may be easily accommodated in existing audit engagements without increasing auditor effort. Furthermore, a consensus exists in the economics literature that compliance with environmental regulations will likely increase a firm's costs. What is unclear is the extent to which such compliance-related costs will actually reduce the firm's future profits and hence diminish returns to shareholders because firms differ in their ability to pass on these costs to consumers and end-users. Some argue that increased environmental regulations may create entry barrier and could then lower inherent business risk for the incumbent companies. Dean and Brown (1995) show that environmental regulations have a net deterrent effect on new firm entry across a broad range of manufacturing companies. Helland and Matsuno (2003) demonstrates that more stringent environmental regulations allow some firms to obtain monopoly rents and to enjoy a higher Tobin's q. More recent studies suggest that carbon related environmental regulations have little adverse impact on firms' financial performance. For example, Smale et al (2006) show that although European Union Carbon Trading Schedule (EU ETS) increases the marginal production costs for the five high carbon emission industries (cement, newsprint, petroleum, steel, and

[10] It is interesting to observe that a Supreme Court of Canada decision in 1997 involving Hercules Managements Ltd. established that auditors only owed a "duty of care" to a narrow group of parties - including the companies they are hired to work for - but not to all investors broadly. The Supreme Court ruled that it would be "an unacceptably broad expansion of the bounds of liability" to hold auditors responsible to every potential investor who buys a company's shares (extracted from a Globe and Mail article on *April 8, 2014* by Janet McFarland).

aluminium), four of them actually experienced an increase of different magnitude in EBITA because firms in these industries could pass the increased compliance costs on to end consumers. Similarly, Sijim et al (2006) explore the impact of the EU ETS on the power sector in Germany and the Netherlands and they find that power companies can pass through between 60% to 100% of their carbon compliance costs to consumers. The discussions above suggest that environmental regulations may not have a material impact on firms' inherent business risk, hence may not affect audit engagements.

Our first hypothesis, stated in the alternate form, explores the tension between environmental compliance risk and audit effort (fees).

H1: there is a positive association between audit fees and corporate environmental compliance risk.

Kim et al (2012) argue that audit complexity will increase audit fees. Specifically, they show that the IFRS adoption in European Union countries increases audit fees there because of the resulting increase in audit complexity following the adoption. They argue that since IFRS is fair-value oriented, implementing IFRS requires accountants and auditors to make more complex estimates and more professional judgments (Kim et al. 2012 p. 2066). Other studies also show that the number of subsidiaries or business segments will affect audit complexity and audit fees (Hackenbrack and Knechel 1997, Francis et al. 2005). Following the same logic, we argue that the complexity in corporate environmental regulations increases the clients' compliance risk. To comply with ISA (250), auditors must implement complex audit procedures to audit clients facing complex environmental regulations, which will lead to a higher audit fee. Auditors must assess the aggregated compliance risk the clients face by considering the overall complexity of environmental regulations, not just individual environmental risk factors. For example, a firm

facing both Superfund liability and TRI reporting requirement has a more environmental compliance risk than a firm with Superfund liability only. Auditors must apply a more complex auditing process to the first firm to ensure that it reports its Superfund liability in the financial statements properly and it has an effective environmental management system to track the flow of toxic chemicals in the production process in order to comply with the TRI reporting requirement. Thus, our second hypothesis explores the impact of the complexity in client's environmental exposure on audit fees.

H2: there is a positive association between audit fees and the complexity in corporate environmental regulations.

Although both H1 and H2 examine the impact of corporate environmental compliance risk on audit fees, H2 focuses on how auditors assess the aggregated compliance risk in audit engagements for clients facing multiple environmental regulations. H2 implies that auditors must ensure that appropriate auditing processes are employed to deal with increased environmental compliance risk. To the extent that auditors are not directly responsible for the financial consequences of violating individual environmental regulations, the impact of individual environmental risk factor should not be linear on audit effort and audit fees. To minimize the aggregated risk of audit failure, auditors should be more concerned about the complexity in the applicable environmental regulations. We characterize the complexity in firm's environmental compliance risk by the number of different environmental risk factors the sample firms face. H2 captures the essence of this argument and it explores the connection between audit effort and the complexity in environmental regulations in this study. The findings will shed light on the mechanism by which corporate environmental compliance risk affects audit task complexity and contributes to the understanding of the relationship between audit task complexity and audit fees.

We seek to establish evidence that corporate environmental compliance risk affects audit effort beyond its direct impact on firms' business risk. We will discuss our empirical proxy for the complexity in environmental compliance risk further later.

III. Sample selection and research design

Data and empirical proxies for corporate environmental risk

We employ a longitudinal sample of U.S. public companies to test our hypothesis. Our sample consists of companies covered both in the Audit Analytics and Compustat North America database since we require audit fees, audit opinion, and financial data, including segment information for controls variables. To ensure our sample firms face the same legal and environmental regulatory regime, we limit our sample firms to those with headquarters in the U.S.. We then merge the sample with environmental risk variables from three different databases as outlined below.

We develop our environmental risk exposure proxies from three different data sources: the Superfund liability data, the TRI data, and the ASSET4 data. Specifically, we consider corporate environmental compliance risk in the following five areas: Superfund liability, TRI emissions, CO_2 emissions, total waste produced, and fines and penalties from environmental violations. For firms without data in all five areas, we assume they have lower compliance risk relative to other firms in our sample. This is a reasonable assumption since all sample firms operate in the U. S. and face the same legal and environmental regulatory regime. Finally, all

independent variables are winsorized to the 1 percentile level in both ends to mitigate the impact of outliers.[11]

The actual sample size may vary in different regressions when different environmental risk exposure proxies are used. For example, the Superfund data covers the period from 2000 to 2012, TRI from 2000 to 2009, but the ASSET4 database covers the period from 2002 to 2012. When we use environmental risk proxies from all three different databases in one regression or use the complexity measure, the sample covers the period from 2002 to 2009 only. This sample has 30, 436 observations and consists of 6,122 firms from 72 different industries.

An important feature of this study is that we assess corporate environmental risk in five different areas. The reasons are as follows. First, firms in different industries may face different environmental regulations and it is unlikely that environmental performance in one area will capture environmental risk exposure for firms in different industries. Second, firms differ in pollution propensity, emissions types, environmental performance relative to their industry peers, and compliance status with the existing environmental regulations. Thus, assessing the overall compliance risk with existing environmental regulations must consider all applicable environmental regulations and risk factors. For these two reasons, we assess corporate environmental risk in five different areas, both individually and in aggregate, to ensure the validity of our empirical proxy measures. Finally, as in the existing literature, our audit fee model may suffer from omitted variables and our results could be driven by a correlation between one of our environmental risk proxies and any potential omitted variables. Using five different environmental risk proxies mitigates the concern that our results are driven by omitted variables.

[11] Throughout the paper, we run all of our regression models by excluding observations with an absolute value of the R-student measure greater than 3. We obtain similar results if we include these observations.

Empirical model specifications

To test the relation between environmental risk exposure and audit fees (H1 and H2), we develop an audit fee model based on prior research (Simunic 1980; Francis 1984; Choi et al. 2009). We employ five different environmental risk proxies from three separate data sources as discussed earlier. Our treatment variable *Env* is the environmental risk proxy developed from these databases and we replace *Env* with different environmental risk proxies in different regressions. For example, one of our environmental risk proxies is *TRI_RANK* which is a rank variable defined as aggregated total toxics releases in year *t*, scaled by total sales to control for difference in the production scale, and then ranked within industry peers with the same two-digit SIC number.[12] A high *TRI_RANK* value corresponds to a high relative environmental risk exposure because it indicates a higher toxic emissions amount per thousand dollars of sales relative to the firm's industry peers with the same two-digit SIC code. Our empirical model is specified as follows:

$$\begin{aligned} LnFee = {} & \alpha_0 + \alpha_1 Env + \alpha_2 LnAssets + \alpha_3 NBS + \alpha_4 NGS + \alpha_5 Inv + \alpha_6 QRatio \\ & + \alpha_7 ETD + \alpha_8 ROA + \alpha_9 Loss + \alpha_{10} Opinion + \alpha_{11} Big + \varepsilon, \end{aligned} \quad (1)$$

where $LnFee =$ the natural logarithm of audit fees;

Control variables:

$LnAssets =$ the natural logarithm of total assets;

$NBS =$ number of business segments;

$NGS =$ number of geographic segments;

$Inv =$ ratio of total inventory to total assets;

$QRatio =$ the difference between current assets and inventory divided by current liabilities;

[12] This relative environmental risk exposure measure within industry peers is consistent with the existing literature (see Clarkson et al. 2004, Clarkson et al. 2013). All five environmental risk proxies are defined in the Appendix.

ETD = equity to debt ratio;

ROA = return on assets;

Loss = an indicator variable that equals one if the company reports a loss, and zero otherwise;

Opinion = an indicator variable that equals one if a going-concern is issued, and zero otherwise;

Big = an indicator variable that equals one if the company was audited by a Big4/5 auditor, and zero otherwise.

A significant and positive α_1 is consistent with corporate environmental risk exposure (higher relative toxic emissions per thousand dollars of sales in the case of *TRI_RANK*) being associated with higher audit fees.

We also develop a set of environmental risk proxies based on firms' Superfund liabilities. Specifically, we replace *Env* in equation (1) with *SUPF_DUM*, with *SUPF_DUM* equal to 1 for firms with the Superfund liability and zero otherwise. Our second Superfund based environmental risk proxy is *SUPF_ASSETW* which is as asset-weighted net worth of total Superfund liabilities as reported in the Decision of Order issued by the EPA (see Barth and McNichols 1994 for more details). We also use CO_2 equivalents emissions, the total waste produced, and environmental fines and penalties from the ASSET4 database to proxy for corporate environmental risk. Finally, we create a new variable, *COMPLEXITY*, as our proxy for the compliance risk with all applicable environmental regulations by summing up the dummy variables in each of the five areas. This variable should capture the aggregated compliance risk in five different areas as discussed earlier. We test H2 by replacing *Env* in equation (1) with this *COMPLEXITY* proxy.

Control variables

We follow the existing audit fee literature and control for a variety of factors that are known to affect audit fees from previous studies such as Dao et al. (2012), Francis and Yu (2009), Fung et al. (2012), Hay et al. (2006), Numan and Willekens (2012), and Simunic (1980). Specifically, we control for client size (*LnAssets*), operating complexity (*NBS, NGS*), and financial risk (*Inv, QRatio, ETD, ROA, Loss*). The coefficients of *LnAssets, NBS, NGS, Inv,* and *LOSS* are expected to be positive and the coefficients of *QRatio, ETD,* and *ROA* are expected to be negative. We include going concern opinion (*Opinion*) as a control variable because more investigative effort are usually required in such circumstances, which may lead to higher audit fees (Francis et al. 2005, Fung et al. 2012). Extant literature has shown that Big audit firms may charge a fee premium (Hay et al. 2006) and thus we also control for Big audit firms (*BIG*) in the regression. We expect the coefficients for *Opinion* and *BIG* to be positive. Finally, we control for the year and industry fixed-effects with indictor variables as appropriate. The definitions for all variables are provided in the Appendix.

IV. Empirical Results and Discussion

Descriptive Statistics

Panel A in Table 1 reports the descriptive statistics of audit fees, various environmental risk proxies based on Superfund, TRI, and Asset4 database, and other key control variables for the sample that requires all five environmental risk variables for the period of 2002 to 2009. As shown in the table, the average audit fee is $1.3 million. About 8% of our sample firms have the Superfund liability and the mean TRI per thousand dollars of sales is 0.035 pound. The mean of CO_2 equivalents emissions is about 1.392 ton per million dollars of net sales and mean environmental fines and penalties are $1.45 per million dollar sales. Panel B in Table 1 shows

the industry distribution of our sample for each year, sorted by Industry Standard Code (SIC) with most observations. The top five industries are Business Services (73), Electrical Equipment (36), Chemicals and Allied Products (28), Measuring, Analyzing & Controlling Instruments (38), Machinery (35), consistent with the industry composition in the US economy. The Panel C in Table 1 shows the correlations among all variables with no clear indication for multi-co-linearity among independent variables. It is interesting to observe that most environmental risk proxies are positively associated with audit fees.

Results using Superfund data to proxy for environmental risk

Table 2 presents the regression results on the association between audit fees and corporate environmental risk as proxied by firms' Superfund liabilities for the period of 2000 to 2012. Column (1) presents the results when a dummy variable *SUPF_DUMMY* is used to indicate whether a firm has Superfund liabilities or not. The estimated coefficient for *SUPF_DUMMY* is 0.188 and it is significantly positive at the 1 percent level. This result suggests that firms with Superfund liabilities on average would pay about 21% higher audit fees than firms without Superfund liabilities, all else being equal.[13] Column (2) presents the regression results when environmental risk is proxied by the net worth of total Superfund liability weighted by the total assets of all firms identified as potentially responsible for the site cleanup cost (i.e., *SUPF_ASSETW*).[14] Column (3) presents regression results when environmental risk is proxied by the net worth of total Superfund liability weighted by the number of firms who are potentially responsible for the site cleanup cost and scaled by the sales

[13] Note that 21% = exp (0.188)-1

[14] This proxy is based on the notion that bigger firms may assume a higher portion of the total cleanup costs due to their "deeper pockets."

revenue of this firm (i.e., *SUPF_EQUALW*).[15] Both variables have significantly positive coefficients, consistent with our hypothesis one. Regarding control variables, the coefficients are all significant at the 1 percent level with signs consistent with the existing literature, except for inventory (*Inv*) being insignificant. Specifically, larger and more complex firms paid higher audit fees and more profitable firms paid lower audit fees. Firms audited by Big 4 auditors and firms that receive a going-concern opinion also paid higher fees.

Results using TRI data to proxy environmental risk

Table 3 reports the results for the regressions using TRI data to proxy for corporate environmental risk for the period of 2000 to 2009. Column (1) shows the impact of the *TRI_DUMMY*, indicating whether a firm released toxics chemicals to the environment or not, on audit fees. The estimated coefficient is 0.100 and statistically significant at 1% level. To interpret our coefficient estimates, firms with toxics releases would pay 10.5% higher audit fees, all else being equal. Columns (2) and (3) present the regression results using *TRI_RANK* (TRI per thousand dollar sales ranked within the industry peers) and *TRI_SALES* (TRI per thousand dollars sales) to proxy for corporate environmental risk e, respectively.[16] Consistently with our hypothesis, both proxies have significantly positive coefficients. Regarding control variables, similar to Table 2, the coefficients are all significant at the 1 percent level and they bear signs consistent with prior studies except for *Inv* being insignificant.

Results using Asset 4 data to proxy for environmental risk

[15] This proxy is based on the notion that all identified responsible firms share the future cleanup liability equally.
[16]We also scaled TRI by cost of goods sold and the results are very similar. We do not report this result for the sake of brevity.

Table 4 presents the regression results using environmental risk proxies obtained from Asset4 database for the period of 2002 to 2012. Specifically, *CO2_SALES* is the total CO_2 and CO_2 equivalents emissions in tons, *WASTE_SALES* is total waste generated by the sample firms in tons, and *VIOLATIONS* is environmental fines and penalties. All three variables are scaled by net sales in millions of dollars to control for variation in production scale. *CO2_DUMMY*, *WASTE_DUMMY*, and *VIOLATIONS_DUMMY* are dummy variables indicating whether a company has CO_2 emission, or industrial waste production, or environmental violations or not. The regression results indicate that all six proxies have a significantly positive impact on audit fees, consistent with H1. The coefficients of all control variables are significant at 1 percent level and bear signs consistent with prior studies, except for *Inv* being insignificant. The results from Tables 2, 3, and 4 together indicate that each of our five environmental risk proxies capture some aspect of corporate environmental risk exposure and they all have a positive impact on audit fees. Overall, these results are consistent with H1.

Complexity in applicable environmental regulations and audit fees

H2 explores the impact of the complexity in applicable environmental regulations on audit fees. To test H2, we create a new variable *COMPLEXITY* to proxy for the aggregated environmental compliance risk in five different compliance areas. Specifically, the variable *COMPLEXITY* is the sum of *SUPF_DUMMY*, *TRI_DUMMY*, *CO2_DUMMY*, *WASTE_DUMMY*, and *VIOLATIONS_DUMMY*. The construction of the *COMPLEXITY* variable is based on the assumption that each of the five environmental risk dummy variables represents one particular area where compliance with the applicable environmental regulations is required. Thus, this *COMPLEXITY* variable captures the overall environmental compliance risk each sample firm

faces. We argue that auditors must increase audit effort and audit task complexity to ensure compliance in these five areas. Since this variable requires data from all three data sources, the sample period is intersection of the periods for all data sources, i.e., 2002 to 2009. We estimate regression model (1) with this *COMPLEXITY* proxy and the results are reported in Table 5. Column (1) in Table 5 presents the regression results when *COMPLEXITY* is used in the regression. To further assess the combined impact of individual environmental risk proxies used in Tables 2, 3 and 4, we replicate model (1) by including all five continuous environmental risk proxies (*TRI_SALES*, *SUPF_EQUALW*, *CO2_SALES*, *WASTE_SALES*, and *VIOLATIONS*) and the results are presented in Column (2). The coefficient of *COMPLEXITY* is 0.081 and significant at 1% level, consistent with H2, indicating an increase in *COMPLEXITY* by one will lead to an 8% increase in audit fees. Column (2) shows that *TRI_SALES*, *CO2_SALES* remain significant while *SUPF_EQUALW*, *WASTE_SALES*, and *VIOLATIONS* become insignificant. The results in Table 5 indicate that each of our environmental risk proxies may capture a new dimension in the overall corporate environmental risk exposure. Although our continuous environmental risk proxies in each area may reflect the magnitude of future compliance costs in that area, they do not impact auditor effort and audit complexity in a linear fashion. It appears that auditors are more concerned about the aggregated exposure to environmental risk in all five different areas and will increase their effort and audit task complexity when the complexity in applicable environmental regulations increases. The results in Table 5 support our argument that *COMPLEXITY* can better capture the impact of aggregated compliance risk on audit fees than individual continuous environmental risk proxies.

As further evidence in support of H2, we also investigate the impact of changes in *COMPLEXITY* on audit fees and the results are presented in Table 6. Column (1) in Table 6

shows that the coefficient of the *COMPLEXITY_CHANGE* is 0.024 and significant at 5% level for a signed one-tail test, indicating that changes in *COMPLEXITY* have a significant and positive impact on audit fees, while changes in all five continuous environmental risk proxies are not significant as shown in Column (2). The results in Table 6 provide further support that auditors are more concerned about the aggregated compliance risk than the incremental changes in the magnitude of individual environmental risk factors.

Overall, the regression analyses so far indicate that firms with significant environmental compliance risk appear to pay higher audit fees, consistent with auditors exercising more audit effort for firms with high environmental compliance risk. Our results also suggest that auditors are more concerned about the overall complexity in the applicable environmental regulations, less so about the magnitude of individual environmental risk factors.

V. Additional Analyses

We conduct a number of additional analyses in this section to check the robustness of the results in Section IV and to provide further corroborating evidence in support of our hypotheses.

Impact of environmental risk on going-concern opinion and default risk

To validate the argument that corporate environmental risk increases the business risk and to provide further evidence that auditors consider corporate environmental compliance risk in audit engagements, we analyze the impact of corporate environmental risk on auditor's going-concern opinion and on the default risk of audit clients. Specifically, we analyze whether corporate environmental risk affects the likelihood of auditor issuing a going-concern opinion and the likelihood of clients going bankrupt. This set of analyses is based on the notion that auditors ought to care about audit client's environmental risk if such risk increases the clients'

default risk and business risk to the extent that auditors may issue a going-concern opinion. Table 7 presents the results of two additional analyses. Column (1) in Table 7 shows the results of our analysis of the impact of *COMPLEXITY* on auditors' propensity to issue a going-concern opinion while Column (2) presents the results of the impact of *COMPLEXITY* on the bankruptcy risk for the sample firms. The results indicate that auditors are more likely to issue a going concern opinion for firms facing complex environmental regulations. Following the existing literature, we measure audit clients' bankruptcy risk by Z-score (Altman 1968). *COMPLEXITY* has a negative and significant coefficient estimate on the Z-score, consistent with environmental risk increasing audit client's bankruptcy risk.[17] Overall, the results in Table 7 suggest that corporate environmental risk exposure contributes to business risk to the extent that it increases the likelihood of a going-concern opinion and the default risk. These results provide corroborating evidence that corporate environmental risk exposure should affect auditor behavior and audit fees.

Controlling corporate governance and internal control

Previous studies suggest that corporate governance and internal control may also affect audit fees (Hay et al. 2006). One could argue that firms with stronger corporate governance mechanisms may have better internal control and lower environmental risk exposure (Lam and Li 2013). To ensure that our regression analysis does not suffer from these omitted variables, we implement an additional analysis to control for corporate governance strength and internal control deficiencies. Specifically, we identify a subsample of firms in the ASSET4 dataset with both corporate governance strength score and the environmental risk data (*CO2_SALES*,

[17] Please note that the higher the Z-score is, the lower is the bankruptcy risk. See the Appendix for the definition of Z-score.

WASTE_SALES, *VIOLATIONS*) and we include new variables (*LnCG* and *IC*) in the regression to control for cross-sectional variation in corporate governance strength and internal control deficiencies. *LnCG* is the natural logarithm of the corporate governance pillar score from Asset 4 database. *IC* is an indicator variable that equals one if the auditor's assessment on internal control effectiveness is "NO" in the current fiscal year and zero otherwise. (We obtain similar results by using the number of internal control weakness). The number of observations drops to 2,851 due to the requirement for these variables. Internal control data is available from 2005, thus, the sample period is now from 2005 to 2011 and the sample covers the accelerated filers who are required to disclose internal control deficiency. The results for this analysis are shown in Table 8. The coefficients on all four environmental risk exposure proxies remain significantly positive, indicating that corporate governance strength and internal control deficiencies do not drive our results.

Regulatory impact on auditor behavior in Year 2004

To provide further evidence that auditors increase their effort for clients facing environmental compliance risk, we explore the impact of a regulatory event that should affect auditor effort. Specifically, the GAO issued a comprehensive report calling for improved corporate environmental disclosure in 2004. The report urges the SEC and other related regulators and policy makers to explore ways to improve the reliability and transparency of corporate environmental disclosure. One could argue that this report would increase the awareness of corporate environmental risk among investors and other related stakeholder groups, including securities and accounting regulators. In addition, the release of the report may trigger enhanced enforcement action by the SEC with respect to the quality and reliability in corporate

environmental disclosure in corporate legal filings such as 10-Ks. If corporate environmental exposure affects auditor effort and audit fees, we would expect that such impact will be more pronounced in 2004. Rational auditors may increase auditor effort in response to anticipated future enforcement activities by the SEC following the release of the GAO report. To test this conjecture, we create a year dummy *Y04* equal one for fiscal year 2004 and zero otherwise. We interact this variable with our corporate environmental risk exposure proxy *COMPLEXITY* (*COMPLEXITY_Y04 = Y04*COMPLEXITY*). We replicate regression model (1) with this additional interaction variable and the results are presented in Table 9. As expected, the coefficient of *COMPLEXITY_Y04* is 0.074 and significant at 1% level. The coefficient of *COMPLEXITY* is 0.075 and is also significant at 1% level. These results are consistent with auditors increasing audit effort and charging a higher audit fee for companies facing environmental risk exposure in 2004. These results provide further corroborating evidence that corporate environmental compliance risk affects audit fees and auditor behaviors.

International evidence

The sample firms in the previous analyses are drawn from Compustat North America and Audit Analytics database. Thus, they are mainly public securities registrants in the U.S.. In addition, two of our five environmental risk proxies are based on the US environmental regulations (Superfund liability and TRI). One might argue that the environmental regulations and SEC enforcement actions in the US are more stringent than those in other jurisdictions in the world and the findings in Section IV may only apply to the US regulatory setting. To check whether our findings still hold in non-US environmental and securities regulations regimes, we replicate our analyses using non-US listed companies only. Specifically, we identify a group of

non-US companies with environmental performance data from the Asset4 database which covers more than 3,500 global companies up to 9 years of historical data. We also extract audit fees, total assets, quick ratio, inventory, net income, and audit opinion from this database. However, it is not possible to calculate an accurate number of business segments and geographic segments from ASSET4 database. Thus, we are not able to control for these two factors in the regression model in this part of the analysis. Since Superfund liability and TRI data are only applicable to the US registrants, our environmental risk complexity measure in this section does not include them. We create a new variable *COMPLEXITY_NEW* to measure the environmental compliance risk for the international sample firms. Specifically, *COMPLEXITY_NEW* is the sum of *CO2_DUMMY*, *WASTE_DUMMY*, and *VIOLATIONS_DUMMY* for the international sample firms. Table 10 presents the regression results using the international sample firms. Panel A shows the regression results. Panel B shows the country distributions. Column (1) in Panel A Table 10 shows that *COMPLEXITY_NEW* has a positive coefficient estimate and significant at 10% level for a one tail signed test, consistent with the environmental compliance risk increasing audit fees. Column (2) shows the impact of three individual environmental risk factors on audit fees, CO_2 emissions (*CO2_SALES*), total waste (*WASTE_SALES*), and environmental violations (*VIOLATIONS*). *WASTE_SALES* has a significant and positive impact on audit fees, and *CO2_SALES* and *VIOLATIONS* do not. Panel B of Table 10 shows that most of the sample firms are from Japan and European countries. In sum, the results in Table 10 indicate that the positive relationship between audit fees and corporate environmental compliance risk is not restricted to the US environmental and securities regulation regime. It appears that auditors in non-US legal regimes also consider the complexity in corporate environmental compliance risk in the auditing process.

VI. Conclusions

This study examines the impact of corporate environmental compliance risk on audit effort and audit fees. We argue that corporate environmental risk increases firms' business risk and auditors must increase audit effort for firms with environmental risk in order to reduce audit risk. Furthermore, the existing auditing standards require auditors to identify risk in financial misreporting when auditing clients with significant accrued environmental remediation liabilities and to ensure compliance with environmental regulations that may have a material impact on future operations and on an entity's ability to continue its business, or to avoid material penalty due to violation (ISA 240, 250). This mandate for auditors to ensure compliance with the applicable environmental regulations implies that auditors must design more complex auditing process to deal with clients facing more environmental risk factors and complex environmental compliance issues. These arguments lead to our predictions that corporate environmental compliance risk affects audit fees and auditors will employ more complex audit process for clients facing more complex environmental regulations. Using a large longitudinal sample of U.S. public companies from the 2000 to 2012 and five different proxies for corporate environmental compliance risk, we find direct evidence that corporate environmental compliance risk has a significant and positive impact on audit fees. Our findings are robust to controls of other factors that are known to affect audit fees in the existing literature. Further analyses indicate that the impact of client’s environmental compliance risk on audit fees is not linear and that the complexity in corporate environmental regulations has a more direct impact on audit fees. Overall, the findings in this study suggest that auditors exercise more effort when auditing clients with environmental compliance risk, as mandated by the existing auditing standards and auditors

appear to charge a higher audit fee for clients with more complex environmental compliance issues. These findings are consistent with auditors employing complex audit processes for clients facing complex environmental regulations. Overall, our findings suggest that auditors exercise increased audit effort when auditing firms with high environmental compliance risk and that the level of increased auditor effort is consistent with the complexity in corporate environmental compliance risk.

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APPENDIX Variable Definitions

SUPF_DUMMY	=	1 if the company has superfund liability and zero otherwise.
SUPF_ASSETW	=	Asset weighted net worth of total Superfund liability in dollars, scaled by sales in thousands of dollars.
SUPF_EQUALW	=	Equal weighted net worth of total Superfund liability in dollars, scaled by sales in thousands of dollars.
TRI_SALES	=	The toxics releases (in pounds) scaled by the sales revenue (in $ thousands). The toxics releases is calculated based on data obtained from the U.S. Environmental Protection Agency's (EPA) Toxics Release Inventory (TRI) database and is the sum of all chemicals (in pounds) released to air, water and land by firm *i* in year *t*.
TRI_RANK	=	A proxy for pollution propensity relative to industry peers, measured as the intra-industry (two digit SIC code) decile rank of TRI_SALES in year t.
TRI_DUMMY	=	1 if the company has TRI emissions in year t and zero otherwise.
CO2_SALES	=	Total CO2 and CO2 equivalents emission in tons divided by sales in millions of dollars.
CO2_DUMMY	=	1 if the company has CO2 emission and zero otherwise.
WASTE_SALES	=	Total amount of waste produced in tons divided by net sales in millions of dollars.
WASTE_DUMMY	=	1 if the company has waste produced and zero otherwise.
VIOLATIONS	=	Environmental violations, measured as penalties, fines, settlements or cases not yet settled regarding environmental controversies divided by net sales in millions of dollars.
VIOLATIONS_DUMMY	=	1 if the company has a non-zero environmental violation cost and zero otherwise.
COMPLEXITY	=	Sum of SUPF_DUMMY, TRI_DUMMY, CO2_DUMMY, WASTE_DUMMY and VIOLATIONS_DUMMY.
COMPLEXITY_NEW	=	Sum of CO2_DUMMY, WASTE_DUMMY and VIOLATIONS_DUMMY.
COMPLEXITY_CHANGE	=	Current COMPLEXITY minus last year’s COMPLEXITY.
Y04	=	1 if fiscal year is 2004 and zero otherwise.
COMPLEXITY_Y04	=	COMPLEXITY times Y04.
LnFee	=	The natural log of audit fees in dollars.
LnAssets	=	The natural log of assets in millions of dollars.
NBS	=	Number of business segments.
NGS	=	Number of geographic segments.
QRatio	=	The difference between current assets and inventory divided by current liabilities.

Inv	=	Ratio of total inventory to total assets.
ETD	=	Equity to debt ratio.
ROA	=	Return on assets.
Loss	=	Indicator variable that equals one if the company reports a loss this year, and zero otherwise.
Opinion	=	Indicator variable that equals one if going-concern is issued, and zero otherwise.
Big	=	Indicator variable that equals one if the company was audited by a Big4/5 auditor, and zero otherwise.
LnCG	=	The natural log of corporate governance pillar score from Asset4 database.
IC	=	Indicator variable that equals one if the effectiveness of internal control audit opinion is No and zero otherwise.
Z-Score	=	Z-Score = A * 3.3 + B * 0.99 + C * 0.6 + D * 1.2 + E * 1.4, where A=EBIT/Total Assets; B=Net Sales /Total Assets; C=Market Value of Equity / Total Liabilities; D=Working Capital/Total Assets; E=Retained Earnings /Total Assets Common interpretation of Z Score: > 3.0 - safe based on these financial figures only. 2.7 to 2.99 - On Alert. 1.8 to 2.7 - Good chances of going bankrupt within 2 years. < 1.80 - Probability of Financial distress is very high The higher the score, the lower the default risks.

Table 1 Descriptive Statistics and Correlation Matrix

Panel A: Descriptive Statistics

Variable	Mean	Std Dev	Minimum	Median	Maximum
AUDIT_FEES	1,334,811	2,724,445	1,500	535,450	82,249,000
LnFee	13.151	1.403	7.313	13.191	18.225
COMPLEXITY	0.329	0.757	0	0	5
SUPF_DUMMY	0.084	0.277	0	0	1
TRI_DUMMY	0.176	0.381	0	0	1
CO2_DUMMY	0.027	0.162	0	0	1
WASTE_DUMMY	0.015	0.120	0	0	1
VIOLATIONS_DUMMY	0.028	0.165	0	0	1
SUPF_ASSETW	0.058	0.375	0	0	3.221
SUPF_ EQUALW	0.427	2.279	0	0	17.375
TRI_RANK	0.153	0.332	0	0	1
TRI_SALES	0.035	0.184	0	0	2.215
CO2_SALES	1.392	8.374	0	0	66.160
WASTE_SALES	0.790	6.549	0	0	62.090
VIOLATIONS	1.449	8.542	0	0	66.160
LnAssets	5.483	2.292	-0.470	5.557	10.917
NBS	2.113	1.517	1	1	7
NGS	2.477	1.978	1	2	11
QRatio	2.171	2.556	0.064	1.376	17.888
Inv	0.109	0.131	0.000	0.060	0.582
ETD	1.966	3.027	-0.795	0.975	21.152
ROA	-0.112	0.508	-3.622	0.024	0.363
Loss	0.388	0.487	0	0	1
Opinion	0.075	0.264	0	0	1
Big	0.718	0.450	0	1	1

Number of observations: 25,654 in the period of Year 2002 to 2009.

Panel B Industry Distribution (First two digits of SIC codes)

SIC	Industry	2002	2003	2004	2005	2006	2007	2008	2009	Total
73	Business Services	487	501	482	456	421	384	354	345	3,430
36	Electr, Oth Elec Eq, Ex Cmp	327	333	334	331	328	314	296	288	2,551
28	Chemicals & Allied Products	256	275	292	294	297	287	264	251	2,216
38	Meas Instr;Photo Gds;Watches	263	293	288	278	269	252	236	217	2,096
35	Indl,Comml Machy,Computer Eq	240	227	222	202	200	190	175	177	1,633
49	Electric, Gas, Sanitary Serv	154	181	178	173	171	159	156	157	1,329
13	Oil and Gas Extraction	107	119	116	123	135	142	139	139	1,020
48	Communications	129	145	137	133	131	116	106	100	997
50	Durable Goods-Wholesale	78	88	85	86	80	74	67	62	620
80	Health Services	66	67	76	78	83	74	76	79	599
37	Transportation Equipment	76	82	80	75	73	73	66	66	591
20	Food and Kindred Products	67	73	66	65	63	65	64	59	522
59	Miscellaneous Retail	65	68	65	69	64	59	60	56	506
87	Engr,Acc,Resh,Mgmt,Rel Svcs	75	72	66	62	58	53	50	57	493
58	Eating and Drinking Places	56	63	63	59	54	49	42	40	426
51	Nondurable Goods-Wholesale	45	43	47	45	47	49	46	45	367
34	Fabr Metal,Ex Machy,Trans Eq	60	51	50	48	45	41	33	33	361
33	Primary Metal Industries	47	45	44	47	44	40	38	36	341
56	Apparel and Accessory Stores	43	37	43	43	40	36	36	34	312
79	Amusements, Recreation	38	44	42	36	37	32	32	29	290
30	Rubber & Misc Plastics Prods	45	46	44	38	36	27	24	22	282
67	Holding,Other Invest Offices	28	31	35	38	37	37	33	31	270
27	Printing,Publishing & Allied	38	38	37	33	29	27	24	22	248
26	Paper and Allied Products	30	28	29	30	28	32	32	30	239
39	Misc Manufacturing Industries	29	25	27	25	25	28	24	26	209
23	Apparel & Other Finished Pds	29	26	27	26	24	23	20	15	190
45	Transportation By Air	19	20	21	24	24	27	21	22	178
55	Auto Dealers, Gas Stations	24	24	23	21	21	20	19	15	167
42	Motor Freight Trans,Warehouse	20	21	21	24	21	17	18	14	156
53	General Merchandise Stores	20	19	20	19	21	20	19	18	156
54	Food Stores	23	22	23	18	18	16	16	16	152
99	Nonclassifiable Establishment	28	29	29	22	21	12	5	2	148
32	Stone,Clay,Glass,Concrete Pd	21	21	17	17	17	18	16	16	143
64	Ins Agents,Brokers & Service	18	22	18	20	18	16	12	11	135
25	Furniture and Fixtures	17	17	15	17	16	14	15	15	126
57	Home Furniture & Equip Store	19	16	15	13	17	14	13	12	119
62	Security & Commodity Brokers	6	13	16	14	18	16	16	18	117
24	Lumber and Wood Pds, Ex Furn	19	18	14	13	12	15	14	11	116
65	Real Estate	13	16	15	20	15	14	12	11	116
82	Educational Services	14	14	14	15	13	12	14	14	110
29	Pete Refining & Related Inds	7	9	13	13	14	14	16	17	103

SIC	Industry	2002	2003	2004	2005	2006	2007	2008	2009	Total
63	Insurance Carriers	15	14	13	13	12	11	10	12	100
16	Bldg Cnstr-Gen Contr,Op Bldr	11	11	12	11	12	10	12	12	91
31	Leather and Leather Products	10	11	10	12	12	12	11	11	89
78	Motion Pictures	14	11	13	11	10	11	9	10	89
10	Metal Mining	10	11	9	8	9	12	12	12	83
44	Water Transportation	11	10	11	11	11	11	9	8	82
22	Textile Mill Products	12	13	10	11	10	9	9	7	81
70	Hotels, Other Lodging Places	19	18	12	5	5	5	6	6	76
17	Construction-Special Trade	11	9	10	10	8	10	8	8	74
72	Personal Services	11	9	12	10	7	8	7	7	71
01	Agriculture Production-Crops	11	11	11	10	8	5	6	7	69
47	Transportation Services	7	9	9	8	8	8	9	10	68
60	Depository Institutions	6	7	8	8	7	7	5	7	55
12	Coal Mining	5	4	5	6	3	4	8	10	45
14	Mng, Quarry Nonmtl Minerals	5	5	5	5	4	6	6	6	42
52	Bldg Matl,Hardwr,Garden-Retl	7	5	4	4	5	5	6	5	41
46	Pipe Lines, Ex Natural Gas	5	5	6	6	5	5	5	3	40
61	Nondepository Credit Instn	8	6	5	4	4	3	4	6	40
83	Social Services	6	7	6	6	4	3	4	4	40
40	Railroad Transportation	3	5	5	5	5	4	5	4	36
75	Auto Repair,Services,Parking	5	5	6	6	5	3	3	3	36
07	Agricultural Services	3	4	3	3	3	4	5	5	30
21	Tobacco Products	2	2	3	3	3	3	3	4	23
02	Agric Prod-Lvstk,Animal Spec	2	1	2	2	2	3	2	1	15
41	Transit & Passenger Trans	2	2	2	2	2	2	2	1	15
08	Forestry	3	3	2	2	1	1	1	1	14
15	Bldg Cnstr-Gen Contr,Op Bldr	2	2	1	1	1	1	1	1	10
76	Misc Repair Services	1	1	1	1	1	1	1	1	8
81	Legal Services	1	1	1	1	1	1	1	1	8
09	Fishing, Hunting & Trapping	1	1	0	0	0	0	0	0	2
86	Membership Organizations	1	0	0	0	0	0	0	0	1

Panel C: Pearson Correlation Matrix

		lnFee	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	COMPLEXITY	***0.430***	1																					
2	SUPF_DUM	***0.284***	***0.712***	1																				
3	TRI_DUM	***0.338***	***0.768***	***0.434***	1																			
4	CO2_DUM	***0.291***	***0.638***	***0.227***	***0.193***	1																		
5	WASTE_DUMMY	***0.215***	***0.540***	***0.198***	***0.154***	***0.624***	1																	
6	VIOLATIONS_DUMMY	***0.273***	***0.606***	***0.221***	***0.186***	***0.665***	***0.451***	1																
7	SUPF_ASSETW	***0.180***	***0.414***	***0.515***	***0.244***	***0.179***	***0.146***	***0.191***	1															
8	SUPF_EQUAL	***0.069***	***0.367***	***0.620***	***0.222***	***0.048***	***0.040***	***0.057***	***0.631***	1														
9	TRI_RANK	***0.333***	***0.751***	***0.423***	***0.975***	***0.193***	***0.155***	***0.187***	***0.246***	***0.221***	1													
10	TRI_SALES	***0.124***	***0.306***	***0.169***	***0.413***	***0.077***	***0.036***	***0.066***	***0.120***	***0.090***	***0.468***	1												
11	CO2_SALES	***0.291***	***0.638***	***0.230***	***0.193***	***0.997***	***0.628***	***0.664***	***0.179***	***0.048***	***0.192***	***0.074***	1											
12	WASTE_SALES	***0.215***	***0.539***	***0.200***	***0.154***	***0.622***	***0.994***	***0.449***	***0.146***	***0.041***	***0.156***	***0.037***	***0.626***	1										
13	VIOLATIONS	***0.272***	***0.606***	***0.222***	***0.186***	***0.662***	***0.453***	***0.999***	***0.193***	***0.057***	***0.187***	***0.064***	***0.664***	***0.451***	1									
14	LnAssets	***0.838***	***0.419***	***0.273***	***0.333***	***0.286***	***0.204***	***0.266***	***0.185***	***0.065***	***0.329***	***0.143***	***0.285***	***0.204***	***0.265***	1								
15	NBS	***0.378***	***0.368***	***0.267***	***0.347***	***0.188***	***0.122***	***0.169***	***0.167***	***0.100***	***0.340***	***0.176***	***0.187***	***0.122***	***0.168***	***0.378***	1							
16	NGS	***0.325***	***0.260***	***0.171***	***0.252***	***0.121***	***0.115***	***0.123***	***0.124***	***0.077***	***0.249***	***0.055***	***0.123***	***0.115***	***0.124***	***0.204***	***0.177***	1						
17	QRatio	***-0.133***	***-0.104***	***-0.083***	***-0.099***	***-0.050***	***-0.030***	***-0.041***	***-0.041***	***-0.029***	***-0.096***	***-0.062***	***-0.050***	***-0.029***	***-0.041***	***-0.134***	***-0.142***	***0.052***	1					
18	Inv	***-0.071***	***0.063***	***0.044***	***0.127***	***-0.036***	***-0.019***	***-0.030***	0.005	***0.064***	***0.118***	***0.044***	***-0.035***	***-0.019***	***-0.030***	***-0.082***	0.002	***0.083***	***-0.177***	1				
19	ETD	***-0.178***	***-0.108***	***-0.082***	***-0.102***	***-0.057***	***-0.036***	***-0.040***	***-0.041***	***-0.023***	***-0.099***	***-0.063***	***-0.056***	***-0.036***	***-0.040***	***-0.161***	***-0.143***	***0.047***	***0.788***	***-0.064***	1			
20	ROA	***0.282***	***0.122***	***0.083***	***0.119***	***0.056***	***0.044***	***0.061***	***0.043***	***0.042***	***0.118***	***0.043***	***0.056***	***0.043***	***0.061***	***0.434***	***0.149***	***0.088***	***0.067***	***0.061***	***0.105***	1		
21	Loss	***-0.233***	***-0.157***	***-0.106***	***-0.133***	***-0.094***	***-0.065***	***-0.097***	***-0.061***	***-0.037***	***-0.133***	***-0.042***	***-0.094***	***-0.065***	***-0.097***	***-0.364***	***-0.172***	***-0.031***	***0.056***	***-0.065***	-0.001	***-0.464***	1	
22	Opinion	***-0.278***	***-0.093***	***-0.059***	***-0.091***	***-0.047***	***-0.035***	***-0.048***	***-0.032***	***-0.024***	***-0.091***	***-0.029***	***-0.046***	***-0.034***	***-0.047***	***-0.388***	***-0.120***	***-0.093***	***-0.136***	***-0.019***	***-0.133***	***-0.542***	***0.300***	1
23	Big	***0.542***	***0.203***	***0.131***	***0.199***	***0.102***	***0.075***	***0.101***	***0.073***	***0.037***	***0.194***	***0.078***	***0.102***	***0.074***	***0.101***	***0.588***	***0.184***	***0.159***	0.001	***-0.073***	***-0.039***	***0.243***	***-0.201***	***-0.274***

The bold and italic fonts indicate significant at 1% level, bold fonts indicate statistical significance at the 5% level, italic fonts indicate statistical significance at the 10% level, and the normal fonts are insignificant. All variables are defined in the Appendix.

TABLE 2
Audit Fees and Superfund Liabilities

This table examines the association between audit fees and environmental risk, as proxied by Superfund liabilities. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in the Appendix.

Multivariate Analysis (Dependent Variable = LnFee)

	(1)	(2)	(3)
Intercept	10.249***	10.229***	10.217***
	(142.88)	(142.10)	(141.98)
SUPF_DUMMY	0.188***		
	(16.65)		
SUPF_ASSETW		0.047***	
		(5.88)	
SUPF_EQUALW			0.003**
			(2.06)
LnAssets	0.472***	0.477***	0.478***
	(227.37)	(230.89)	(233.45)
NBS	0.049***	0.053***	0.053***
	(22.56)	(24.45)	(24.84)
NGS	0.059***	0.060***	0.060***
	(34.70)	(34.94)	(35.34)
QRatio	-0.013***	-0.014***	-0.014***
	(-6.83)	(-7.17)	(-7.23)
Inv	0.048	0.052*	0.049
	(1.51)	(1.65)	(1.55)
ETD	-0.020***	-0.020***	-0.020***
	(-12.48)	(-12.59)	(-12.56)
ROA	-0.139***	-0.141***	-0.143***
	(-18.45)	(-18.71)	(-18.99)
Loss	0.139***	0.136***	0.136***
	(19.88)	(19.48)	(19.37)
Opinion	0.121***	0.125***	0.126***
	(8.84)	(9.06)	(9.18)
Big	0.352***	0.348***	0.346***
	(41.96)	(41.35)	(41.13)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
No. of Observations	36,214	36,214	36,214
Adjusted R^2 (%)	84.63	84.53	84.52

TABLE 3
Audit Fees and TRI Emissions

This table examines the association between audit fees and environmental risk, as proxied by TRI_DUMMY, TRI industry ranking (TRI_RANK), and TRI scaled by sales (*TRI_SALES*). Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in the Appendix.

Multivariate Analysis (Dependent Variable = LnFee)

	(1)	(2)	(3)
Intercept	10.313***	10.311***	10.296***
	(233.01)	(232.92)	(232.47)
TRI_DUMMY	0.100***		
	(9.40)		
TRI_RANK		0.106***	
		(8.94)	
TRI_SALES			0.052***
			(2.92)
LnAssets	0.474***	0.474***	0.479***
	(203.93)	(204.46)	(210.71)
NBS	0.049***	0.050***	0.053***
	(20.34)	(20.44)	(22.13)
NGS	0.062***	0.063***	0.063***
	(32.30)	(32.33)	(32.75)
QRatio	-0.015***	-0.015***	-0.016***
	(-7.14)	(-7.15)	(-7.41)
Inv	0.025	0.024	0.033
	(0.71)	(0.68)	(0.96)
ETD	-0.019***	-0.019***	-0.020***
	(-10.91)	(-10.93)	(-11.10)
ROA	-0.148***	-0.149***	-0.150***
	(-17.93)	(-17.94)	(-18.16)
Loss	0.138***	0.138***	0.136***
	(17.91)	(17.92)	(17.61)
Opinion	0.130***	0.130***	0.131***
	(8.68)	(8.69)	(8.76)
Big	0.339***	0.339***	0.336***
	(36.16)	(36.15)	(35.82)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
No. of Observations	30,670	30,670	30,670
Adjusted R^2 (%)	83.77	83.77	83.74

TABLE 4
Audit Fees and Environmental Risk Variables from Asset4

This table examines the association between audit fees and environmental risk, as proxied variables obtained from Asset4 database. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in the Appendix.

Multivariate Analysis (Dependent Variable = LnFee)

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	10.145***	10.146***	10.132***	10.132***	10.131***	10.131***
	(136.23)	(136.21)	(135.93)	135.93	(135.96)	(135.97)
CO2_DUMMY	0.172***					
	(9.60)					
CO2_SALES		0.003***				
		(9.64)				
WASTE_DUMMY			0.156***			
			(6.46)			
WASTE_SALES				0.003***		
				(6.41)		
VIOLATIONS_DUMMY					0.127***	
					(7.30)	
VIOLATIONS						0.003***
						(7.37)
LnAssets	0.479***	0.479***	0.482***	0.482***	0.481***	0.481***
	(207.99)	(207.89)	(212.12)	(212.12)	(209.25)	(209.19)
NBS	0.051***	0.051***	0.052***	0.052***	0.052***	0.052***
	(22.06)	(22.07)	(22.54)	(22.53)	(22.37)	(22.37)
NGS	0.059***	0.059***	0.060***	0.060***	0.060***	0.060***
	(32.59)	(32.60)	(32.82)	(32.82)	(32.72)	(32.72)
QRatio	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***
	(-4.51)	(-4.51)	(-4.50)	(-4.50)	(-4.51)	(-4.51)
Inv	0.037	0.037	0.039	0.039	0.039	0.039
	(1.09)	(1.09)	(1.14)	(1.14)	(1.14)	(1.14)
ETD	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***
	(-11.55)	(-11.55)	(-11.48)	(-11.48)	(-11.54)	(-11.54)
ROA	-0.137***	-0.137***	-0.140***	-0.140***	-0.139***	-0.139***
	(-16.60)	(-16.60)	(-16.99)	(-16.99)	(-16.81)	(-16.81)
Loss	0.149***	0.149***	0.149***	0.149***	0.150***	0.150***
	(19.62)	(19.62)	(19.49)	(19.50)	(19.63)	(19.63)
Opinion	0.113***	0.113***	0.116***	0.116***	0.113***	0.113***
	(7.46)	(7.46)	(7.65)	(7.65)	(7.49)	(7.48)
Big	0.367***	0.367***	0.364***	0.364***	0.364***	0.364***
	(40.68)	(40.73)	(40.33)	(40.33)	(40.40)	(40.41)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	31,196	31,196	31,196	31,196	31,196	31,196
Adjusted R^2 (%)	84.49	84.49	84.47	84.47	84.47	84.47

TABLE 5
Audit Fees and Complexity of Corporate Environmental Risk Exposure

This table examines the association between audit fees and the complexity of environmental risk (sum of dummy variables from all data sources) and the association between audit fees and the continuous variables obtained from all three data sources. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in the Appendix.

Multivariate Analysis (Dependent Variable = LnFee)	(1)	(2)
Intercept	10.237***	10.214***
	(204.38)	(203.41)
COMPLEXITY	0.081***	
	(13.85)	
TRI_SALES		0.054***
		(2.64)
SUPF_EQUALW		0.002
		(1.52)
CO2_SALES		0.003***
		(4.51)
WASTE_SALES		0.000
		(0.60)
VIOLATIONS		0.001
		(1.30)
LnAssets	0.476***	0.482***
	(179.59)	(184.90)
NBS	0.046***	0.051***
	(17.26)	(19.12)
NGS	0.062***	0.063***
	(29.41)	(29.85)
QRatio	-0.009***	-0.010***
	(-3.78)	(-4.23)
Inv	0.013	0.020
	(0.33)	(0.51)
ETD	-0.020***	-0.020***
	(-10.36)	(-10.36)
ROA	-0.144***	-0.147***
	(-15.43)	(-15.73)
Loss	0.155***	0.152***
	(18.10)	(17.77)
Opinion	0.112***	0.115***
	(6.73)	(6.88)
Big	0.360***	0.358***
	(35.35)	(35.01)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
No. of Observations	25,654	25,654
Adjusted R^2 (%)	83.79	83.70

TABLE 6
Audit Fees and Changes in the Complexity of Environmental Risk Exposure

This panel examines the association between audit fees and changes in complexity of environmental risk, as proxied by COMPLEXITY_CHANGE. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. *TRI_SALES_CHANGE* is current year's *TRI_SALES* minus last year's *TRI_SALES*. *SUPF_EQUALW_CHANGE* is current year's *SUPF_EQUALW* minus last year's *SUPF_EQUALW*. *CO2_SALES_CHANGE* is current year's *CO2_SALES* minus last year's *CO2_SALES*. *WASTE_SALES_CHANGE* is current year's *WASTE_SALES* minus last year's *WASTE_SALES*. *VIOLATIONS_CHANGE* is current year's *VIOLATIONS* minus last year's *VIOLATIONS*. We lose year 2002 observations due to data unavailability for year 2001. The rest variables are defined in the Appendix.

Dependent Variable = LnFee

	(1)	(2)
Intercept	10.184***	10.185***
	(180.68)	(180.68)
COMPLEXITY_CHANGE	0.024*	
	(1.61)	
TRI_SALES_CHANGE		-0.033
		(-1.03)
SUPF_EQUALW_CHANGE		-0.003
		(-0.29)
CO2_SALES_CHANGE		0.001
		(1.22)
WASTE_SALES_CHANGE		0.001
		(1.00)
VIOLATIONS_CHANGE		0.000
		(0.10)
LnAssets	0.496***	0.496***
	(177.26)	(176.96)
NBS	0.050***	0.050***
	(17.92)	(17.87)
NGS	0.063***	0.063***
	(27.99)	(27.97)
QRatio	-0.012***	-0.012***
	(-4.46)	(-4.46)
Inv	0.003	0.003
	(0.07)	(0.06)
ETD	-0.016***	-0.016***
	(-7.48)	(-7.47)
ROA	-0.168***	-0.167***
	(-15.46)	(-15.44)
Loss	0.158***	0.158***
	(16.80)	(16.80)
Opinion	0.120***	0.119***
	(6.31)	(6.29)
Big	0.361***	0.361***
	(32.83)	(32.84)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
No. of Observations	20,632	20,632
Adjusted R^2 (%)	84.07	84.07

TABLE 7

Going-Concern, Default Risk and Environmental Risk Complexity

This panel examines the association between default risk and environmental risk, as proxied by COMPLEXITY. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Wald Chi-Square values are presented in parenthesis in Column (1) and t-values are presented in parenthesis in Column (2). All variables are defined in the Appendix.

	(1) ***Dependent Variable*** Going_concern	(2) **Dependent Variable** Z-score
Intercept	-0.545***	-2.068***
	(12.22)	(-4.58)
COMPLEXITY	0.296***	-0.263***
	(15.16)	(-5.23)
LnAssets	-0.498***	0.396***
	(482.19)	(19.50)
NBS	-0.037	-0.060**
	(1.61)	(-2.56)
NGS	-0.002	-0.048***
	(0.01)	(-2.64
QRatio	-0.485***	0.189***
	(165.29)	(9.05)
Inv	-0.984***	1.561***
	(19.08)	(4.80)
ETD	-0.083***	1.246***
	(11.73)	(71.63)
ROA	-0.909***	11.408***
	(237.51)	(114.71)
Loss	1.490***	
	(284.24)	
Opinion		-2.859***
		(-19.19)
Big	-0.197**	
	(6.01)	
Year fixed effects	Yes	Yes
Industry fixed effects	N/A	Yes
No. of Observations	25,654	23,395
Likelihood Ratio	6,200	
Adjusted R^2 (%)		68.05

Table 8
Audit Fees, Environmental Risk Exposure and Corporate Governance

This table examines the association between audit fees and environmental risk, as proxied by variables obtained from Asset4 database, after controlling corporate governance and internal control. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in the Appendix.

Dependent Variable = LnFee				
	(1)	(2)	(3)	(4)
Intercept	9.455***	9.451***	9.372***	9.377***
	(28.17)	(28.16)	(28.00)	(27.98)
COMPLEXITY_NEW	0.035***			
	(3.98)			
CO2_SALES		0.001***		
		(3.72)		
WASTE_SALES			0.001***	
			(3.02)	
VIOLATIONS				0.001***
				(2.74)
LnCG	-0.003	-0.004	0.002	0.000
	(-0.19)	(-0.24)	(0.15)	(0.01)
IC	0.280***	0.278***	0.282***	0.279***
	(4.83)	(4.79)	(4.86)	(4.80)
LnAssets	0.583***	0.585***	0.590***	0.589***
	(63.26)	(63.76)	(66.65)	(65.64)
NBS	0.060***	0.059***	0.060***	0.059***
	(11.71)	(11.64)	(11.81)	(11.64)
NGS	0.028***	0.028***	0.029***	0.028***
	(6.55)	(6.45)	(6.70)	(6.64)
QRatio	-0.006	-0.006	-0.006	-0.005
	(-0.59)	(-0.64)	(-0.64)	(-0.52)
Inv	1.440***	1.439***	1.428***	1.440***
	(10.08)	(10.08)	(9.98)	(10.06)
ETD	-0.038***	-0.037***	-0.037***	-0.039***
	(-5.27)	(-5.23)	(-5.17)	(-5.39)
ROA	-0.575***	-0.563***	-0.562***	-0.564***
	(-5.15)	(-5.06)	(-5.04)	(-5.05)
Loss	-0.006	-0.007	-0.005	-0.005
	(-0.19)	(-0.21)	(-0.14)	(-0.16)
Opinion	0.074	0.071	0.087	0.070
	(0.52)	(0.49)	(0.60)	(0.49)
Big	0.079	0.074	0.077	0.091
	(0.97)	(0.90)	(0.94)	(1.11)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
No. of Observations	2,851	2,851	2,851	2,851
Adjusted R^2 (%)	77.99	78.04	77.94	77.92

Table 9

The Impact of Policy Enhancement on the Association between Audit Fees and Complexity of Environmental Risk

This table examines the association between audit fees and environmental risk in Year 2004 versus other years. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in the Appendix.

Dependent Variable = LnFee	(1)
Intercept	10.241***
	(204.59)
COMPLEXITY	0.075***
	(12.47)
COMPLEXITY_Y04	0.074***
	(4.90)
Y04	-0.247***
	(-16.37)
LnAssets	0.476***
	(179.63)
NBS	0.046***
	(17.18)
NGS	0.062***
	(29.41)
QRatio	-0.009***
	(-3.73)
Inv	0.013
	(0.35)
ETD	-0.020***
	(-10.39)
ROA	-0.143***
	(-15.38)
Loss	0.156***
	(18.22)
Opinion	0.112***
	(6.74)
Big	0.361***
	(35.47)
Year fixed effects	Yes
Industry fixed effects	Yes
No. of Observations	25,654
Adjusted R^2 (%)	83.82

TABLE 10
International Analysis: Audit Fees and Complexity of Environmental Risk

This table examines the association between audit fees and the complexity of environmental risk (the sum of CO2_DUMMY, WASTE_DUMMY, and VIOLATIONS_DUMMY) of a sample of international companies other than those in Compustat North America. Year- and industry-fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in the Appendix.

Panel A

Multivariate Analysis (Dependent Variable = LnFee)	(1)	(2)
Intercept	1.444**	0.264
	(2.02)	(0.48)
COMPLEXITY_NEW	0.372*	
	(1.63)	
CO2_SALES		0.019
		(0.35)
WASTE_SALES		0.010***
		(3.56)
VIOLATIONS		0.015
		(0.27)
LnAssets	0.788***	0.790***
	(80.93)	(81.83)
QRatio	0.019*	0.019*
	(1.70)	(1.79)
Inv	0.000	0.000
	(-0.36)	(-0.54)
ROA	0.145	0.283
	(0.34)	(0.67)
Loss	0.364***	0.380***
	(4.28)	(4.50)
Opinion	2.518***	2.516***
	(3.78)	(3.82)
Year fixed effects	Yes	Yes
No. of Observations	2,615	2,615
Adjusted R^2 (%)	75.91	76.37

Panel B

Countries	N
JAPAN	675
UNITED KINGDOM	481
FRANCE	210
GERMANY	149
AUSTRALIA	138
SWEDEN	113
NETHERLANDS	109
SWITZERLAND	95
SPAIN	86
SOUTH KOREA	71
FINLAND	54
ITALY	51
BELGIUM	48
NORWAY	44
TAIWAN	38
DENMARK	34
PORTUGAL	34
SOUTH AFRICA	33
INDIA	31
HONG KONG	23
SINGAPORE	20
AUSTRIA	13
BRAZIL	10
THAILAND	10
RUSSIAN FEDERATION	9
CANADA	6
MALAYSIA	6
NEW ZEALAND	6
POLAND	5
CZECH REPUBLIC	4
Others	3
INDONESIA	2
LUXEMBOURG	2
MEXICO	1
PHILIPPINES	1
Total	2,615