Green Transition and Information Verification Costs

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Abstract

This paper examines whether and how the green transition affects the information verification costs of firms in high-polluting industries. By leveraging China's *Green Audit of Outgoing Officials* (GAOO) policy and employing audit fees as a proxy for verification costs, in difference-in-differences analyses (with and without firm fixed effects or entropy balancing) we observe a significant reduction in these costs for high-polluting firms during the economic transition toward green practices. The decrease is stronger among firms located in regions with departing public officials and for firms with more green information to be verified. We identify two channels driving this trend: (1) Auditors rely on public information generated from intensified governmental efforts, thereby economizing on the private verification of green information (i.e., a substitution effect); (2) High-polluting firms improve their environmental performance, leading to diminished client risk and lower verification demand. Additional analyses show that reduced audit fees are not accompanied by a deterioration in audit quality. Overall, our study indicates that the green transition can reduce information verification costs of high-polluting firms.

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1. Introduction

Over the past several decades, the significance of environmental risks has steadily escalated. It is widely acknowledged that the conventional economic development model, heavily reliant on environmentally harmful practices, poses substantial climate risks and is inherently unsustainable. In 2011, the United Nations Environment Program unveiled the notion of a "green transition," advocating for a profound shift toward an economic framework that minimizes environmental harm.[1] The green transition signifies a major transformation, not only in production and consumption systems but also in infrastructure, institutions, societal values, regulations, and politics.

The green transition is fueling a growing demand among various stakeholders for environmental information from firms, especially those operating in high-polluting industries.[2] However, unlike financial data, environmental information (such as details about environmental performance and potential risks) lacks standardization, entails intricate calculations, and requires specialized expertise and substantial judgment. As a result, it poses significant challenges for third-party verification, potentially leading to high verification costs. Anecdotal evidence shows that auditors, the primary entities for third-party verification in the financial markets, consider environmental issues to be essential risk factors. For instance, in BP's 2021 annual report, the auditor highlighted a key audit matter related to "the potential impact of climate change and the energy transition on the valuation of Property, Plant, and Equipment (PPE), goodwill, and

[1] Also referred to as "transition to a green economy" or "green growth."
[2] For example, the SEC Investor Advisory Committee asserts that "investors consider certain environmental and social information material to their investment and voting decisions" (https://www.sec.gov/spotlight/investor-advisory-committee-2012/esg-disclosure.pdf).

intangible assets."[3] High verification costs can result in information frictions, affecting the efficiency of decision-making for both investors and firms. This could potentially undermine some of the intended benefits of the green transition and possibly even disrupt the transition trajectory itself.[4] Therefore, this study aims to further our understanding of whether and how the green transition affects information verification costs for firms in high-polluting industries.

We investigate this research question by focusing on the green transition in China. China is the research setting for the following reasons. First, in countries with democratic systems, the transition to a green economy is usually gradual, spanning a long period. For example, the influence of lobby groups and active voters often results in a sluggish movement toward a green economy (e.g., Purdy, 2010); leaders in democratic systems may find it challenging to commit their successors to consistent environmental policies.[5] Therefore, it is more difficult to identify the impact of a green transition. Conversely, China boasts a high degree of state autonomy, and its society is accustomed to the exertion of coercive power; thus, its system facilitates a more expedited transition. This makes it feasible to observe effects (if any) with fewer confounding factors.[6] Second, China implemented the *Green Audit of Outgoing Officials* policy (GAOO), directly linking environmental performance to public officials' promotions. This creates strong political incentives for officials at all levels of local governments to transit to a green economy.[7]

[3] An analogous Chinese example can be found in ZZMD's 2018 annual report, a coal enterprise (Stock Code 600121), where the auditor stressed that a key audit matter was "the projected liability pertaining to environmental restoration." We provide practical examples in Appendix A (1). According to auditing standards (i.e., ISA 701), key audit matters are those matters that demand significant auditor attention in performing the audit, such as areas with higher assessed risk of material misstatements, areas requiring significant auditor judgment, or transactions or events that had a significant effect on the financial statements or the audit.

[4] Appendix A contains further examples from practice about the importance of verification.

[5] As an example, U.S. President Trump decided to pull out of the Paris Climate Agreement signed by President Obama.

[6] Some researchers use "authoritarian environmentalism" to describe how countries such as China can promptly respond to severe environmental challenges when their leaders make decisions (e.g., Beeson 2010; Shearman and Smith 2007).

[7] Institutional background of the GAOO policy is discussed in Section 2.

Given the dominant role of the government in China, this top-level reform represents a substantial movement toward a green economy and has immediate effects on social and business environments. Therefore, it provides a valuable opportunity to investigate the impact of the green transition.

Our primary hypothesis is that information verification costs, proxied by audit fees, for firms operating within high-pollution industries ("high-polluting firms") will be affected by the green transition, proxied by the implementation of GAOO.[8] There are two contrasting arguments about the effects of green transition on audit fees. On one hand, the green transition, especially when spearheaded by governmental bodies, is usually accompanied by intensified oversight and heightened regulatory measures that escalate the penalty risks associated with environmental issues, potentially resulting in increased audit fees. On the other hand, government-led green initiatives are likely to result in greater availability of public information about firms' environmental performance and more intense government monitoring, decreasing the cost of collecting audit evidence. Further, firms' transition to green production could lead to enhanced environmental performance and diminished environmental risks, reducing the need for verification.

We empirically examine the effects of GAOO on audit fees using a large sample of Chinese listed firms from 2014 to 2018. Our main analyses use a difference-in-differences (DID) regression model, both with and without firm fixed effects, around the implementation of GAOO. The treatment group comprises firms within high-polluting industries, identified due to their

[8] While using audit fees as a proxy is not complete given the existence of other verification entities (e.g., credit-rating agencies, ESG rating agencies, underwriters, certification entities, etc.), focusing on audit fees benefits from superior data availability and quality.

much more severe environmental issues and greater sensitivity to the green transition. Firms in other industries form the control group. Our primary analyses compare firms in high-polluting industries with other firms before and after the implementation of GAOO. In sensitivity analyses we match the two sets of firms using entropy balancing.

After first confirming that GAOO had the intended positive *real effects* on environmental quality, we observe a significant decrease in the audit fees of high-polluting firms following the implementation of GAOO compared to other firms. This finding is robust to specifications without and with firm fixed effects and without and with entropy balancing. Further, we find that the decrease is more pronounced for firms located in cities where leading public officials are leaving office within the next two years, suggesting that the GAOO policy effectively drive the reduction of the verification costs. We also find that the effect is stronger for firms with more environment-related information to be verified (based on textual analysis), suggesting that the reduction is about the verification costs of environmental information.[9]

We further explore *how* the green transition can reduce the audit fees of high-polluting firms by examining two channels. First, GAOO broadens the sources of evidence in the verification process of environment-related issues. When government officials are incentivized to improve environmental performance within their jurisdiction, increased efforts in monitoring polluting firms generate more public information about firms' environmental performance. Auditors can then rely on this heightened public monitoring and expanded public information to reduce their efforts in private verification. Our empirical tests support this channel, showing that the reduction in audit fees for high-polluting firms is stronger in regions with more effective

[9] This finding also suggests that our inferences are not due to industry effects (beyond the industry controls we employ in the empirical analyses).

governmental audits and is strengthened when the government increases the transparency of public environmental information. Additionally, we document that high-polluting firms reduce the lag time of annual reports, indicating a reduction in audit efforts. Together, the empirical evidence is consistent with auditors relying on stricter governmental monitoring and expanded public information, thereby reducing their audit efforts.

Second, GAOO can reduce potential litigation losses associated with environmental issues. In the transition to a green economy, high-polluting firms are likely to increase investments in improving their environmental performance, leading to a lower misstatement risk associated with environmental issues. For example, hidden liabilities linked to environmental concerns are expected to decrease. Research also documents that better environmental performance is associated with lower risk, lower cost of capital, and improvement of efficiency (e.g., Kim, Li, and Li, 2014; Chava, 2014; King and Lenox, 2002). Because lawsuits targeting auditors may arise following corporate failures, a reduction in the client firm's risk can contribute to diminished litigation losses for auditors. Our empirical analyses also provide supporting evidence for this channel. We observe that high-polluting firms significantly increase their green investments after the implementation of GAOO, suggesting a responsive approach to the green transition by making more environment-related investments. These high-polluting firms also apply for and receive more green patents, validating the efficacy of their green investments. Furthermore, we demonstrate that high-polluting firms exhibit a reduced likelihood of inclusion in the intensive government monitoring list and fewer instances of violations concerning environmental laws or regulations after GAOO. These findings indicate a decrease in environmental risks. Taken together, the empirical results are consistent with the idea that firms

respond to GAOO by making more investments to improve their environmental performance, resulting in a reduction of audit risk and audit fees.[10]

Our paper makes several contributions. First, it adds to the literature on Corporate Social Responsibility (CSR) and Environment, Society, and Governance (ESG). The transition toward sustainability underscores the importance of environmental disclosure, while simultaneously raising concerns about elevated verification costs associated with complex green information. These concerns have the potential to disrupt green-related transactions and compromise the intended advantages of such a transition. Our study reveals a decrease in verification costs following the GAOO, thereby alleviating apprehensions regarding the green transition to some extent. In addition, we empirically establish that the green transition influences the verification model and identify synergy between public and private verification in enhancing verification efficiency.

Second, in recent years, CSR and ESG have garnered increasing attention from investors, practitioners, other stakeholders, and researchers. Accounting and finance scholars have started to explore the interactions between the environment and capital markets. However, research predominantly focuses on investors (e.g., Bolton and Kacperczyk, 2021) and creditors (e.g., Chava, 2014; Seltzer, Starks, and Zhu, 2022), largely overlooking an important market participant — auditors. Given that environmental factors are critical inputs in the auditing process and auditing outcomes, we systematically investigate the effects of the green transition from the perspective of auditors. Our findings indicate that as the economy shifts toward a

[10] In additional analyses we observe that reduced audit fees do not come at the expense of audit quality. Further, we do not find evidence that treatment firms switch to lower-priced audit firms or that they experience a reduction in scale.

greener system, external auditors adjust their auditing process. Specifically, due to heightened governmental monitoring and improved environmental performance of client firms, auditors reduce their efforts and in turn lower their fees. These results suggest that the change in the economic development model significantly impacts financial market participants.

Third, our study sheds new light on how auditors respond to changes in clients' external environments. Although auditing standards emphasize the importance of understanding client firms' external environment to assess audit risks and design audit processes, research on such external environment factors is relatively scarce (DeFond and Zhang, 2014). We contribute new evidence by demonstrating that changes in the external environment due to the green transition affect audit fees, indicating that auditors formally consider such changes in the external environment.[11]

Finally, as the country with the largest energy consumption and greenhouse emissions, China plays a crucial role in global environmental efforts.[12] This article provides empirical evidence about China's initiatives to address environmental issues. By integrating environmental protection into the performance evaluation of public officials, China has substantially altered the external environment in which high-polluting firms operate. These changes have tangible effects on pollution control and market participants.

[11] In addition, the paper adds to research that examines the role of political incentives and politicians in capital markets (e.g., Kostovetsky, 2015; Mehta and Zhao, 2020). Our research extends such inquiry by investigating whether and how introducing environmental protection in public officials' performance evaluation and promotion system shapes the external auditor's practice.

[12] China is also the second-largest capital market in the world.

2. Institutional Background and Hypothesis Development

2.1 Institutional Background for Green Transition in China

"Clear waters and green mountains are as good as mountains of gold and silver!" This political slogan, formulated by Chairman Xi Jinping, has been widely used in China to promote environmental awareness in recent years. Despite persistent environmental challenges, China has made significant progress in moving toward a green, or at least greener, economy.[13] In September 2020, China announced its commitment to reach its carbon-emissions peak before 2030 and achieve carbon neutrality before 2060.

China's journey toward environmental sustainability has been long and challenging. In the early 2000s, after decades of rapid economic growth, China emerged as one of the largest global economies. However, this economic success was accompanied by severe environmental degradation.[14] Although the central government recognized the importance of environmental protection and enacted numerous laws and regulations, their enforcement was often ineffective.[15] Lo et al. (2006) point out that the implementation of environmental protection largely depends on local governments and officials. Since the launch of economic reforms in the 1990s, the central government in China has established a GDP tournament among local government officials, closely tying the promotion or demotion of officials to the economic performance in

[13] The public and private investment in clean energy in China was $381 billion in 2021, which outstrips all of North America by $146 billion. See https://www.iea.org/data-and-statistics/data-product/world-energy-investment-2022-datafile.

[14] According to the World Bank (2007), among the twenty most polluted cities in the world, twelve were located in China.

[15] According to an expert in Chinese environmental law, the National People's Congress and its Standing Committee have passed as many as 280 pieces of legislation, of which 29 relate to environmental resources, energy, and clean production. See https://chinadialogue.net/en/pollution/3831-china-s-green-laws-are-useless/. The central government also sets clear targets for protecting the environment. For example, in the eleventh Five-Year-Plan issued in 2005, the central government set the objective to reduce major pollutants by 10% each year and reduce energy consumption per unit of GDP by about 20% from the 2005 level.

their jurisdictions (Li and Zhou, 2005). Fearing that stringent environmental requirements might hinder economic growth, local government officials were hesitant to enforce environmental regulations. Political incentives for economic growth also drove officials to attract industries with high pollution or shield local firms from penalties for environmental violations (Wu et al., 2014; Jiang, Lin, and Lin, 2014). Consequently, rapid economic development in China was coupled with severe environmental deterioration (Wang, Wijen, and Heugens, 2018). According to the World Bank (2014), China became the world's largest emitter of greenhouse gases by 2006.

To address issues stemming from promotion-incentive distortions, the central government initiated adjustments to the promotion-evaluation standards for local officials starting with the release of the 11th Five-Year Plan in 2006. Specifically, the State Council explicitly regulated that environmental pollution would be considered in the performance appraisal of local officials. Integrating environmental protection into the evaluation system for government officials aimed to create incentives for local governments to strike a balance between economic development and environmental protection. Studies confirm that this reform has significantly impacted environmental performance (e.g., Wang, 2013; Zheng et al., 2014).

However, as noted by Wang (2013), several issues plagued the system. First, the evaluation was based on indicators that were easily measured and collected, with real environmental problems not specified as indicators and receiving scant attention. For instance, officials received credit for investments in environmental infrastructure without necessarily ensuring the effective operation of these infrastructures. Second, officials often focused on short-term activities that temporarily met targets. For example, officials received credit if the annual count of blue-sky

days exceeded 85% of the year.[16] Consequently, some local governments temporarily shut down energy-intensive companies to meet the criteria, technically improving quantitative targets without substantial real long-term effects on environmental protection.[17] Empirically, Cao et al. (2019) document that officials relaxed environmental regulations at the end of their tenure, as the effects of pollution might only manifest after officials leave office.

Third, the central government often had to rely on self-reported data from local governments. In the face of asymmetric information, local officials may engage in data manipulation (Ghanem and Zhang, 2014). Consequently, environmental issues persisted even after a decade of implementing the system. According to the Ministry of Ecology and Environment of China, in 2014, only 16 out of 161 cities at or above prefecture level met air-quality standards, and 60.5% of underground water had poor or extremely poor quality.[18]

Due to these problems, the *Green Audits of Outgoing Officials* (GAOO) emerged as the next and important stage of reform. In September 2015, the Central Committee of the Communist Party of China (CCCPC) and the General Office of the State Council (GOSC) issued an "Integrated Reform Plan for Promoting Ecological Progress."[19] The GAOO is a crucial initiative within this plan to enforce audits of public officials' management of natural resource assets when they leave their posts.[20] In November 2015, the CCCPC and GOSC issued a detailed working plan for the green audit, which explicitly stated that formal regulations and guidance would be

[16] A blue-sky day is defined as a day with an API (Air Pollution Index) lower than 100.
[17] It was also reported that local governments cut power to households, schools, and even hospitals, to temporarily achieve energy-reduction targets (Yan 2011). Also, a local government reportedly painted an entire barren mountainside green to fool environment inspectors. See http://news.cntv.cn/special/lanse/shuashan/index.shtml
[18] http://english.mee.gov.cn/Resources/Reports/soe/soe2011/201606/P020160601592064474593.pdf.
[19] CCCPC and COSC represent the top authority in the Chinese Community Party and the central government, respectively.
[20] See the full text of the government announcements at : http://english.www.gov.cn/policies/latest_releases/2015/09/22/content_281475195492066.htm#:~:text=This%20reform%20is%20designed%20to,incentives%20and%20restraints%20by%202020.

issued in 2017. It is important to note that this plan provides all government officials with a clear expectation of the schedule for GAOO implementation.

In December 2015, during a historic UN conference in Paris, China formally announced its adoption of the Paris Climate Change Agreement, signaling its determination to fully engage in global efforts to protect the environment.[21] As anticipated, in June 2017, Chairman Xi Jinping approved the "Regulations on the Natural Resource Audit on the Outgoing Cadres (Trial)," which was formally released in November 2017.[22] This regulation underscores the importance of supervising and protecting natural resources and the environment, mandating GAOO implementation nationwide.

GAOO targets principal leaders at all levels of local governments, such as city mayors or party secretaries, and aims to effectively address the three problems in the old system mentioned above. First, the auditing areas encompass natural resources (such as land, water, forest, mines, etc.), environmental protection, and gas pollution control., within the officials' jurisdiction. GAOO is thus much more comprehensive than the few indicators used in earlier years. Second, the auditing covers not just the year when officials leave office but the entire period they are in charge. This approach establishes a system of lifelong accountability for major ecological and environmental damage that may become apparent after an official has left office and for which they are found liable. Third, because the audit is executed after officials leave office, it eliminates (or at least greatly reduces) the potential for data manipulation while officials are still in power. In Appendix A (2), we present excerpts from a GAOO report.

[21] China also set the following targets for 2030: to reach peak carbon-dioxide emissions, if possible, earlier than 2030; to lower carbon-dioxide emissions per unit of GDP by 60% to 65% from the 2005 level; to increase the share of non-fossil fuels in primary energy consumption to around 20%; and to increase the forest-stock volume by around 4.5 billion cubic meters compared with the 2005 level.

[22] See http://www.xinhuanet.com//politics/2017-11/28/c_1122025649.htm

GAOO holds officials accountable for environmental matters, and the audit results have direct implications for their political careers. Individuals found responsible for environmental damage may face a range of consequences based on the severity of their misconduct. This could include reprimands, public apologies, disciplinary actions within the government or party, demotions, or removal from office.[23] GAOO serves as a very strong motivating factor for government officials to genuinely prioritize environmental concerns and contribute to green growth. As reported by media, by the end of 2021, the government had executed approximately 8,400 green audit projects, involving more than 12,000 leaders and officers at various levels.[24]

2.2 Related Literature

Our paper relates to three streams of literature. The first stream examines the impact of environmental factors on the financial market, an area that has gained increasing attention. Studies find that environmental factors can affect cost of capital (Chava, 2014), firm valuation (Bolton and Kacperczyk, 2021), credit ratings and yield spreads (Seltzer, Starks, and Zhu, 2022), and stock performance (Pástor, Stambaugh, and Taylor, 2022). Further, a few studies highlight the challenges of obtaining accurate information about firms' environmental risk. Christensen et al. (2022) document significant disagreement about firms' environmental performance, suggesting that ESG disclosure exacerbates ESG rating disagreements. Avramov et al. (2022) propose that a prominent challenge for ESG investors is the substantial uncertainty about the true ESG profile of a firm, which significantly affects the risk-return trade-off. Gibbons (2023)

[23] According to the *Green Audit Report of Ping Zeng during His Tenure as the Chief of Tianmen Water Conservancy Bureau*, the former chief did not perform well in fulfilling the responsibilities of natural resource asset management and ecological protection. After the departure audit of green performance, Ping Zeng was demoted to investigator in the Bureau, which is not a leadership role (i.e., a major demotion).

[24] See http://www.news.cn/2021-11/01/c_1128019769.htm.

reveals that mandatory reporting of environmental and social information correlates with increased investment from institutional owners, influencing firms' investment and financing decisions. To summarize, this stream of literature offers ample evidence that environmental factors influence the financial market, while few studies focus on the effects of the green transition on a crucial market participant — auditors. The lack of consensus on environmental performance also underscores the importance of verifying environmental information.

The second stream of research explores the influence of external factors on the auditor's verification process. Knechel (2007) contends that auditors must comprehend the entire organization and its operating environment to understand the audit challenges they may encounter. The external operating environment, along with potential changes, not only influences the strategy and operations of client firms but also shapes the audit process and the allocation of audit efforts. In recent studies, there is an emerging focus on whether and how auditors consider the external environment in which firms operate. Jha, Kulchania, and Smith (2021) use corruption data in the U.S. to show that audit fees are higher for firms headquartered in more corrupt regions. Wu and Ye (2020) find that auditors respond to changes in client firms' external environment, as proxied by the names of their owners included in the "rich list". They demonstrate that auditors charge higher audit fees to address political risks associated with heightened public scrutiny. Eierle et al. (2022) review the literature on external factors affecting audit pricing using the PESTLE framework (Political, Economic, Sociological, Technological, Legal, and Environmental). They note that while most studies focus on the legal environment, "environmental factors remain under-researched despite their importance in public discourse" (p. 112). Our research addresses this gap by investigating how auditors adjust audit fees when

client firms are located in a society undergoing a rapid transition to a green economy.

The third area of research concerns the role of political factors in capital markets. Gul (2006) uses a sample of firms in Malaysia and observes that auditors respond to political factors by adjusting audit fees. Chaney, Faccio, and Parsley (2011) find that politically connected firms are associated with lower quality accounting information. Additionally, a growing body of literature links politics to real effects. Chen, Tang, Wu, and Yang (2021) conclude that newly appointed local leaders, to demonstrate economic achievement, tend to collect more taxes to expand fiscal expenditures, underscoring the critical role of political incentives in corporate tax behaviors. The overarching message from this literature is that political factors and incentives play an important role in shaping the economic behaviors of market participants. Our paper contributes to this research by examining how auditors respond to changes in the external environment toward a green economy, induced by shifts in the political incentives of government officials.

2.3 Hypothesis Development

China, characterized by an authoritarian political regime with a dominant one-party central government, historically emphasized environmental protection through regulations. However, the enforcement of these regulations often faltered due to misaligned incentives among local government officials (Beeson, 2010; Marquis and Qian, 2014).

The introduction of GAOO has significantly altered the political incentives of local government officials. The governmental audit, focusing on officials' adherence to central government policies regarding sustainable development, achievement of natural resource management and environmental protection targets, and fulfillment of monitoring responsibilities,

directly shapes officials' performance evaluation and political careers. Crucially, GAOO establishes a lifelong responsibility system for environmental damage, linking environmental protection with officials' political trajectories. Given the dominant role of the government in China, this represents a substantial move toward a green economy. Auditing standards explicitly mandate auditors to consider their client firms' external environments, encompassing political factors, regulations, environmental requirements, and more, when making audit-planning decisions (e.g., ISA 315; Chinese CPA 1211). Thus, the green transition (and GAOO in particular) can potentially affect the audit process.

There are two contrasting arguments regarding the effects of GAOO on the audit fees of high-polluting firms. On one hand, GAOO might conceivably lead to increased audit fees. International auditing standards require auditors to ensure client compliance with environmental regulations, as noncompliance can affect operations, result in significant penalties, and potentially affect financial statements (ISA 250). GAOO enhances government officials' accountability for environmental issues, prompting closer monitoring of high-polluting firms and increasing the likelihood of penalties. For instance, the JAC Group (600418.sh) listed in Shanghai was fined 1.7 billion RMB due to environmental issues.[25] Empirically, Li, Simunic, and Ye (2014) conclude that auditors charge higher fees for those with higher compliance risk regarding applicable environmental regulations.

On the other hand, there are strong reasons to expect that GAOO may negatively impact the audit fees of high-polluting firms. Heightened monitoring and increased public information about environmental risks may result in lower verification costs. Cordis, Hsu, and Zhang (2022)

[25] See http://news.eastday.com/eastday/13news/auto/news/finance/20200628/u7ai9359427.html

find that the availability of public information from the government leads to a decrease in industrial pollution. Chow et al. (2022) demonstrate that auditors exert less effort and charge lower fees when clients are subject to more stringent external tax authorities, indicating positive spillover effects. Choy, Jiang, Liao, and Wang (2023) conclude that regulators' public disclosure of environmental violations improves the effectiveness of lender monitoring in reducing borrowers' polluting activities. In the context of GAOO, incentivizing government officials to enhance external monitoring of high-polluting firms allows auditors to rely on external governance and government-provided public information, thereby potentially reducing audit efforts and fees.[26] In Appendix A (3) we present some anecdotal evidence that auditors rely on governmental agencies to assess their clients' potential environmental risks.[27]

Second, high-polluting firms, in response to increased regulatory requirements and heightened environmental enforcement, are incentivized to enhance their environmental performance. Importantly, Brown, Martinsson, and Thomann (2022) show that environmental policies encourage high-polluting firms to invest in transformative measures for their production processes. Improved environmental performance can reduce firm risk (Kim, Li, and Li, 2014) and lower the cost of capital (Sharfman and Fernando, 2008; Chava, 2014; Seltzer, Starks, and Zhu, 2022). Therefore, if firms enhance their environmental performance, it may lead to reduced cost of capital, lower default probability, decreased risk, and earnings management, subsequently

[26] China has a highly competitive audit market relative to most Western countries (e.g., Chen, Sun, and Wu 2010; Pan, Shroff, and Zhang 2023), including a much smaller share by the Big-4 audit firms. For example, Li, Liu, Ye, and Yu (2023) conclude that "… the size of domestic [audit] firms is now comparable and competitive with their international counterparts." As a result, the reduced efforts may lead to lower audit fees that auditors can charge. We examine possible audit-firm switches in Section 5.

[27] Note these examples are not audit reports for firms' annual financial reports because auditors rarely discuss details about the auditing process. However, these examples show that governmental agencies and public information are important information resources for auditors. We note that other market participants, such as underwriters, also utilize governmental agencies and public environmental information.

resulting in lower audit risks and audit fees.

Moreover, when firms make green investments to reduce pollution, it often involves a systematic redesign of the production process, creating efficiency gains and mitigating litigation or compliance risks. Porter (1991) views pollution as a waste of resources and argues that measures to reduce pollution can strengthen a firm's competitiveness. King and Lenox (2002) suggest that firms may underestimate the value of pollution-reduction means, and implementing them can lead to financial gains. Dai, Duan, and Ng (2021) find that regulation-induced green innovation helps firms improve their competitive advantage and differentiate themselves from rivals. In response to increased efficiency or decreased compliance risks, auditors may adjust audit fees downward. In summary, client firms exert additional efforts to transition to greener operations, reducing potential environmental liability and resulting in lower audit risks and audit fees.

The above analyses suggest that the impact of GAOO on audit fees for high-polluting firms is an empirical question. We formalize this prediction in the following hypothesis (stated in the null form):

H1: The Green Audit of Outgoing Officials (GAOO) has no effect on audit fees of high-polluting firms.

3. Data and Methodology

3.1 Data

We extract financial information and audit-fee data from the China Stock Market & Accounting Research Database. Our sample period includes four years of data, 2014 and 2015

are years before the event, and 2017 and 2018 are years after the event. We drop year 2016 because it is a transition year. Note, although the regulation of GAOO was formally approved by President Xi Jinping in the middle of 2017, it was well expected by the end of 2015. Accordingly, we use 2017 as the first post year.[28]

GAOO focuses on environmental issues; therefore, it mainly affects high-polluting firms because these firms have a stronger effect on the environment. In contrast, low-polluting firms have weaker effects on the environment and are less likely to affect the audit results of GAOO. As a result, we use high-polluting firms as the treatment firms and use other firms as the control firms. To identify the treatment firms, we rely on the Industry Classification Directory of the Inspection of Environmental Protection for Listed Corporations issued by the State Environmental Protection Administration in China. The following industries are high-polluting industries and have a larger impact on the environment: (1) metallurgical, (2) chemical, (3) petrochemical, (4) coal, (5) thermal power, (6) building materials, (7) paper, (8) brewing, (9) pharmaceutical, (10) fermentation, (11) textiles, (12) leather, (13) mining, and (14) steel. Firms in these industries are more likely to be affected by GAOO and represent treatment firms. Other firms are used as control firms.

3.2 Methodology

To evaluate the effects of GAOO on audit pricing of high-polluting firms, we employ the following DID regression model:

$$AUDITFEE_{i,t} = \beta_0 + \beta_1 \times TREAT_i + \beta_2 \times Post_{i,t} + \beta_3 TREAT_i \times Post_{i,t} + Controls + e_{i,t},$$

[28] Our inferences remain consistent if we set years 2016 and 2017 as the post-event period (i.e., if we do not drop year 2016).

(1)

AUDITFEE is the log of audit fees. *TREAT* is an indicator variable equal to 1 if the firm belongs to a high-polluting industry. *POST* is an indicator variable equal to 1 if the observation is in year 2017 or 2018 and 0 otherwise. *TREAT*×*POST* is the variable of interest, which captures the effects of GAOO on high-polluting firms compared to low-polluting firms.

We include several control variables motivated by extant research, including firm size (*SIZE*), leverage ratio (*LEV*), market-to-book ratio (*MB*), return on asset (*ROA*), operating loss (*LOSS*), current ratio (*CR*), quick ratio (*QUICK*), ratio of inventory and accounts receivable to total assets (*INVREC*), an indicator variable for Big-4 auditor (*BIG4*), modified opinion (*MAO*), total accruals (*TA*), volatility of stock return (*SDRET*), special items (*SPCTERM*), managerial ownership (*MNOWN*), firm age (*AGE*), the proportion of independent directors (*INDDIR*) and the volatility of operational cash flow (*SDCFO*) (e.g., Kim, Liu, and Zheng, 2012; Donohoe and Knechel, 2014; Hope, Hu, and Zhao, 2017).

We estimate a regression both with firm and year fixed effects and a regression without firm and year fixed effects. *Firm fixed effects* control for any unobserved time-invariant heterogeneity across firms, and year fixed effects account for possible time trends in audit fees. Standard errors are clustered by firm to mitigate possible serial correlation in the error term (Petersen, 2009). All variables are defined in Appendix B.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for our main sample. There are a total of 8,960 firm-year observations for the analyses. The mean of *AUDITFEE* is 13.904, which translates to an average of 1.09 million RMB audit fees. The mean of *TREAT* is 0.298, implying that 29.8% of the observations belong to the high-polluting industries. The mean of *SIZE* is 23.155, which translates to an average of firm's market value of 11.38 billion RMB. The average *ROA* is 2.8%, 17.4% of observations have negative operating earnings, and 4.3% of observations receive modified audit opinions in our sample period.

4.2 Preliminary Analyses: Did GAOO Have Its Intended Effects on the Environment?

Our research focuses on the effects of the green transition on audit fees. Therefore, it is useful to first check whether the GAOO, our proxy for green transition, has tangible effects on the environment. If GAOO proves to be merely a "Paper Tiger," it should not influence the behavior of government officials and firms, and consequently it should not determine environmental quality or audit fees. On the contrary, if GAOO has the capacity to affect environmental quality, it implies that it has indeed prompted changes in the behavior of government officials and firms, potentially influencing audit fees as well.

To assess the real effects of GAOO, we adopt the method employed by Chen, Hung, and Wang (2018). Specifically, we regress city-level pollution measures on *POST*, an indicator variable for the most impacted cities (*Most Impacted City*), and their interaction. To gauge the degree of influence by GAOO for each city, we first calculate the total assets of high-polluting

firms within the city as a percentage of the total assets of all firms within that city (*Impact%*). Then we define an indicator variable *Most Impacted City* equal to 1, if *Impact%* for this city exceeds the sample median, and 0 otherwise. In our regression, we incorporate controls for city GDP (*GDP*), city population (*POPULATION*), the size of listed firms in the city (*LISTFIRMS*), and the marketization index (*MARKETIZATION*). We also include province fixed effects.

Our dependent variables are (1) industrial soot emissions (tons); (2) industrial wastewater (in ten thousand tons); and (3) SO_2 emissions (tons), all scaled by city GDP. The results are presented in Table 2. We find that *POST* is negative and significant in all three models, implying that GAOO had a positive effect on the environment. Further, the interaction between *Most Impacted City* and *POST* is also negative and significant, which is consistent with the positive effect being amplified in cities that are more affected by GAOO. Overall, the evidence is consistent with GAOO influencing the behaviors of government officials and firms, thus providing validation for our focus on GAOO in the ensuing empirical analyses.

4.3 Primary Analyses: The Effects of GAOO on Audit Fees (including Dynamic Analyses and Tests for Departing Officials and Textual Analysis of Environmental Disclosures)

Having established that GAOO had its intended effects of improving the environment, Table 3 presents our regression results from estimating equation (1). Column (1) presents the baseline results without any controls and fixed effects, where *TREAT*×*POST* yields a coefficient of -0.0807 (t=-4.40). This suggests a reduction in audit fees post-policy for the treated firms. With the introduction of a set of control variables in Column (2), *TREAT*×*POST* coefficient diminishes to -0.0473 yet remains significant at the 1% level (t=-3.28), further confirming the GAOO's

effect on reducing audit fees among treated firms. *TREAT* is not significant, suggesting no significant difference in audit fees between treatment and control firms before GAOO. *POST* is positive and significant, indicating an upward time trend for audit fees. In Column (3), the further inclusion of *firm* and year fixed effects to control for time-invariant firm characteristics and time trends, leads to the absorption of *TREAT* and *POST*. We can see that *TREAT*×*POST* remains negative at -0.0469 with a t-stat of -3.58, underscoring the significant effect of the policy. In summary, the results suggest an approximately 5% decrease in audit fees for treatment firms after the implementation of GAOO.[29]

Table 4 presents the dynamic change of audit fees around the event. We include interactions between *TREAT* and year indicators with year fixed effects. The coefficients for *TREAT*×*Year 2014* and *TREAT*×*Year 2015* are insignificant, while those for *TREAT*×*Year 2017* and *TREAT*×*Year 2018* are significantly negative (t-stat=-3.86 and -2.83). These results support the argument that GAOO leads to reduced audit fees for high-polluting firms. In untabulated analysis, we also perform the "Honest DID" diagnostic tests developed by Rambachan and Roth (2023). We find that the observed significant DID effect remains robust even when accommodating violations of parallel trends up to 1.8 times the maximum violation observed in the pre-treatment period.

We conduct additional analyses to verify the effects of GAOO. First, GAOO primarily focuses on officials who leave their current positions; thus, we expect the effects to be amplified when the officials are about to leave. To empirically assess this prediction, we identify cities where top officials (mayors or Secretaries of the Municipal Committee of the CPC) are about to

[29] Section 5.2 provides results of employing entropy balancing to ensure our inferences are not affected by uncontrolled heterogeneity between the treatment and control samples.

leave within the next two years. Two variables are introduced to differentiate the GAOO effect in this context: *TREAT_DEPART* equals one for treated firms located in regions with departing officials, and zero otherwise; *TREAT_NODEPART* is set to one for treated firms in areas without departing officials, and zero otherwise. The results in Table 5 confirm our prediction, showing that the magnitude of the coefficient on *TREAT_DEPART×POST* is larger than *TREAT_NODEPART×POST*. Furthermore, the difference in coefficients is statistically significant at the 1% level. This evidence is consistent with the notion that the pressure of GAOO leads to the reduction of audit fees.

Second, we posit that GAOO primarily impacts the verification costs of environmental issues, and consequently, its effects should be more pronounced when firms possess a greater volume of environment-related information requiring verification. In China, high-polluting firms are required to disclose environmental information in their annual reports.[30] This disclosure includes details on pollution emissions, pollution mitigation equipment, internal environmental management systems, applications for pollution discharge permits, and other administrative procedures or licenses related to environmental issues.

We conduct a textual analysis of annual reports in the year before the event. Specifically, we count the number of environment-related words and calculate the ratio of environment-related words to total words. A higher ratio signifies a greater need for the verification of environment-related information. To discern GAOO's effect across varying levels of environmental disclosure, we differentiate the treated firms based on their green information intensity: *TREAT_HIGREENINFO* denotes treated firms with an above-median green information ratio

[30] https://www.gov.cn/gongbao/content/2014/content_2739869.htm

while *TREAT_LOGREENINFO* applies to treated firms falling below this threshold. The results, as presented Table 6, reveal that audit fees are significantly reduced only for firms whose annual reports incorporate more environmental information. Additionally, the difference between *TREAT_HIGREENINFO×POST* and *TREAT_LOGREENINFO×POST* is statistically significant.

In summary, the results from Tables 3-6 provide empirical support for GAOO leading to a reduction of audit fees for high-polluting firms. In Section 5, we consider possible alternative explanations for our findings. But first, we evaluate potential mechanisms for the observed effects.

4.4 Channel Analysis: Heightened Governmental Monitoring as Substitution

After showing that GAOO leads to the reduction of audit fees for high-polluting firms, we next explore potential channels for these effects. The first is a *substitutional* effect, wherein *heightened governmental monitoring* generates more public information. This information could serve as a possible substitute for the collection of audit evidence, resulting in the reduction of audit fees. We present several pieces of evidence from different perspectives.

First, GAOO is conducted by the national audit office and its local affiliates at different levels.[31] Despite being a national policy, the quality of green audits may vary across regions due to China's substantial variation in economy, institutional development, and government administrative quality. To assess this possibility, we measure the effectiveness of government audits based on irregular funds identified in government auditing scaled by regional GDP,

[31] The GAOO is listed as one of the major responsibilities of the national audit offices. See http://www.audit.gov.cn/n10/n14/index.html

following the approach of Lin, Mills, Zhang, and Li (2018). We divide the sample into two subsamples based on the effectiveness of government audit. The results in Panel A of Table 7 show that *TREAT*×*POST* has a negative and significant coefficient (Coef=-0.0775, t-stat=-4.43) when the effectiveness of government audit is high, supporting the notion that stricter enforcement of GAOO leads to a decrease in audit fees for high-polluting firms.

Second, the substitutional effect implies that heightened governmental monitoring generates more public information that auditors can utilize. To examine this idea, we consider whether the reduction in audit fees is stronger when the government increases the transparency of environmental disclosure. For this purpose, we employ the Pollution Information Transparency Index (PITI) rank, which is collaboratively compiled by the Institute of Public and Environmental Affairs (IPE) and The Natural Resources Defense Council (NRDC), to measure the transparency of pollution information disclosure across 120 cities nationwide. Panel B of Table 7 shows that in the group with higher changes in government disclosure quality, *TREAT*×*POST* has a negative and significant coefficient (Coef=-0.0825, t-stat=-3.34), while in the group with lower changes, *TREAT*×*POST* is not significant (Coef=-0.0197, t-stat=-1.00). This evidence supports the idea that when the government improves the disclosure quality of environmental information, auditors can rely more on heightened external monitoring, leading to a stronger reduction in audit fees.

Third, we evaluate whether *audit efforts* for high-polluting firms decrease after GAOO. We use audit lag, defined as the number of days between a client's fiscal year-end and the release of the audit report, as a measure of audit effort (e.g., Knechel and Payne, 2001; Chan, Chen, Chen, and Yu, 2012). The results are presented in Table 8. We find that *TREAT*×*POST* has a negative

and significant coefficient in both specifications (Coef=-2.6376, t-stat=-3.33 in the model without fixed effects; Coef=-1.5680, t-stat=-1.99 with fixed effects), indicating a decrease in audit efforts for high-polluting firms after GAOO.

In summary, our findings suggest that the reduction of audit fees is stronger when governmental auditing is more effective and when auditors are more capable of relying on public information from the government. Additionally, audit efforts decrease after GAOO, indicating that auditors substitute their efforts with external governmental monitoring, leading to a decrease in audit fees.

4.5 Channel Analysis: Increased Green Investments?

Another potential channel we consider is that GAOO can impact firms' business risk by motivating polluting firms to make green investments to reduce pollution and protect the environment, leading to reduced environmental risks (a risk factor for auditors) or improved competitive advantage.[32] To examine this channel, we conduct the following tests.

First, we examine whether high-polluting firms increase their green investments. We define green investments as expenditures on projects related to environmental protection, scaled by total assets. We extract this information from the notes of the financial reports. Our regression model is similar to that in Equation (1), except that we replace the dependent variable with green investment. We control for factors documented to influence corporate green investments (e.g., Di Giuli and Kostovetsky, 2014; Chen, Dong, and Lin, 2020). Specifically, we control for firm size (*SIZE*), leverage ratio (*LEV*), return on asset (*ROA*), stock return (*RET*), firm age (*AGE*),

[32] Dai, Duan, and Ng (2021) find that stricter environmental regulation can induce green innovation, which helps competitive firms better achieve product differentiation and earn higher market share.

KZ index (*KZ Index*), cash holding (*CASH*), research and development expenditures (*R&D*), advertisement expenditure (*ADVERTISING*), dividend payment (*DIVIDEND*), property, plant, and equipment (*PPE*), capital expenditure (*CAPEX*), the percentage of independent directors (*INDDIR*), the age of CEO (*CEO age*), and an indicator variable for female CEO (*CEO Female*).

The results are presented in Table 9. We observe that the coefficient of *TREAT*×*POST* is positive and statistically significant in both models (Coef=0.1259, t-stat=2.76 in the model without fixed effects; Coef=0.0985, t-stat=2.16 in the model with fixed effects), supporting the idea that treatment firms increase their green investments after GAOO. The evidence is consistent with the argument that treatment firms invest more to improve environmental performance, reducing environmental risks and, in turn, audit fees.

Next, we assess whether high-polluting firms, in response to the green transition, obtain more green patents to improve their environmental performance. Brown, Martinsson, and Thomann (2022) suggest that environmental policy motivates high-polluting firms to expand their capacity to absorb external knowledge and technical know-how. Consistent with this argument, we examine whether high-polluting firms apply for and receive green utility model patents after GAOO.[33] We employ two measures: the number of green utility-model patents that firms apply for in year t+1 and the number of green utility-model patents awarded to the firm in year t+2. Here, one or two lag years are used to allow the time for generating innovations and approving patents. We use these variables as dependent variables and run a similar DID regression to examine the effects of GAOO. The results, presented in Table 10, show that the

[33] China's patent system provides three types of patent rights: invention, utility model, and design. Design patents refer to the creation of new designs for the shape, patterns, etc., and thus are not relevant to our study. Invention patents are more related to the development of new innovation and usually take three to five years to grant. It is thus difficult to link invention patents to the event. In contrast, utility-model patents relate to technical solutions and take about one year to grant.

coefficient of *TREAT×POST* is positive and significant in all four models, suggesting that high-polluting firms have applied for and been awarded more green patents after GAOO. These green patents may transform their production processes and improve their environmental performance, reducing their potential environmental liability (a risk factor for auditors).

We further evaluate whether the environmental risk of high-polluting firms decreases after GAOO. We use two measures. The first is an indicator that equals 1 if the firm is under national intensive monitoring and control and 0 otherwise. Each year, the Ministry of Environmental Protection announces a list of firms that generate significant pollution and need to receive intensive monitoring. In other words, being included in the list implies that the firm has poor environmental performance. The second proxy is an indicator variable that equals 1 if the firm violates environmental laws or regulations during the year and 0 otherwise. We run logistic regressions with these two variables as dependent variables. The results presented in Table 11, show that *TREAT×POST* is negative and significant in both models, suggesting that high-polluting firms are less likely to be included in the intensive monitoring list and have fewer violations of environmental laws or regulations following the regulation (relative to control firms).

Taken together, the evidence signifies that after GAOO, high-polluting firms make more green investments and receive more green patents, significantly reducing their environmental risks. This evidence is consistent with the environmental improvement channel.

5. Further Analyses

5.1 Possible Alternative Explanations

Potential Effects on Audit Quality: Our evidence suggests that auditors substitute audit efforts with strengthened governmental monitoring. An interesting question arises: does this substitution lead to lower audit quality? To measure audit quality, we use *RESTATEMENT*, an indicator equal to 1 if the financial statements of the firm in the current year are restated later and 0 otherwise. In Panel A of Table 12, the results show that the coefficient of *TREAT*×*POST* is insignificant, suggesting that the reduction in audit efforts does not lead to lower audit quality.[34]

Audit-Firm Switches: Next, we consider whether the lower audit fees are associated with audit-firm switches to lower-ranked (and thus cheaper) audit firms.[35] In Panel B of Table 12, we do not find any evidence of significant downward switches, either from Big-4 to non-Big-4 auditors, or from Big-10 to non-Big-10 auditors.[36] In other words, the observed reduction in audit fees is not caused by client firms switching to lower-priced audit firms. In untabulated analyses, we include the switching variables as additional controls in the primary regression, and conclusions remain unaltered. We also run a specification with audit-firm fixed effects, and inferences are unaffected (untabulated).

Treatment Firm Scale: Finally, we conduct additional analyses related to the scale of treatment firms. Given the well-known relation between audit fees and client-firm size, we

[34] In untabulated analyses we include *RESTATEMENT* as an additional control in the primary regression. No inferences are affected.
[35] Recall that our primary analyses already control for whether the firm is audited by a Big-4 audit firm.
[36] The Big-10 versus non-Big-10 analysis is common in China-related research because of the considerably smaller market share by the Big-4 firms in China. Note that the number of observations is lower for these tests because for logistic regressions with fixed effects, observations with no variations are dropped.

explicitly include time-varying controls for firm size in our DID analyses. Moreover, we employ firm fixed effects. In Panel C of Table 12, where we consider scale as the outcome variable using total assets, market value of equity, and total revenues as proxies, we do not discern any significant reduction in the scale of the treatment firms. This suggests that scale is not a likely alternative explanation for our findings.

5.2 Entropy Balancing

We identify treated firms based on industry membership, which is a reasonable approach as industries are affected by GAOO to varying degrees. However, systematic differences across high-polluting and other firms could threaten the credibility of inferences drawn from the DID analyses. To address potential covariate imbalances, we employ the entropy balancing procedure to equalize the distributions of underlying variables across treatment and control groups. As shown in Panel A of Table 13, treated firms and control firms have differences in several firm characteristics before matching, while the differences in firm characteristics are not significant after entropy balancing. This indicates that the control firms, reweighted by the entropy-balancing approach, can serve as a credible counterfactual for treated firms. The regression results based on entropy balancing (both with and without firm and year fixed effects), presented in Panel B of Table 13, demonstrate that our inferences are robust to this methodological adjustment.

6. Conclusion

This study empirically assesses the impact of the green transition on information verification

costs of firms in high-polluting industries. Leveraging the implementation of the *Green Audit of Outgoing Officials* policy in China, we document a significant decrease in audit fees for firms in high-polluting industries following the reform. We further provide evidence for two channels: (1) Auditors rely on intensified governmental efforts for green data verification, especially in instances of effective government audits and enhanced transparency in public environmental disclosure, thereby economizing the private verification process (i.e., a substitution effect); (2) High-polluting firms improve their environmental performance, leading to diminished client risk and lower verification demand. Additional analyses reveal that the reduction in audit fees is not accompanied by a deterioration in audit quality, and there is no evidence of treatment firms switching to lower-priced auditors.

The green transition has triggered an unprecedented demand for environmental information, potentially driving up verification costs due to the complexity of such data. Elevated verification expenses raise concerns that they may lead to financial frictions and inadvertently slow down the pace of the green transition. Our study reveals a reduction in verification costs, thus mitigating such concerns. Furthermore, our empirical analyses shed light on the significant changes occurring in the verification landscape as a result of the green transition and emphasize the positive externality of public verification on private verification.

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Table 1: Descriptive Statistics of Main Variables

				Percentile	
	N	Mean	SD	P25	P50	P75
AUDITFEE	8,960	13.904	0.689	13.459	13.816	14.286
TREAT	8,960	0.298	0.457	0.000	0.000	1.000
SIZE	8,960	23.155	1.019	22.419	23.008	23.754
LEV	8,960	0.094	0.103	0.016	0.056	0.141
MB	8,960	2.877	2.381	1.418	2.086	3.359
ROA	8,960	0.028	0.069	0.010	0.029	0.057
LOSS	8,960	0.174	0.379	0.000	0.000	0.000
CR	8,960	2.142	2.167	1.071	1.536	2.369
QUICK	8,960	1.661	1.964	0.682	1.097	1.837
INVREC	8,960	0.265	0.172	0.134	0.241	0.361
BIG4	8,960	0.059	0.236	0.000	0.000	0.000
MAO	8,960	0.043	0.204	0.000	0.000	0.000
TA	8,960	0.057	0.067	0.017	0.038	0.071
SDRET	8,960	0.024	0.008	0.018	0.023	0.029
SPCTERM	8,960	0.019	0.064	0.001	0.004	0.012
MNOWN	8,960	0.051	0.116	0.000	0.000	0.024
AGE	8,960	4.887	0.598	4.431	4.990	5.412
INDDIR	8,960	0.375	0.054	0.333	0.364	0.429
SDCFO	8,960	0.052	0.040	0.026	0.041	0.064

Notes:

This table reports descriptive statistics of the main variables. The sample period includes two years before the policy (i.e., 2014 and 2015) and two years after the policy (i.e., 2017 and 2018). Variable definitions are presented in Appendix B. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the effects of outliers.

Table 2: Preliminary Analyses on GAOO and Environmental Performance (Real Effects)

	SOOT	*WASTEWATER*	SO_2
	(1)	(2)	(3)
Most Impacted City×POST	***-0.0028****	***-0.0004*****	***-0.0046*****
	(-2.52)	***(-2.92)***	***(-4.16)***
Most Impacted City	0.0019*	0.0002	0.0027***
	(1.80)	(1.49)	(2.87)
POST	-0.0033***	-0.0003***	-0.0038***
	(-5.54)	(-6.37)	(-7.50)
GDP	-0.0035***	-0.0004***	-0.0043***
	(-4.41)	(-4.81)	(-4.99)
POPULATION	0.0002	-0.0001	-0.0005
	(0.26)	(-0.84)	(-0.53)
LISTFIRMS	0.0004	0.0001**	0.0006**
	(1.28)	(2.19)	(2.41)
MARKETIZATION	-0.0004	0.0000	0.0002
	(-1.08)	(1.09)	(1.48)
Province Fixed Effects	YES	YES	YES
Observations	872	872	873
Adjusted R^2	0.413	0.314	0.464

Notes:

This table reports the results of the effects of *Green Audit of Outgoing Officials* (GAOO) on environment performance, based on the city-year observations. The dependent variables are city-level pollution variables: 1) *SOOT*: industrial soot emissions (tons) scaled by city GDP; 2)*WASTEWATER*: industrial wastewater (in 10 thousand tons) scaled by city GDP; 3)SO_2: SO_2 emissions (tons) scaled by city GDP. The variable of interest is *Most Impacted City* × *POST*. We define an indicator variable for *Most Impacted City* and set it equal to 1 for cities whose ratio of the assets of high-polluting firms to the assets of all firms is greater than the sample median, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. *GDP* is the natural logarithm of the city's GDP; *POPULATION* is the natural logarithm of population; *LISTFIRMS* is the natural logarithm of the aggregate total assets of city's listed firms; *MARKETIZATION* is the market development index. Standard errors are clustered at the city level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 3: GAOO and Audit Fees

	Dependent Variable=*AUDITFEE*		
	(1)	(2)	(3)
TREAT×POST	***-0.0807****	***-0.0473****	***-0.0469****
	(-4.40)	***(-3.28)***	***(-3.58)***
TREAT	0.0721**	-0.0193	
	(2.37)	(-1.05)	
POST	0.2969***	0.1825***	
	(30.23)	(15.63)	
SIZE		0.4166***	0.3646***
		(41.10)	(19.70)
LEV		-0.1300	0.0658
		(-1.46)	(1.04)
MB		-0.0430***	-0.0480***
		(-14.36)	(-14.21)
ROA		-0.7868***	-0.2706***
		(-6.59)	(-3.86)
LOSS		0.0449**	0.0227**
		(2.48)	(2.20)
CR		-0.0391***	-0.0227*
		(-2.97)	(-1.71)
QUICK		0.0194	0.0090
		(1.29)	(0.61)
INVREC		-0.0814	0.0525
		(-1.56)	(0.76)
BIG4		0.5963***	0.2387***
		(14.23)	(3.78)
MAO		0.0990***	0.0587***
		(3.56)	(2.71)
TA		-0.0928	-0.0473
		(-1.07)	(-0.89)
SDRET		-1.5512**	-1.0203*
		(-2.04)	(-1.76)
SPCTERM		0.0531	0.1093*
		(0.55)	(1.67)
MNOWN		-0.0006	-0.1130*
		(-0.01)	(-1.81)
AGE		0.0729***	0.1581***
		(4.93)	(4.81)
INDDIR		0.1482	-0.1609
		(1.19)	(-1.52)
SDCFO		-0.0151	0.2143
		(-0.09)	(1.34)
Constant	13.7472***	3.9948***	5.0448***
	(855.28)	(17.24)	(11.89)
Firm Fixed Effects	NO	NO	YES
Year Fixed Effects	NO	NO	YES
Observations	8,960	8,960	8,960
Adjusted R^2	0.040	0.631	0.913

Notes:

This table provides our main results of the effects of GAOO on firm audit fees. Column (1) presents baseline regression results without any controls. Column (2) adds a set of control variables. Column (3) further incorporates firm and year fixed effects. The dependent variable (*AUDITFEE*) is the natural logarithm of annual audit fees. *TREAT* is an indicator variable for firms most impacted by GAOO, equal to one if firms are

in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 4: GAOO and Audit Fees: Dynamic Analysis

	Dependent Variable=*AUDITFEE*
TREAT×Year 2014	-0.0214
	(-1.14)
TREAT×Year 2015	-0.0098
	(-0.49)
TREAT×Year 2017	-0.0795***
	(-3.86)
TREAT×Year 2018	-0.0577***
	(-2.83)
Other Controls	YES
Year Fixed Effects	YES
Observations	8,960
Adjusted R^2	0.636

Notes:

This table examines the change of audit fees around the adoption of GAOO policy. The dependent variable (*AUDITFEE*) is the natural logarithm of annual audit fees. *TREAT* is an indicator variable for firms most impacted by GAOO, equal to one if firms is in high-polluting industries, and 0 otherwise. *Year 2014* (*2015, 2017, 2018*) is an indicator variable for year 2014 (2015, 2017, 2018), and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 5: The Role of Politician Departure Pressure

	Dependent Variable=*AUDITFEE*
TREAT_DEPART×POST	-0.0952***
	(-4.76)
TREAT_NODEPART×POST	-0.0272*
	(-1.81)
Dif: TREAT_DEPART×POST- TREAT_NODEPART×POST	***-0.0680******
	(F-statistics=8.93)
Other Controls	YES
Firm Fixed Effects	YES
Year Fixed Effects	YES
Observations	8,960
Adjusted R^2	0.913

Notes:

This table reports the moderating effects of politician departure on the effects of green audit policy. The sample firms are partitioned into sub-samples based on whether the core leaders (i.e., mayor and Secretary of Municipal Committee of the CPC) of the city that the firm is located in are about to departure within two years. The dependent variable (*AUDITFEE*) is the natural logarithm of annual audit fee. *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 6: The Role of Green Information

	Dependent Variable=*AUDITFEE*
TREAT_HIGREENINFO×POST	-0.0699***
	(-4.54)
TREAT_LOGREENINFO×POST	-0.0220
	(-1.17)
Dif: TREAT_HIGREENINFO×POST- TREAT_LOGREENINFO×POST	**-0.0479****
	(*F-statistics= 4.68*)
Firm Fixed Effects	YES
Year Fixed Effects	YES
Observations	8,960
Adjusted R^2	0.913

Notes:

This table reports the role of green information on the effects of green audit policy. The sample firms are partitioned into sub-samples based on the sample median of the level of green information contained in the financial reports, calculated as the ratio of the count of green-related words to the total number of words. The dependent variable (*AUDITFEE*) is the natural logarithm of annual audit fee. *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 7: Channel Analysis: Heightened Monitoring as Substitution

Panel A: The Role of Government Audit Effectiveness

	Dependent Variable=*AUDITFEE*		
	Effective Government Audit		Ineffective Government Audit
	(1)		(2)
TREAT×POST	-0.0775***		-0.0054
	(-4.43)		(-0.27)
Difference		***-0.0721******	
		(Z-statistic=-2.75)	
Other Controls	YES		YES
Firm Fixed Effects	YES		YES
Year Fixed Effects	YES		YES
Observations	4,655		4,305
Adjusted R^2	0.914		0.913

Panel B: The Role of Government Disclosure Quality about Environmental Information

	Dependent Variable=*AUDITFEE*		
	High Quality		Low Quality
	(1)		(2)
TREAT×POST	-0.0825***		-0.0197
	(-3.34)		(-1.00)
Difference		***-0.0628****	
		(Z-statistic=-1.98)	
Other Controls		YES	
Firm Fixed Effects		YES	
Year Fixed Effects		YES	
Observations	2,466		5,171
Adjusted R^2	0.902		0.918

Notes:

In Panel A, the sample firms are partitioned into sub-samples based on the sample median of government audit effectiveness of the province that the firm is located in. The effectiveness of government audit is measured using the amount of irregular fund detected in government auditing scalded by regional GDP. In Panel B, the sample firms are partitioned into sub-sample based on the median of changes in city-level disclosure quality measured by Pollution Information Transparency Index (PITI) rank. The PITI, collaboratively compiled by Institute of Public and Environmental Affairs (IPE) and The Natural Resources Defense Council (NRDC), is a comprehensive measure of the transparency of pollution information disclosure across 120 cities nationwide. The dependent variable (*AUDITFEE*) is the natural logarithm of annual audit fee. *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 8: Audit-Report Lag

	Dependent Variable=AUDITLAG	
	(1)	(2)
TREAT×POST	***-2.6376****	***-1.5680****
	(-3.33)	***(-1.99)***
TREAT	0.2812	
	(0.39)	
POST	6.4670***	
	(13.05)	
SIZE	1.2451***	5.3445***
	(4.26)	(6.60)
LEV	-0.8621	5.3005
	(-0.33)	(1.45)
MB	-0.2628**	-1.1345***
	(-2.02)	(-5.96)
ROA	-33.1007***	-27.1368***
	(-7.08)	(-5.68)
LOSS	2.7020***	2.1312***
	(3.98)	(2.97)
CR	0.7773	0.8042
	(1.48)	(0.86)
QUICK	-0.8973	-1.0457
	(-1.49)	(-1.02)
INVREC	0.7587	4.2943
	(0.42)	(1.18)
BIG4	-7.2019***	0.0063
	(-6.68)	(0.00)
MAO	8.8541***	7.4592***
	(8.57)	(6.16)
TA	-8.3905**	-2.6283
	(-2.24)	(-0.70)
SDRET	79.0045***	-41.2360
	(2.69)	(-1.16)
SPCTERM	-4.5540	-3.7442
	(-1.14)	(-0.91)
MNOWN	1.8120	-1.1849
	(0.81)	(-0.31)
AGE	-1.7918***	6.6006***
	(-3.69)	(3.43)
INDDIR	0.6691	3.9212
	(0.16)	(0.68)
SDCFO	3.1305	-8.3164
	(0.47)	(-0.91)
Constant	72.5877***	-56.4604***
	(10.60)	(-2.81)
Firm Fixed Effects	NO	YES
Year Fixed Effects	NO	YES
Observations	8,917	8,917
Adjusted R^2	0.074	0.386

Notes:

This table provides the results of the effects GAOO on audit report lag. The dependent variable (*AUDITLAG*) is the number of days between a firm's fiscal year-end and audit report date. *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0

otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 9: Channel Analysis: Green Investment

	Dependent Variable=*GREENINV*	
	(1)	(2)
TREAT×POST	***0.1259****	***0.0985****
	(2.76)	***(2.16)***
TREAT	0.0322	
	(0.72)	
POST	-0.0032	
	(-0.12)	
SIZE	-0.0373***	0.0132
	(-2.77)	(0.40)
LEV	0.7301***	0.5275***
	(3.93)	(2.75)
ROA	0.2032	0.1849
	(1.46)	(1.24)
RET	-0.0296	-0.0052
	(-1.49)	(-0.27)
AGE	-0.0186	0.1241
	(-0.64)	(1.21)
KZ Index	-0.0015	-0.0056
	(-0.10)	(-0.34)
CASH	-0.0253	0.0830
	(-0.29)	(0.74)
R&D	0.0072***	0.0037
	(3.58)	(1.19)
ADVERTISING	-3.9071***	-1.4142
	(-6.64)	(-1.56)
DIVIDEND	-2.1583**	-1.8943
	(-2.13)	(-1.43)
PPE	0.4691***	0.0133
	(4.36)	(0.06)
CAPEX	5.5445***	5.1174***
	(9.21)	(9.19)
INDDIR	-0.3895*	0.1118
	(-1.70)	(0.44)
CEO Age	-0.0340	-0.0482
	(-0.34)	(-0.41)
CEO Female	-0.0360	0.0156
	(-0.65)	(0.22)
Constant	1.0710**	-0.7908
	(2.38)	(-0.77)
Firm Fixed Effects	NO	YES
Year Fixed Effects	NO	YES
Observations	8,960	8,960
Adjusted R^2	0.097	0.510

Notes:

This table examines the green investments by firms around GAOO. The dependent variable is green investments scaled by total Assets (*GREENINV*). *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 10: Green Patents

	Patent Application for Year t+1		Patent Grant for Year t+2	
	(1)	(2)	(3)	(4)
TREAT×POST	***0.1018****	***0.0727****	***0.1221****	***0.0916****
	(3.10)	***(2.36)***	***(3.79)***	***(3.10)***
TREAT	-0.2625***		-0.2546***	
	(-7.22)		(-7.03)	
POST	0.1556***		0.0872***	
	(6.89)		(3.93)	
SIZE	0.3552***	0.1518***	0.3300***	0.0749***
	(16.40)	(5.79)	(15.17)	(2.65)
LEV	-0.0487	-0.0561	0.0590	-0.0689
	(-0.30)	(-0.41)	(0.37)	(-0.56)
ROA	0.4389***	0.1870	0.4371***	0.3754***
	(2.59)	(1.45)	(2.63)	(2.87)
RET	-0.1054***	0.0245	-0.1116***	-0.0062
	(-5.16)	(1.50)	(-5.63)	(-0.37)
AGE	-0.0465	-0.0405	-0.0299	-0.1351*
	(-1.53)	(-0.56)	(-0.98)	(-1.95)
KZ Index	0.0561***	-0.0097	0.0526***	-0.0104
	(3.37)	(-0.60)	(3.28)	(-0.68)
CASH	0.0512	0.1219	0.0214	0.1034
	(0.41)	(1.21)	(0.18)	(1.02)
R&D	0.0419***	0.0103***	0.0407***	0.0077***
	(21.12)	(4.07)	(20.65)	(3.13)
ADVERTISING	-7.9546***	-2.3556***	-7.7873***	-2.9422***
	(-7.88)	(-3.15)	(-7.77)	(-3.25)
DIVIDEND	0.0300	-0.9245	0.2299	-0.1371
	(0.02)	(-0.83)	(0.18)	(-0.13)
PPE	0.3651***	0.0268	0.3515***	0.1315
	(3.76)	(0.22)	(3.68)	(1.14)
CAPEX	0.9701***	0.5949**	0.8966**	0.2232
	(2.75)	(2.29)	(2.53)	(0.93)
INDDIR	-0.0943	0.1004	-0.0981	0.0435
	(-0.33)	(0.42)	(-0.35)	(0.19)
CEO Age	0.0230	-0.0407	0.0433	-0.0550
	(0.23)	(-0.48)	(0.44)	(-0.68)
CEO Female	-0.1481***	-0.0640	-0.1127**	0.0015
	(-2.62)	(-1.24)	(-2.05)	(0.03)
Constant	-8.0886***	-2.5542***	-7.6495***	-0.1528
	(-12.74)	(-3.39)	(-12.05)	(-0.19)
Firm Fixed Effects	NO	YES	NO	YES
Year Fixed Effects	NO	YES	NO	YES
Observations	8,888	8,888	8,838	8,838
Adjusted R^2	0.251	0.717	0.234	0.731

Notes:

This table provides the results of the effects on green patents. The dependent variable in Columns (1)-(2) is the logarithm of one plus the number of green patents applied in year t+1. The dependent variable in Columns (3)-(4) is the logarithm of one plus the number of green patents granted in year t+2. *TREAT* is an indicator variable equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 11: Regulation Risk

	Key Monitoring	Environmental Violation
	(1)	(2)
TREAT×POST	***-0.5578****	***-1.1057****
	(-2.84)	***(-2.03)***
TREAT	2.0141***	1.5871***
	(10.17)	(2.86)
TPATENT	0.1328***	0.0110
	(3.26)	(0.09)
MetStandard	-1.0647**	-1.9123**
	(-2.24)	(-2.39)
SIZE	0.1934***	-0.3509**
	(3.83)	(-2.55)
LEV	-0.2631	-2.4369*
	(-0.51)	(-1.90)
ROA	1.0712*	0.5049
	(1.86)	(0.36)
RET	-0.0258	0.4935*
	(-0.27)	(1.73)
AGE	0.5924***	0.1013
	(5.96)	(0.38)
KZ Index	-0.0553	0.0125
	(-0.95)	(0.07)
CASH	-0.0211	-3.2426**
	(-0.05)	(-2.41)
R&D	0.0722***	0.0392
	(8.52)	(1.54)
ADVERTISING	-1.2954	11.1808
	(-0.51)	(1.20)
DIVIDEND	-4.3264	-11.6935
	(-1.10)	(-0.72)
PPE	2.9171***	1.6613***
	(10.12)	(2.77)
CAPEX	1.8471*	3.1534
	(1.90)	(1.33)
INDDIR	-1.1263	-0.0946
	(-1.49)	(-0.05)
CEO Age	0.4111	-0.7318
	(1.32)	(-0.91)
CEO Female	0.0762	-0.3875
	(0.44)	(-0.69)
Key Monitoring		1.0627***
		(3.25)
Constant	-10.7336***	7.6661*
	(-6.37)	(1.75)
Year Fixed Effects	YES	YES
Province Fixed Effects	YES	YES
Observations	8,945	8,050
Pseudo R^2	0.316	0.161

Notes: This table reports the logistic results of the effects of green audit policy on regulation risk. The dependent variable in is an indicator variable, equal to 1 if the firm is included in key monitoring list (column 1) or if the firm violates environmental laws or regulations (column 2) during the year, and 0 otherwise. *TREAT* is an indicator variable equal to one if firms is in high-polluting industries, and 0 otherwise. Standard errors are clustered at the firm level. Z-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 12: Potential Alternative Explanations (Reduced Audit Quality: Auditor Switches; Reduction in Scale)

Panel A: Is Audit Quality Sacrificed?

	Dependent Variable=*RESTATEMENT*	
TREAT×POST	***0.1496***	***(1.30)***
TREAT	-0.0384	(-0.40)
SIZE	-0.0573*	(-1.74)
LEV	-0.0908	(-0.30)
MB	0.0308**	(2.19)
ROA	-1.4152***	(-2.66)
LOSS	0.0067	(0.08)
CR	-0.0187	(-0.31)
QUICK	0.0090	(0.13)
INVREC	0.0828	(0.42)
BIG4	-0.5905***	(-4.38)
MAO	0.3209**	(2.42)
TA	-0.2317	(-0.51)
SDRET	7.8362*	(1.74)
SPCTERM	-0.0138	(-0.03)
MNOWN	0.4251	(1.56)
AGE	0.2339***	(3.98)
INDDIR	-0.1818	(-0.36)
SDCFO	2.0652***	(2.85)
Constant	-0.4906	(-0.60)
Year Fixed Effects	YES	
Province Fixed Effects	YES	
Observations	8,960	
Pseudo R^2	0.098	

Notes:

This table reports the logistic results of the effects of green audit policy on restatements probability. The dependent variable (*RESTATEMENT*) is an indicator variable, equal to 1 if the financial statement of the firm in the current year is restated later, and 0 otherwise. *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. Z-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Panel B: Do Treatment Firms Switch to Smaller Audit Firms?

	Dependent Var.=Downward Switch	
	(1)	(2)
	downward move from Big-4 to non-Big-4	downward move from Big-10 to non-Big-10
TREAT×POST	***-0.1559***	***0.5286***
	(-0.17)	***(1.55)***
TREAT	-0.0174	-0.3449
	(-0.03)	(-1.20)
Year Fixed Effects	YES	YES
Province Fixed Effects	YES	YES
Observations	6,234	8,792
Pseudo R^2	0.141	0.051

Notes:

This table reports the logistic results of the whether the treatment firms switch to lower-priced auditors following GAOO. *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. Z-statistics are presented in parentheses.

Panel C: Do Treatment Firms Experience a Reduction in Scale?

Dependent Var.	*Assets*	*MV*	*Revenues*
	(1)	(2)	(3)
TREAT×POST	-0.0223	0.0031	-0.0080
	(-0.95)	(0.14)	(-0.30)
Other Controls	YES	YES	YES
Firm Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES
Observations	8,960	8,960	8,960
Adjusted R^2	0.933	0.905	0.921

Notes:

This table reports the results of the whether the treatment firms experience a reduction in scale following GAOO. *TREAT* is an indicator variable for firms most impacted by politician green audit, equal to one if firms is in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level.

Table 13: Entropy Balancing

Panel A: Descriptive Statistics

	Treat	Control firms without Weighting	Control firms with Weighting
SIZE	23.4135	23.4106	23.4135
LEV	0.1054	0.0889***	0.1054
MB	3.7258	4.5548***	3.7258
ROA	0.0220	0.0295***	0.0220
LOSS	0.2812	0.2001***	0.2812
CR	1.9287	2.2737***	1.9287
QUICK	1.5038	1.7514***	1.5038
INVREC	0.1965	0.2935***	0.1966
BIG4	0.0632	0.0545	0.0632
MAO	0.0481	0.0285**	0.0481
TA	0.0643	0.0547***	0.0643
SDRET	0.0317	0.0341***	0.0317
SPCTERM	0.0204	0.0276**	0.0204
MNOWN	0.0396	0.0634***	0.0396
AGE	4.9031	4.7527	4.9031
INDDIR	0.3724	0.3783**	0.3724
SDCFO	0.0527	0.0535	0.0527

Panel B: Regression Results Based on Entropy Balancing

	Dependent Variable=*AUDITFEE*	
	(1)	(2)
TREAT×POST	***-0.0387****	***-0.0363****
	(-2.40)	***(-2.54)***
TREAT	-0.0190	
	(-0.91)	
POST	0.1761***	
	(12.25)	
Other Controls	YES	YES
Firm Fixed Effects	NO	YES
Year Fixed Effects	NO	YES
Observations	8,495	8,495
Adjusted R^2	0.638	0.920

Notes:

This table reports the results based on entropy balancing weighted on the first moment. Panel A presents the mean values of the firm characteristics just before the policy enactment, both unweighted and weighted. *, **, *** indicate that firm characteristics are significantly different between treatment and control firms at the 10 percent, 5 percent, and 1 percent levels, respectively. Panel B reports the regression results for estimating equation (1) using the entropy balancing procedure. The dependent variable (*AUDITFEE*) is the natural logarithm of annual audit fees. *TREAT* is an indicator variable for firms most impacted by GAOO, equal to one if firms are in high-polluting industries, and 0 otherwise. *POST* is an indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 otherwise. Please see Appendix B for variable definitions. Standard errors are clustered at the firm level. T-statistics are presented in parentheses. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Appendix A: Examples from Practice (Anecdotal Evidence)

(1). Excerpts from Annual Reports with Environmental Issues as Key Audit Matters

(a) From 2018 annual report of ZZMD (Full company name: Zhengzhou Coal Industry and Electric Power Co., Ltd; Stock ID: 600121)

As described in the financial statements in Note 3-15 and Note 3-22, and in Note 5-(11) and Note 5-(25), ZZMD established a Mine Geological Environmental Remediation and Restoration Fund in accordance with the "Guidance on Canceling Mine Geological Environmental Remediation Guarantee Deposits and Establishing Mine Geological Environmental Remediation and Restoration Fund" (Caijian [2017] No. 638) issued by the Ministry of Finance, Ministry of Land and Resources, and Ministry of Environmental Protection, as well as the "Notice on Canceling Mine Geological Environmental Remediation Guarantee Deposits and Establishing Mine Geological Environmental Remediation and Restoration Fund" (Yucai Huan [2017] No. 111) issued by the Henan Provincial Department of Finance, Henan Provincial Department of Land and Resources, and Henan Provincial Department of Environmental Protection.

Various production units under ZZMD have recognized the estimated liabilities related to mine geological environmental remediation and have also confirmed the corresponding abandoned assets. The depreciation expenses calculated based on abandoned assets have been included in the cost items. Additionally, the financial expenses calculated based on the amortized cost and discount rate of estimated liabilities during the reporting period have been recognized as estimated liabilities.

Because the amount of recognized estimated liabilities is significant and the subsequent measurement of estimated liabilities and corresponding abandoned assets has a significant impact on the total profit for the year 2018, we have identified this as a key audit matter.

(b) From 2016 annual report of SDHH (Full company name: Shandong Haihua Co., Ltd.; Stock ID: 000822)

On January 29, 2016, a slope protection failure occurred in the northern slurry pit of the SDHH soda ash plant, leading to a production halt and economic losses to external entities. SDHH entrusted the Weifang Binhai Economic and Technological Development Zone Management Committee to coordinate the compensation work for the external entities that suffered losses. As of the date of the financial statements, an insurance claim amount of CNY 43.3273 million has been received for the external losses. However, the nature of the event has not been determined, and the loss assessment and compensation work with the affected parties are ongoing.

As of December 31, 2018, the estimated compensation to external entities for the slope protection failure in the northern slurry pit amounts to CNY 349.5693 million. Of this, CNY 346.2009 million has been settled, with CNY 105.2009 million settled in the current year, and an estimated amount of CNY 3.3684 million still to be compensated to external affected entities. Due to the significant amount of the claim for the slope failure incident and its involvement in significant management estimates and judgments, we have determined the recognition of the estimated liability for compensation for the slope failure incident as a key audit matter.

We conducted interviews on this matter with the Weifang Binhai Economic and Technological Development Zone Safety Production Supervision Administration, Weifang Environmental Protection Bureau Binhai District Branch, China People's Property Insurance Company, Sunshine Property Insurance Company, Lin Gang Industrial Park Management Service Center, and Weifang Binhai Economic and Technological Development Zone Appraisal Center to understand the progress of the incident, including the determination of the event's nature, its impact on the external environment, the insurance claim amount for external losses, the loss assessment by the assessment company for external compensation, as well as the signing of compensation agreements with the affected parties and the payment of compensation funds.

(2). Excerpts from a GAOO report

(https://www.tja.gov.cn/public/118323205/1258575387.html)

GAOO report of Chen Bo, the Secretary of Cao'an Town Party Committee, and Xu Jie, the Mayor of Cao'an Town, in Relation to Their Term in Office

In accordance with the requirements of the Third Plenary Session of the 18th Central Committee of the Communist Party of China regarding the "Audit of Natural Resource Assets upon Departure of Leading Cadres," …, the District Audit Bureau dispatched an audit team to conduct a pilot audit of the natural resource assets of Chen Bo, the Secretary of Cao'an Town Party Committee, and Xu Jie, the Mayor of Cao'an Town, starting from June 1, 2020. The audit period covered the time from January 2016 to December 2019, focusing on natural resources such as water, land, forests, and the environment. Departments such as the District Land and Resources Bureau, the District Agriculture and Water Bureau, and the District Environmental Protection Bureau were emphasized for audits. Cao'an Town and related units provided written commitments regarding the authenticity and completeness of the financial and other relevant information. The responsibility of the District Audit Bureau is to conduct audits independently in accordance with the law and issue an audit report.

Overall Air Quality: The overall air quality Cao'an Town is one of the towns in Tianjia'an District with relatively good air quality. In 2018, the average PM2.5 concentration for the entire district was 53.2 micrograms per cubic meter, which marked an improvement of three places and ranked 5th in the city, with a decrease of 20.9%. The average PM10 concentration was 90.3 micrograms per cubic meter, showing a decrease of 15.4%. The air quality excellent rate was 66.8%, an increase of 12.7 percentage points. The town successfully achieved the PM2.5 assessment target set by the municipal government for the year 2018.

Air Pollution Control: In June 2018, Cao'an Town conducted an investigation of environmental pollution sources, covering a total of 23 high polluting enterprises. Six projects have been rectified, and seven concrete mixing plants have been phased out. … In conjunction with Cao'an Town Land Office's land renovation work, two wood processing enterprises with noise and dust pollution were closed. Weekly inspections and rectifications of pollution from mobile vehicle repairs and special industries in the catering sector were carried out, with a total of 34 catering establishments inspected and rectified. Seventeen central and provincial environmental protection inspection cases were processed, including 4

cases from the central environmental protection inspection in 2018 and 13 cases from the provincial environmental protection inspection in 2019, all of which have been completed. Since 2016, a total of 53 environmental complaints have been accepted…. The processing rate is 98%, and the satisfaction rate of the masses is 96%.

The sewage treatment plant was unable to operate normally. The Cao'an Town Wastewater Treatment Plant was designed by the Anhui Environmental Science Research Institute and officially began operations in September 2009 with a daily processing capacity of 280 tons. During the audit period, the sewage treatment plant could not operate in normal condition due to pump damage.

Environmental information: The environmental protection department of Cao'an Town Government and other departments responsible for environmental protection supervision and management have indeed disclosed environmental information in accordance with the relevant regulations, but public participation is low.

(3). Examples that Auditors Use Public Environmental Information

(a) Excepts from the report of Gongzheng Tianye Accounting Firm for YDNY's application of private place (Full company name: Far East Smarter Energy Co., Ltd.; Stock ID: 600869)

The Ecological and Environmental Office of Gaocheng Town, Yixing City, has issued an "Explanation of the Company's Environmental Protection Situation." New Far East Cable (a subsidiary of YDNY) has paid all the environmental fines and completed the necessary corrective measures. From January 1, 2021, to the present, the company has been able to strictly comply with the laws, regulations, and rules related to environmental protection at the national and local levels. There have been no instances of being penalized for violations of environmental protection laws, regulations, or rules during this period.

The Ecological and Environmental Bureau of Yichun City has issued a reply regarding the "Request for Assistance in Handling Enterprise Compliance Certificates." They have confirmed that Jiangxi Far East Battery (a subsidiary of YDBY) has undergone rectification and replaced the relevant upgrading pumps annually. They have also ensured that domestic sewage is connected to the company's sewage treatment plant for treatment. The water quality discharged daily has been verified through the online monitoring system to meet the discharge standards, thus completing the environmental credit restoration. Thus, the company does not result in severe environmental pollution, or significant harm to the interests of the listed company, investors' legal rights, or damage to the public interest.

(b) Excepts from the report of Lixin Accounting Firm for ZJRS's application of private place (Full company name: RONGSHENG ENGIRONMENT.; Stock ID: 603165)

Regarding the entities within the scope of the company's consolidated financial statements involved in production and pollution emissions, the relevant authorities have issued compliance certificates as follows:
On September 16, 2022, the Pinghu Branch of the Jiaxing Ecology and Environment Bureau issued a certificate stating, "ZJRS has not been subject to administrative penalties by our bureau for environmental

violations." On September 7, 2022, the Ecological and Environmental Bureau of Quanjiao County issued a certificate stating, "Anhui Rongsheng Packaging New Materials Technology Co., Ltd., since its establishment in Quanjiao, has not violated environmental laws and regulations and has not been subject to administrative penalties by our bureau." … In summary, the company has completed the project records and environmental impact assessment procedures for the existing annual paper production capacity of 600,000 tons, and long-term overcapacity production is in line with the requirements of the environmental impact assessment approval. There is no need to re-submit project records or environmental impact assessment procedures, and this does not constitute a major violation of laws and regulations, nor has it resulted in administrative penalties.

In June 2022, Zhejiang Qixin Testing Co., Ltd. issued the "Environmental Protection Acceptance Monitoring Report for the Completion of the Green Upgrade and Renovation Project of ZJRS." After the technological upgrade of the "Green Upgrade and Renovation Project," the total paper production capacity of the entire plant reached 600,000 tons per year. The environmental protection measures of the project have been implemented, and various pollutant indicators in the monitoring have met the corresponding emission standards and relevant environmental quality standards, complying with the requirements of the completion of the environmental protection acceptance inspection.

(4). Examples of the Importance of Verification

OECD (2022) suggests that to promote green transition, it is important to have "effective tracking and verification processes to ensure that market participants can verify and assess progress in line with a low-carbon transition." Some relevant discussion in the report includes:

- "In particular, the report highlights the importance of having effective tracking and verification processes to ensure that market participants can verify and assess progress in line with a low-carbon transition."

- "Addressing challenges related to information on sustainable risk and opportunities is of important to ensure that capital is allocated to investments that support the low-carbon transition and sustainable growth."

- "Eventually, market participants need access to consistent, comparable, and verifiable information about key climate transition information"

- "Addressing challenges related to information on sustainability-related risks and opportunities is of vital importance to ensure that capital is allocated to investments that support a low- carbon transition and sustainable growth."

- "There is growing recognition that better quality data and reporting will be needed to provide globally consistent and verifiable information by which to assess the progress of companies' transitions, and to incorporate results into capital allocation processes."

Source: OECD (2022), ESG ratings and climate transition: An assessment of the alignment of E pillar

scores and metrics, OECD Business and Finance Policy Papers, OECD Publishing, Paris, https://doi.org/10.1787/2fa21143-en.

"Financial authorities, international organizations, and market participants should encourage transparency of information to support quality data and targets used in transition plans, as well as effective use of monitoring, including through third-party verification. In turn, this will improve availability of relevant data for financial markets to support an orderly transition to low-carbon economies."

"ICMA notes that independent technical review and verification of information in firms' transition plans should be undertaken, including to assess alignment of both the long-term and short-term targets with the overall scenario and the credibility of the firms' strategy to reach the target."

Source: OECD (2022), Policy guidance on market practices to strengthen ESG investing and finance a climate transition, OECD Business and Finance Policy Papers, OECD Publishing, Paris, https://doi.org/10.1787/2c5b535c-en.

Choy et al. (2023) suggest that environmental information is important for lenders. The paper also show that lenders can use environmental covenants to improve borrowers' environmental performance. Considering the threat of potential environmental liabilities to banks' financial health, FDIC also instructs banks to have proper monitoring mechanisms and loan documentation to avoid incurring environmental liabilities. Specifically, FDIC advises banks to use environmental covenants that allow banks to be proactive in gauging the environmental risks dynamically and to respond to heightened risks quickly.

https://www.fdic.gov/regulations/laws/rules/5000-4900.html

The environmental risk assessment should continue during the life of the loan by monitoring the borrower and the real property collateral for potential environmental concerns. …. Loan documents should…require that the borrower… disclose information about the environmental status of the real property collateral and grant the institution the right to acquire additional information about potential hazardous contamination by inspecting the collateral for environmental concerns.

Source: Choy, S., Jiang, S., Liao, S. and Wang, E., 2023. Public environmental enforcement and private lender monitoring: Evidence from environmental covenants. Forthcoming, *Journal of Accounting and Economics*.

Appendix B: Definitions of Main Variables

Variables	Definitions
AUDITFEE	The natural logarithm of annual audit fees.
TREAT	Indicator variable for firms most impacted by the policy, equal to one if firms is in the most polluting industries, and 0 otherwise. The most polluting industries are classified according to the *Industry Classification Directory of the Inspection of Environmental Protection for Listed Corporations* (上市公司环保核查行业分类管理名录) issued by Environmental Protection Administration in China, including: (1)metallurgical, (2) chemical, (3) petrochemical, (4) coal, (5) thermal power, (6) building materials, (7) paper, (8) brewing, (9) pharmaceutical, (10) fermentation, (11) textiles, (12) leather, and (13) mining industries, (14) steel.
POST	Indicator variable for post-policy period, equal to 1 if it is year 2017 or 2018, and 0 if it is year 2014 or 2015.
SIZE	Firm size, calculated as the natural logarithm of firm's market value at year end.
LEV	Leverage ratio, calculated as long-term liabilities divided by total assets.
MB	Market-to-book ratio, calculated as the total assets minus book equity plus market equity, divided by total assets.
ROA	Return on assets, calculated as net income divided by total assets.
LOSS	Indicator variable for loss firm, equal to 1 if net income before extraordinary items is negative, and zero otherwise.
CR	Current ratio, calculated as current assets divided by current liabilities.
QUICK	Quick ratio, equal to quick assets (i.e., current assets less inventories) divided by current liabilities.
INVREC	Ratio of inventory and accounts receivable to total assets
BIG4	Indicator variable for Big-4 auditor, equal to 1 if Big-4 auditors audit the firm, and 0 otherwise.
MAO	Indicator variable equal to 1 if a firm receives a modified audit opinion, and 0 otherwise.
TA	The absolute value of total accruals, scaled by total assets.
SDRET	The standard deviation of residuals from the market model estimated by daily returns during the year.
SPCTERM	Absolute value of special items, divided by total income.
MNOWN	Percentage of firm shares owned by managers and directors.
AGE	Firm age, calculated as the natural logarithm of the number of months since listing.
INDDIR	The percentage of independent directors on the board, calculated as the number of independent directors divided by the total number of directors on the board.
SDCFO	Standard deviation of cash flows from operations over most recent five-year period.