The (Unintended) Environmental Impacts of the 2003 Dividend Tax Cut

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Abstract

We examine the trade-off between dividends and firms' negative externalities. Leveraging the 2003 U.S. personal tax reform we find that firms with greater agency costs increase their total pollution levels following the dividend tax cut. This effect is stronger for firms with weaker monitoring and governance, such as having more powerful CEOs, higher CEO pay slice, higher excess cash holdings, weaker competitive pressures, and lower analyst coverage. Also, we find no evidence that firms increase dividend payouts after the tax cut. Instead, firms allocate more resources toward investment but reduce their investments in pollution abatement. Our results reveal an unintended consequence of the dividend tax cut: by prioritizing investment over environmental responsibility, firms with greater agency problems exacerbate pollution.

Keywords: Toxic releases, Dividend taxation, Pollution, Agency Costs

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1 Introduction

Taxing dividends presents a trade-off between equity and capital allocation efficiency. While taxing dividends serves redistributive purposes, it also introduces efficiency costs by influencing corporate financial decisions (Chetty and Saez, 2010). One well-documented effect of dividend taxation is its impact on firm valuation and the cost of equity capital, as investors are primarily concerned with the after-tax value of dividends (Dhaliwal et al., 2007). However, beyond its implications for shareholder value, dividend taxation can also shape corporate sustainability policies by altering firms' financial constraints and investment behaviour. For instance, Pagano and Volpin (2001) show in their survey that managers prefer to keep dividends constant at the cost of employment levels. Similarly, Masulis and Reza (2014) show that corporate philanthropy declines following the 2003 dividend tax cut. However, it is unclear whether dividends take priority when it comes to firms' negative externalities on the environment. Therefore, we address this gap in the literature by examining the effect of the 2003 dividend tax cut on firms' toxic releases.

A key mechanism through which dividend taxation may affect firm pollution is financial constraints. Limited resources force firms to balance pollution abatement costs against legal liabilities (Xu and Kim, 2022). Reducing dividend tax burdens should ease financial constraints, enabling firms to allocate more resources toward environmentally responsible practices. In turn, reducing toxic emissions.

However, the relationship between dividend taxation and firm pollution is more complex due to potential agency conflicts. When firms face reduce dividend tax burdens, managers may gain greater discretion over retained earnings. This can lead to two competing outcomes. The 'traditional view' of neoclassical corporate taxation theory (e.g., Harberger, 1962; Poterba and Summers, 1984) posits that by reducing firms' cost of capital, permanent dividend tax cuts encourage firms to raise new funds and increase investment. In that

case, following a dividend tax cut firms will prioritize investment, including pollution abatement investment, rather than shareholder payouts. In turn, leading to a reduction in pollution. Alternatively, the 'shareholder realignment' model suggests that firms will pay higher dividends to reduce agency costs and ensure future investment from minority shareholders Gomes (2000); Jensen (1986). Hence, the dividend tax cut may lead to lower investment in pollution abatement, leading to an increase in pollution.

We exploit the dividend tax cut in the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) of May 2003 as an exogenous variation in the after-tax value of dividends. This tax cut led to a substantial increase in the after-tax value of dividends for individual investors, reducing the top marginal tax rate on dividends by more than 20 percentage points, from 38.6% to 15%. As noted by Brown et al. (2007), this tax cut was largely unanticipated prior to 2003, making it an exogenous shock to the after-tax value of dividends.

To measure firm pollution, we utilize plant-level data from the Toxics Release Inventory (TRI) Program of the U.S. Environmental Protection Agency (EPA), which serves as the most comprehensive source on corporate pollution activities. Employing a difference-in-differences (DID) approach, we analyse 423 publicly listed firms and find that firms with a higher proportion of outstanding shares held by individual investors experienced a significant increase in total pollution levels after the tax cut. Specifically, we estimate that a one-standard-deviation increase in individual investor holdings leads to a 9.6% rise in toxic releases following the tax cut.

To understand the underlying mechanisms, we next examine whether the increase in corporate pollution is linked to increases in firm payouts. Contrary to Chetty and Saez (2005) and Brown et al. (2007), we find no evidence that firms that firms with more minority investors benefited more from the tax reform increased their regular dividend payments after the reform. Given this, we explore whether firms increased investment after the tax reform. Our results suggest that firms benefiting more from the tax cut increase capital expenditures

and investment efficiency.

Next, we examine whether the reduction in firm pollution is driven by changes in pollution abatement activities. Pollution abatement, like product quality and employee treatment, represents an implicit contract between the firm and its stakeholders. Firms may compromise these commitments when prioritizing profit generation to meet debt obligations (Barron et al., 2022). We use two measures to assess pollution abatement: (1) Plant-chemical level abatement data from the EPA's Pollution Prevention (P2) database, and (2) Two indicators from the MSCI ESG database, both widely used to evaluate corporate social responsibility (CSR). Our findings show that firms reduced their investments in pollution abatement following the dividend tax cut, suggesting that these firms compromised on pollution abatement while increasing investment.

In addition, we further explore how cross-sectional heterogeneous firm-level characteristics influence the effects of tax reform on firm pollution. The 'agency conflict' model by Chetty and Saez (2010) suggests that a dividend tax has heterogeneous effects on firm behaviour. We find that the impact on toxic release is more pronounced in firms with higher agency problems—namely, firms with greater CEO power, higher CEO pay slice, excess cash, lower competition, and fewer analysts covering them. This result suggests that firms with higher agency problems place less emphasis on costly negative environmental externalities and abatement investments after the tax reform.

Our paper contributes to several strands of literature. We contribute to the strand of literature that investigates the impact of the 2003 dividend tax cut. Chetty and Saez (2005) document that firms responded to the tax reduction by initiating dividends or increasing dividend payouts, while Brown et al. (2007) find that this effect is more pronounced in firms where executives have high direct stock ownership. Chetty and Saez (2006) examine the impact on ex-dividend returns and show that the ex-dividend day premium increases following the tax rate cut. Similarly, Auerbach and Hassett (2005) study the effect on firm

valuation and find that firm value rises after the dividend tax cut, particularly for firms with higher dividend yields. Moreover, they report that non-dividend-paying firms experience larger abnormal returns than dividend-paying firms. Dhaliwal et al. (2007) find that the tax rate reduction decreases the cost of equity by 1.02% and the impact is more pronounced for financial constrained firms (Dai et al., 2013). Lin and Flannery (2013) report that firms reduce leverage by about 5% following the tax cut. Additionally, Chay et al. (2023) find that the tax cut enhances investment efficiency. On the contrary, Yagan (2015) find no increase in investment after the tax cut, indicating no decrease in the cost of capital. Despite extensive research on the financial effects of dividend tax reforms, little is known about their impact on firms' environmental ethics and the unintended consequences of such policies.

Second, our paper builds on the literature examining the determinants of firm toxic releases and environmental policies. Prior research has identified various firm-level characteristics, such as sources of financing (Lyu et al., 2025), financial constraints (Xu and Kim, 2022), ownership structure (Shive and Forster, 2020), institutional investor ownership (Kim et al., 2019; Dyck et al., 2019), community characteristics (Kalnins and Dowell, 2017), and political connections (Xiao and Shen, 2022). Regarding the impact of tax policy, Brown et al. (2022) show that country-level taxes on emissions lead to substantial increases in polluting firms' R&D spending. Beyond the U.S. context, Park et al. (2024) examine the effects of a Korean tax reform that imposed a new tax on cash retention and find that treated firms improved their CSR performance after the reform. While their study highlights how tax policy can incentivize firms to enhance CSR, our paper instead focuses on how a dividend tax cut—by altering firms' investment behaviour in the presence of agency problems—can lead to negative environmental consequences.

Finally, our paper extends the literature on how corporate governance and agency problems play a crucial role in shaping firms' resource allocation across competing priorities, including environmental and financial investments. Research indicates that

managerial incentives, ownership structures, and shareholder pressures significantly impact firms' investment and payout decisions (Jensen, 1986; Bertrand and Mullainathan, 2003). Additionally, studies highlight that firms with strong governance structures are more likely to engage in CSR activities (Ferrell et al., 2016) and that shareholder activism can influence environmental and social policies (Flammer et al., 2021). Masulis and Reza (2015) show that managers use corporate funds to support their personal charitable preferences. After the 2003 dividend tax cut, which increased the cost of CEOs pursuing private philanthropic interests, corporate giving declined significantly—especially in firms where CEOs had higher ownership stakes. Building on this insight, our results suggest that there may be a trade-off between investment expansion and pollution abatement expenditures due to agency problems. When CEOs gain more control or have greater access to cash following a dividend tax cut, their decisions may prioritize financial investments over environmental considerations. As a result, firms respond to tax changes in different ways, and the emphasis on financial returns over environmental responsibility can lead to unintended negative consequences of dividend tax policy.

2 Background on Dividend Tax Cut

The U.S. government enacted the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) in 2003, significantly reducing the taxation of dividend income. The reform lowered the top federal tax rate on individual dividend income from 38.6% to 15%. Designed to stimulate investment and economic growth, the policy moved swiftly from proposal to law in under five months, making it largely unexpected for businesses and investors prior to 2003. Specifically, President Bush proposed the reform on January 7, 2003. It applied retroactively to January 1 2003. The reform was officially signed into law on May 28, 2003.

The primary objective of the reform was to enhance capital market efficiency by reducing

the tax burden on dividend distributions. Prior to the reform, corporate earnings were subject to double taxation—once at the corporate level and again at the individual level when distributed as dividends—leading many firms to prefer retained earnings or share repurchases over dividend payments. The tax cut aimed to reverse this trend by making dividends more attractive to investors, thereby encouraging firms to distribute more earnings rather than hoarding excess cash.

We identify the effect of the reform on firms' pollution behaviour using a DID approach, exploiting the fact that the tax reform affects only individual investors but not corporations or nonprofit investors. Following a similar approach to (Lin and Flannery, 2013), we define treatment status based on the fraction of a firm's shares owned by individual investors at the time of the tax cut—measured as one minus the percentage of the firm's shares held by institutional investors, as reported in 13F filings.

3 Hypothesis Development

Conceptually, a dividend tax cut could have opposing effects on firm pollution. On the one hand, the tax cut could reduce firm pollution because lower tax rates on capital gains and dividends decrease the cost of capital, thereby alleviating firms' financial constraints. This aligns with the findings of Dhaliwal et al. (2007) and Dai et al. (2013).

The reduction in the cost of equity is expected to be stronger for firms with high demand inelasticity in equity capital, particularly those that are financially constrained. Since resources are limited, firms must balance abatement costs with legal liabilities. Previously, financially constrained firms may have compromised environmental commitments in favour of profit generation. Xu and Kim (2022) provides evidence that financial constraints increase firms' toxic emissions, as firms actively trade off abatement costs against potential legal liabilities. By reducing firms' financial constraints, a dividend tax cut could enable firms

to allocate more resources to environmental initiatives, ultimately leading to lower toxic releases.

On the other hand, a reduction in dividend tax rates increases after-tax returns for investors, making dividend distributions more attractive. Chetty and Saez (2005) show that firms are more likely to initiate or increase dividend payouts following tax cuts. This shift may pressure firms to prioritize shareholder payouts over other expenditures, including those related to environmental protection. Moreover, the 'traditional view' of neoclassical corporate taxation theory (for example, Harberger, 1962; Feldstein, 1970; Poterba and Summers, 1984), predicts that by reducing firms' cost of capital, permanent dividend tax cuts encourage firms to raise new funds and increase investment. Faccio and Xu, 2015 show that corporate and personal tax changes across multiple countries affect firms' capital structure decisions. Similarly, Kontoghiorghes, 2024 finds that tax cuts affecting primarily retail investors, lead firms to increase their dividends, labour, and capital investment.

However, if these investments are primarily directed toward growth and profit-maximizing activities rather than sustainability initiatives, firms may allocate fewer resources to pollution control. As a result, the tax cut could inadvertently lead to increased emissions, particularly in industries where environmental compliance is costly.

During our sample period from 2000 to 2006, firms primarily focused on growth and investment rather than environmental concerns. This period was characterized by strong economic expansion, particularly following the recovery from the dot-com bubble and the 2001 recession. Moreover, the regulatory environment, especially in the U.S., remained relatively lenient, as the Bush administration prioritized economic growth over stringent environmental policies. While CSR gained traction, environmental sustainability was not a dominant concern for most industries.

Based on the above considerations, we hypothesize that treated firms will increase toxic release after the tax cut. Hence, we test the following:

Hypothesis 1 Treated firms increase toxic releases following the dividend tax cut.

We next examine whether firms increase dividend payouts after the tax cut. Chetty and Saez (2005) and Brown et al. (2007) find that the 2003 dividend tax cut led to higher dividend payouts. The tax cut reduced the cost of capital for firms, increasing the incentive to distribute profits to shareholders rather than retaining them. The response was strongest in firms with powerful principals or strong agent incentives to increase dividends, such as those with executives who held more shares and fewer unexercised stock options. In contrast, firms lacking these incentives showed little response to the tax reform.

Based on the above arguments, we hypothesize that firms with a higher proportion of individual investors, who benefit more from the tax cut, will increase dividend payouts. Hence, we test the following:

Hypothesis 2 Treated firms increase dividend payouts following the dividend tax cut.

Next, we investigate the impact of the tax cut on firm investments. As we discussed, the 'traditional view' of neoclassical corporate taxation theory predicts that dividend tax cuts encourage firms to raise new funds and increase investment. However, Yagan (2015) finds no change in corporate investment following the tax cut, aligning with the 'neutrality view' of neoclassical models (King, 1977; Auerbach, 1979), which assume that new investments are financed by internal funds, making dividend taxes irrelevant to corporate investment decisions. In contrast, a recent 'agency conflict' model by Chetty and Saez (2010) suggests that the effects of a dividend tax cut on corporate investment can vary across firms. With reduced tax burdens on dividends, firms may reallocate capital to investment opportunities instead of retaining earnings. The financial flexibility provided by the tax cut could encourage firms to expand capital expenditures, particularly in high-growth industries or when driven by CEOs' preferences for business growth. Thus, we test the following:

Hypothesis 3 Treated firms increase capital investments following the dividend tax cut.

We then investigate the impact of the tax cut on firm abatement activities. Pollution

abatement, like product quality and employee treatment, represents an implicit contract between the firm and its stakeholders. Firms may compromise these commitments when prioritizing profit generation (Barron et al., 2022). While investment in operational efficiency may rise post-tax reform, environmental investments might decline. If firms prioritize dividend payouts or capital investments after the tax cut, they are likely to reduce spending on pollution abatement. Given that environmental initiatives often require significant upfront costs with long-term benefits, firms under pressure to increase dividends may scale back their pollution mitigation efforts. Thus, we hypothesize:

Hypothesis 4 Treated firms reduce investments in pollution abatement following the dividend tax cut.

Finally, we examine how agency problems influence the effect of the tax cut on firm pollution. Jensen (1986) highlights the conflict of interest between managers and shareholders, particularly when managerial decisions do not directly align with shareholder value maximization. Managers prefer to expand firms through acquisitions and investments rather than returning cash to shareholders. They may be reluctant to invest in pollution prevention strategies when the outcomes and economic benefits are uncertain, as such initiatives often require significant upfront costs with long-term payoffs. Henriques and Sadorsky (1999) emphasize that for a firm to prioritize environmental responsibility, it may be necessary to create financial incentives and other rewards to encourage managers to engage in environmental strategies.

In firms with higher agency problems, managers often prioritize short-term financial gains, such as increasing dividend payouts or allocating capital toward profit-maximizing investments, rather than engaging in long-term sustainability initiatives. The dividend tax cut may exacerbate these tendencies by giving managers greater discretion over capital allocation, potentially leading them to divert resources away from pollution control measures.

Agency problems are more pronounced in firms where managerial discretion is high and

external monitoring is weak. We capture these issues through five measures: CEO power, executive ownership, excess cash, market competition, and analyst coverage.

First, firms with greater CEO power—such as those with dual CEO-chair roles—are more likely to prioritize personal objectives over shareholder or stakeholder interests. A powerful CEO may be less constrained in redirecting resources away from pollution abatement to focus on short-term financial performance following the tax cut. Prior research shows that stock returns are more variable for firms run by powerful CEOs (Adams et al., 2005) and CEO power negatively correlates with corporate environmental responsibility (Muttakin et al., 2018).

Second, lower top executive ownership weakens alignment between managers and shareholders (see, for example, Ang et al., 2000), reducing incentives for executives to engage in long-term value-enhancing strategies, including environmental protection. When executives have little personal financial stake in the firm, they may be more inclined to maximize immediate returns at the expense of sustainability initiatives.

Third, firms with excess cash holdings are more prone to agency conflicts, as managers in cash-rich firms have greater discretion over capital allocation. Instead of investing in pollution control, managers may use the additional liquidity from the tax cut to finance projects that enhance their power or reputation. Jensen (1986) states how free cash flow can lead to inefficient investment decisions that do not maximize shareholder value, particularly in firms with weak governance structures.

Fourth, lower competition can further exacerbate agency problems, as firms operating in less competitive markets face weaker external pressures to maintain efficiency or respond to stakeholder concerns. With fewer market-driven incentives to reduce pollution, managers in these firms may be more likely to divert resources away from environmental initiatives following the tax cut. Bertrand and Mullainathan (2003) find that managers in less competitive industries are more likely to enjoy a 'quiet life', avoiding challenging

decisions that could benefit shareholders and other stakeholders, including those related to environmental performance.

Finally, firms with fewer analysts covering them face lower scrutiny from external investors and the market. Analysts play a key role in monitoring firm behaviour and holding managers accountable for their decisions. When analyst coverage is low, there is less oversight of corporate actions, increasing the likelihood that managers will de-prioritize pollution control efforts after the tax cut. Jing et al. (2024) show that firms experience an increase in toxic emissions following a decrease in analyst coverage, highlighting the role of external monitoring in influencing corporate environmental policies.

Taken together, these agency-related factors suggest that firms with weaker governance structures and lower external monitoring are more likely to increase pollution following the dividend tax cut. Consequently, firms with severe agency conflicts are likely to increase toxic emissions more than those with stronger governance mechanisms. Based on this, we propose the following hypothesis:

Hypothesis 5 Treated firms with higher agency problems experience a greater increase in toxic release following the dividend tax cut.

4 Data and Summary Statistics

4.1 Data and Variables

We collect firm pollution data from the U.S. Environmental Protection Agency (EPA)'s Toxics Release Inventory (TRI) database, which has reported establishment-chemical-level toxic release information since 1987. The TRI was established under the Emergency Planning and Community Right-to-Know Act (EPCRA) to enhance transparency regarding industrial toxic chemical releases. Facilities are required to report to the TRI program if they operate

within covered industries, employ ten or more individuals, and manufacture, process, or otherwise use TRI-listed chemicals in quantities exceeding regulatory thresholds. As of the latest update, the TRI database includes 774 individual chemicals across 33 categories, many of which are known to pose significant risks to human health and the environment. The TRI data have been widely used in academic studies, including Kanashiro and Rivera (2019), Gibson (2019), Akey and Appel (2021), Xu and Kim (2022), and Lyu et al. (2025).

The TRI reports the total amount of toxic chemicals released by establishments each year, including both on-site and off-site releases. On-site releases include emissions into the air, discharges into water bodies, land disposal, and underground injection. Air emissions are further categorized into stack emissions—controlled releases through smokestacks or vents—and fugitive emissions, which result from leaks, evaporation, or unintended discharges from equipment and industrial processes. Off-site releases occur when pollutants are transferred to external facilities for treatment, disposal, recycling, or energy recovery. These transfers often involve treatment methods such as biological processing, incineration, or chemical oxidation, as well as processing at publicly owned treatment works. The total toxic release is determined by summing on-site and off-site emissions.

In addition to toxic releases data, the TRI provides pollution prevention information. We utilize the pollution prevention (P2) database under the TRI to analyze abatement activities. Under the Pollution Prevention Act (PPA) of 1990, industrial facilities are mandated report source reduction efforts at the chemical level, detailing measures taken to minimize hazardous substances before they enter the waste stream. The EPA's P2 database classifies these activities into nine categories, broadly grouped into process-related and operating-related abatement measures. The most commonly reported activity is 'good operating practices', which includes enhanced maintenance scheduling, record-keeping, and procedural improvements. The second most frequent is 'process modification', such as altering equipment, layout, or piping to reduce chemical use and emissions. The list of

activities included in both types of abatement are reported in Akey and Appel (2021). We use these classifications to construct a binary variable that equals one if a firm reports either process-related or operating-related abatement activities and zero otherwise.

We also utilize two indicators from the MSCI ESG database to capture firms' abatement activities. The first, 'Pollution Reduction' (ENV-STR-B in KLD), identifies firms that have active programs and demonstrate performance in reducing toxic emissions. The second, 'Clean Energy Investment' (ENV-STR-D in KLD), is a binary variable that equals one if a firm proactively invests in clean technologies.

We collect accounting information from Compustat, while stock market data comes from the CRSP database. Institutional ownership data is obtained from the Thomson Reuters Institutional Holdings (13F) database, and analyst coverage is sourced from I/B/E/S. Executive ownership and titles are retrieved from the ExecuComp database. Our sample period spans 2000 to 2006, covering three years before and three years after the 2003 tax reform.

We define the variables as follows. $Ln(Total\ toxic\ release)$ is defined as the natural logarithm of one plus the amount of total toxic releases in pounds scaled by total firm sales. We also include subcategories of pollution: $Ln(Onsite\ toxic\ release)$, $Ln(Offsite\ toxic\ release)$, $Ln(Stack\ toxic\ release)$, and $Ln(Fugitive\ toxic\ release)$, which are defined as the natural logarithm of one plus the amount of on-site, off-site, stack, and fugitive toxic release scaled by the total sales of a firm, respectively.

To measure firm dividend payouts, we use three variables. *Dividend payout* is defined as dividends per share divided by earnings per share. *Dividend yield* is dividends per share divided by stock price. *Dividend ratio* is the ratio of common dividends to total assets. For investment measures, we define $CAPEX$ as the ratio of capital expenditures to total assets. Inv_eff denotes investment efficiency, calculated as the negative absolute deviation of actual investment from the expected or optimal level of investment, following Chay et al. (2023).

We estimate the expected level of investment by regressing current investment on the lagged sales growth rate while controlling for industry and year fixed effects. *Abatement investment* as a binary variable that takes a value of one if a firm invests in pollution abatement for operations or process. *Pollution reduction* is a binary variable that equals one if a firm has active programs and performance in reducing toxic emissions. *Clean energy investment* is a binary variable that equals one if a firm proactively invests in clean technologies.

We use five measures to capture firm agency problems. *CEO power* is a binary variable that equals one if a CEO holds the title of board chairman following Adams et al. (2005). *CEO pay slice* is CEO's total compensation as a fraction of the combined total compensation of the top five executives (including the CEO) in a given company, following Bebchuk et al. (2011). *Excess cash* is the difference between a firm's actual cash and predicted cash ratio. We estimate the predicted cash ratio by Equation 1, following Gao et al. (2013). Prior work such as Opler et al. (1999) and Gao et al. (2013) suggest that, in the presence of agency costs arising from managerial discretion, managers may hold excess cash to pursue their own objectives at the expense of shareholders. *HHI* measures industry competition and is calculated as the sum of an industry's squared market shares. Giroud and Mueller (2010) show that competition mitigates managerial slack. *COV* represents analyst coverage and is measured as the number of analysts following a firm in a given year. Chen et al. (2015) and Jing et al. (2024), for example, show that financial analysts curb agency issues. A firm is classified as having a high agency problem if the CEO holds chairman duality, *COV* is below the median, and *CEO pay slice*, *Excess cash* and *HHI* are above the median.

$$\begin{aligned} ln(Cash) =& \alpha + \beta_1 ln(assets) + \beta_2 CF + \beta_3 CF\ volatility + \beta_4 Sales\ growth + \beta_5 Leverage + \\ & \beta_6 Net\ working\ capital + \beta_7 Capex + \beta_8 R\&D + \beta_9 Acquisition + \beta_{10} Dividend + \\ & Industry\ FEs + Year\ FEs + \epsilon \end{aligned} \tag{1}$$

where $ln(Cash)$ is the natural logarithm of the cash ratio. CF is the operating cash flow scaled by total assets, where operating cash flow is calculated as earnings after interest, dividends, and taxes but before depreciation. Cash flow (CF) volatility is measured as the industry average of standard deviation of operating cash flows over the previous five years for each year. *Net working capital* is defined as (current assets—current liabilities—cash) scaled by total assets. $R\&D$ is the research and development expenditures scaled by total assets. *Acquisition* is the acquisition expenditures scaled by total assets. *Dividend* is an indicator variable that takes the value of one if a firm pays dividends, and zero otherwise.

Control variables are defined as follows. Firm size ($ln(assets)$) is the natural logarithm of total assets. Cash holding ($Cash$) is the ratio of cash and short-term investments to total assets. PPE (PPE) is the ratio of property, plant, and equipment to total assets. Sales ($ln(sales)$) is the natural logarithm of total sales. Capital expenditures ($CAPEX$) is the ratio of capital expenditures to total assets. Leverage ($Leverage$) is the book value of long-term debt plus debt in current liabilities divided by the book value of total assets. ROA (ROA) is return on assets, which is calculated by the ratio of operating income before depreciation to total assets. RE/TE (RE/TE) is retained earnings divided by the total book value of common stockholders' equity. Sales growth ($Sales\ growth$) is the changes in total sales divided by the previous year's level. *D_payout* is a binary variable that equals one if a firm pays dividend or repurchase shares in a year. Tobin Q ($Tobin's\ q$) is the ratio of the market value of total assets to the book value of total assets. Firm age (Age) is the number of years for a firm appears in CRSP database. Table 1 reports the definitions of all variables used in this paper.

4.2 Summary Statistics

Table 2 presents the summary statistics for firm-level characteristics of the sample firms. Our final sample consists of 2,844 firm-year observations from 2000 to 2006, covering 423 unique firms which appear consecutively in all years of the sample period. In 2002, the average proportion of shares held by individual investors is approximately 43.2%.

On average, firms release a total of 2.8 million pounds of toxic chemicals per year, with 2.3 million pounds released on-site. This includes 1.3 million pounds from stack emissions and 0.9 million pounds from fugitive emissions. Additionally, 37.2% of firms invest in pollution abatement for operations or processes, 3.1% invest in clean technologies, and 4.1% invest in pollution reduction.

The average firm is 3.087 years old, with a cash ratio of 8.4%, capital expenditures of 5.3%, a dividend payout ratio of 30.7%, a dividend yield of 1.5%, a dividend ratio of 1.3%, and leverage of 27.3%. The average firm size is 7.398, with property, plant, and equipment accounting for 35.8% of total assets and R&D accounting for 2%. The average ROA is 13.3%, sales growth is 9.8%, and Tobin's Q is 1.64.

5 Empirical results

5.1 The Effects of Dividend Tax Cut on Toxic Release

In this section, we examine the effects of the dividend tax reform on firms' toxic releases. To do so, we estimate the following difference-in-differences regressions on firms' toxic releases around the dividend tax reform.

$$Ln(Toxic\ Release)_{i,t} = \alpha + \beta Treated_i \cdot Post_t + X_{i,t-1} + FE \tag{2}$$

where $Ln(Toxic\ Release)_{i,t}$ is the natural logarithm of one plus the total (on-site, off-site, stack, fugitive) annual toxic releases scaled by firm sales for firm i in year t. $Treated$ represents the proportion of outstanding shares held by individual investors in 2002. $Post$ is a binary variable that equals one for years after 2003. $X_{i,t-1}$ represents firm-level characteristics that we control for in the regressions. Specifically, we control for $ln(assets$, $Cash$, PPE, $ln(sales)$, $CAPEX$, $Leverage$, and ROA. FE denotes firm and year fixed effects. Standard errors are clustered at the industry and year levels.

Our main focus is the coefficient, β, of the interaction term, $Treated_i \cdot Post_t$. If β is positive and significant, it lends support to our hypothesis that the 2003 tax reform increases firm's toxic releases.

Table 3 presents the results of the analysis. As shown in Table 3, Column (1), the coefficient of $Treated_i \cdot Post_t$ is 0.42 and is statistically significant at the 5% level, which supports Hypothesis 1. This suggests that, after accounting for other factors and policy changes surrounding the tax reform, the 2003 tax reform significantly increased firm pollution. Specifically, a one standard deviation increase in individual investor holdings leads to a 9.6% rise in toxic releases.

We continue to find a positive and significant relationship after controlling for firm characteristics in Column (2). After splitting toxic releases into on-site and off-site releases in Columns (3) and (4), we find that the impact is significant only for on-site releases. A one standard deviation increase in individual investor holdings leads to a 12.8% rise in on-site toxic releases. In contrast, the effect on off-site releases (Column (4)) is smaller and not statistically significant, suggesting that firms primarily increased pollution at their own facilities rather than through external waste management channels. Finally, both stack and fugitive toxic releases increase significantly after the tax reform. In terms of other control variables, firms with higher PPE and greater sales have lower toxic releases.

5.2 The Effects of Dividend Tax Cut on Dividend Policy

In this section, we examine whether firms increase toxic releases following the dividend tax cut due to the rise in dividend payouts. To do so, we estimate the following regression model based on DeAngelo et al. (2006):

$$Dividend\ polity_{i,t} = \alpha + \beta Treated_i \cdot Post_t + X_{i,t} + FE \tag{3}$$

where $Dividend\ polity_{i,t}$ represents firm i's dividend policy in year t. We use three measures of dividend policy: *Dividend payout*, *Dividend yield*, and *Dividend ratio*. We control for RE/TE, ROA, lagged ROA, *Sales growth*, $ln(assets)$, $Cash$, lagged D_payout.

Table 4 presents the results. We find no significant impact of the dividend tax reform on firm dividend policies, a result that contrasts with Chetty and Saez (2005) and Brown et al. (2007). This result is consistent with Yagan (2015), which shows that the dividend tax cut did not have any significant near-term effects on U.S. private firms, supporting the 'neutrality view' of neoclassical models.

One possible explanation is that firms may have already optimized their dividend policies based on long-term strategic considerations rather than reacting to short-term tax incentives. Additionally, dividend policies tend to be sticky (as discussed in Myers, 1984 and Fama and French, 2001), meaning that firms may be reluctant to adjust payouts frequently. Some firms might prioritize alternative uses for excess cash, such as reinvestment in operations, debt reduction, or stock repurchases, instead of increasing dividend distributions.

This perspective aligns with prior literature suggesting that firms do not always respond uniformly to tax policy changes. Factors such as financial constraints, ownership structures, and managerial incentives can all play a significant role in shaping corporate payout decisions.

5.3 The Effects of Dividend Tax Cut on Investment

We then explore the impact of the dividend tax cut on investment as an alternative way to use funds. The empirical specification is as follows:

$$Inv_{i,t} = \alpha + \beta Treated_i \cdot Post_t + X_{i,t-1} + FE \tag{4}$$

where $Inv_{i,t}$ denotes either capital expenditures scaled by total assets ($CAPEX_{i,t}$) or investment efficiency (Inv_eff). We control for firm-specific variables, including $ln(assets)$, $Tobin's\ q$, $Cash$, $Leverage$, and Age.

Table 5 presents the estimation results. The significant positive coefficient on the interaction between $Treated$ and $Post$ in both columns suggests that the tax cut increases firm capital expenditures and investment efficiency. Specifically, a one–standard deviation increase in individual investor holdings is associated with a 0.228 percentage point increase in investment and a 0.912 percentage point increase in investment efficiency, corresponding to more than 4% and 13% of the average levels of capital expenditures and investment efficiency, respectively. This finding supports the 'traditional view' of neoclassical corporate taxation, which argues that reducing the cost of capital encourages firms to undertake new investments. Additionally, the positive and significant coefficient on Tobin's q suggests that firms with higher growth opportunities allocate more resources to capital investments, while firm size and leverage exhibit negative and significant relationships with capital expenditures. Overall, these results indicate that, on average, firms prioritized investment over dividend payouts following the tax reform, suggesting that the tax cut provided firms with greater financial flexibility to expand capital expenditures.

5.4 The Effects of Dividend Tax Cut on Abatement Activities

Here, we test our Hypothesis 4, which states that firms reduce abatement activities after the tax reform. The empirical specification is as follows:

$$Abatement_{i,t} = \alpha + \beta Treated_i \cdot Post_t + X_{i,t-1} + FE \tag{5}$$

where $Abatement_{i,t}$ represents firm i's abatement activities in year t. We use three measures of abatement activities: *Abatement investment*, *Pollution reduction*, and *Clean energy investment*. Control variables include $ln(assets)$, $Tobin's\ q$, $Cash$, $Leverage$, and Age.

We report the results in Table 6. The significant negative coefficient on the interaction between Treated and Post in column (1) suggests that firms reduce abatement investment after the dividend tax cut. A one-standard-deviation increase in individual investor holdings leads to a decrease in abatement investment by 2.964 percentage points, accounting for approximately 8% of the average abatement investment level.

Additionally, we find evidence that firms reduce abatement investment related to clean energy but not pollution reduction. For clean energy investment, the β coefficient of -0.03 is statistically significant at the 5% level. The economic magnitude of this effect is substantial: a one-standard-deviation increase in individual investor holdings implies a 22% reduction relative to the sample mean. Additionally, firm size is positively associated with clean energy investment and Tobin's q is negatively associated with pollution reduction investment. Overall, these results indicate that the tax cut may have weakened firms' incentives to invest in environmental initiatives, potentially exacerbating negative externalities related to pollution.

5.5 Agency Problem and the Effects of Dividend Tax Cut on Toxic Release

In Section 5.1, we observe that the dividend tax cut has a positive influence on firm toxic release in treated firms, supporting Hypothesis 1. In this section, we investigate whether this impact is driven by firm agency problems. Specifically, we focus on the following firm-level characteristics: CEO power, CEO pay slice, excess cash, competition, and analyst coverage. We divide the sample into subsamples based on whether the CEO holds the title of board chairman, CEO pay slice, excess cash, HHI, and the number of analysts covering the firm is above or below the median in a year.

Table 7 presents the heterogeneous effects of the tax cut on pollution emissions across different firm characteristics. The results indicate that firms with high CEO power, high CEO pay slice, high excess cash, low competition (high HHI), and low analyst coverage experience a more pronounced increase in toxic releases following the tax cut. Specifically, the significant and positive $Treated_i \cdot Post_t$ coefficients in Columns (1), (3), (5), (7), and (9) suggest that firms with greater agency problems allocate fewer resources to pollution control after the tax reform. These findings support Hypothesis 5, indicating that weaker governance structures exacerbate the environmental impact of the tax cut by giving managers more discretion to de-prioritize sustainability efforts. Conversely, firms with stronger governance—such as low CEO power, low excess cash, and higher external monitoring—do not exhibit significant increases in pollution, highlighting the role of governance mechanisms in mitigating negative environmental externalities.

6 Conclusion

This paper provides novel evidence on the unintended environmental consequences of dividend tax cuts. Leveraging the 2003 U.S. dividend tax reform as a natural experiment, we find that treated firms increased their pollution levels following the tax cut. This effect is more pronounced in firms with higher agency problems, including those with greater CEO power, higher CEO pay slice, higher excess cash, weaker competition, and lower analyst coverage. Importantly, we find no evidence that firms responded to the tax cut by increasing dividend payouts. Instead, firms prioritized investment while simultaneously reducing pollution abatement expenditures. Our findings suggest that while tax policy can influence corporate investment behaviour, it can also lead to adverse environmental outcomes when managerial discretion is high and governance mechanisms are weak.

Our study contributes to several strands of literature. First, we add to the growing body of research on the effects of the 2003 dividend tax cut (e.g., Chetty and Saez, 2005; Yagan, 2015). While prior studies focus primarily on financial outcomes such as investment, dividend policy, and firm valuation, we extend this discussion by highlighting its environmental consequences. Second, our study builds on the literature examining the determinants of firm pollution (e.g., Lyu et al., 2025; Shive and Forster, 2020). We provide evidence that firms' financial policies, particularly in response to tax incentives, play a crucial role in shaping pollution outcomes. Finally, our findings contribute to the broader corporate governance and agency theory literature (Jensen, 1986; Bertrand and Mullainathan, 2003) by demonstrating that weaker governance structures exacerbate negative externalities when firms face fewer financial constraints.

Our findings carry important policy implications. While dividend tax cuts are often implemented to stimulate economic growth and investment, policymakers should consider their potential unintended environmental consequences. In particular, our results suggest

that tax reforms that increase managerial discretion over corporate resources may lead to reduced environmental responsibility. Policymakers may mitigate these adverse effects by strengthening environmental regulations, enhancing corporate governance mechanisms, or providing targeted incentives for pollution abatement investments. Furthermore, our findings highlight the importance of investor oversight in mitigating agency-driven externalities. Institutional investors and regulatory bodies should play an active role in monitoring corporate environmental performance, particularly in firms with governance structures that allow for greater managerial discretion.

Finally, our findings reveal the ethical considerations that underpin corporate decisions regarding pollution mitigation and prevention. Many corporations grapple with competing priorities, weighing the short-term financial benefits of cost-saving measures against the long-term ethical imperative to minimize their environmental footprint. By illustrating how financial policies and governance structures influence environmental outcomes, our study highlights the interplay between corporate decision-making and ethical responsibility. In doing so, we offer a nuanced perspective on the ethical implications of corporate financing decisions, reinforcing the need for mechanisms that align financial incentives with broader societal and environmental well-being.

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Tables

Table 1: Variable definitions

This table defines and/or describes the variables used in this paper.

Variables	Description
Treated	The proportion of shares held by individual investors in 2002, calculated as one minus the proportion of shares held by institutional investors, as reported in the 13F filings.
Post	A binary variable that equals one for years after 2003 (2004–2006) and zero otherwise.
Corporate Pollution	
Ln(Total toxic release)	The natural logarithm of one plus the amount of total toxic releases in pounds of a firm scaled by the total sales.
Ln(Onsite toxic release)	The natural logarithm of one plus the amount of on-site toxic releases in pounds of a firm scaled by the total sales.
Ln(Offsite toxic release)	The natural logarithm of one plus the amount of off-site toxic releases in pounds of a firm scaled by the total sales.
Ln(Stack toxic release)	The natural logarithm of one plus the amount of stack toxic releases in pounds of a firm scaled by the total sales.
Ln(Fugitive toxic release)	The natural logarithm of one plus the amount of fugitive toxic releases in pounds of a firm scaled by the total sales.
Abatement measure	
Abatement investment	A binary variable that equals one if a firm invests in pollution abatement for operations or process, and zero otherwise..
Clean energy investment	A binary variable that equals one if a firm proactively invests in clean technologies, and zero otherwise..
Pollution reduction	A binary variable that equals one if a firm has active programs and performance in reducing toxic emissions, and zero otherwise..
Firm Characteristics	
Acquisition	The acquisition expenditures scaled by total assets.
Age	The number of years for a firm appears in CRSP database.
Cash	The ratio of cash and short-term investments to total assets.
CAPEX	The ratio of capital expenditures to total assets.
CEO power	A binary variable that equals one if a CEO holds the title of board chairman, and zero otherwise..
CF	The operating cash flow scaled by total assets.
CF volatility	The industry average of standard deviation of operating cash flows over the past 5 years.
COV	The number of analysts following a firm in each year.
D_payout	A binary variable that equals one if a firm pays dividend or repurchase shares in a year, and zero otherwise..
Dividend payout	Dividends per share divided by earnings per share.
Dividend yield	Dividends per share divided by stock price.
Dividend ratio	The ratio of common dividends to total assets.
Excess cash	The difference between a firm's actual cash and predicted cash ratio estimated by Equation 1.
HHI	The sum of an industry's squared market shares.
Inv_eff	investment efficiency, calculated as the negative absolute deviation of actual investment from the expected level of investment.
Leverage	The book value of long-term debt plus debt in current liabilities divided by the book value of total assets.
ln(assets)	The natural logarithm of total assets.
ln(sales)	The natural logarithm of total sales.
Net working capital	Current asset minus current liabilities minus cash scaled by total assets.
Ownership	The sum of the fractions of shares owned by top five executives, including CEO.
PPE	The ratio of property, plant, and equipment to total assets.
R&D	The research and development expenditures scaled by total assets.
RE/TE	The ratio of retained earnings to total common equity.
ROA	The ratio of operating income before depreciation to total assets.
Sales growth	The change in total sales divided by the previous year's level.
Tobin's q	The ratio of the market value of total assets to the book value of total assets.

Table 2: Summary statistics

This table presents summary statistics of the main variables used in the analysis The sample period is from 2000 to 2006. All variables are winsorized at 1% at both tails.

Row	Mean	Median	SD	Min	Max	N
Treated	0.432	0.382	0.228	0.025	1.000	2844
Post	0.424	0.000	0.494	0.000	1.000	2844
Total toxic release	2834838.000	60152.740	11800000.000	0.000	135000000.000	2844
Onsite toxic release	2377762.000	38960.620	10700000.000	0.000	134000000.000	2844
Offsite toxic release	457075.700	1604.044	4379979.000	0.000	99300000.000	2844
Stack toxic release	1307532.000	14172.000	7629526.000	0.000	118000000.000	2844
Fugitive toxic release	90938.980	2290.000	465858.400	0.000	8018973.000	2844
Ln(Total toxic release)	3.308	3.773	3.682	-10.601	14.347	2844
Ln(Onsite toxic release)	2.601	3.200	4.010	-10.601	14.190	2844
Ln(Offsite toxic release)	-0.956	-0.148	4.894	-10.724	12.418	2844
Ln(Stack toxic release)	1.296	2.295	4.368	-10.601	9.320	2844
Ln(Fugitive toxic release)	-0.540	0.406	4.135	-10.601	7.340	2844
Abatement investment	0.372	0.000	0.483	0.000	1.000	2844
Clean energy investment	0.031	0.000	0.174	0.000	1.000	2844
Pollution reduction	0.041	0.000	0.199	0.000	1.000	2844
Age	3.087	3.367	0.895	0.000	4.407	2840
Cash	0.084	0.043	0.106	0.000	0.560	2844
CAPEX	0.053	0.042	0.043	0.004	0.295	2844
D_payout	0.791	1.000	0.407	0.000	1.000	2844
Dividend payout	0.307	0.151	0.524	0.000	3.435	2658
Dividend yield	0.015	0.010	0.017	0.000	0.089	2844
Dividend ratio	0.013	0.008	0.016	0.000	0.099	2844
Inv_eff	-0.067	-0.047	0.081	-0.605	-0.001	2838
Leverage	0.273	0.262	0.173	0.000	0.853	2844
ln(assets)	7.398	7.368	1.750	2.553	11.389	2844
ln(sales)	7.356	7.373	1.609	2.696	11.142	2844
PPE	0.358	0.314	0.201	0.053	1.056	2844
R&D	0.020	0.008	0.031	0.000	0.168	2844
RE/TE	0.541	0.660	1.327	-6.499	5.806	2844
ROA	0.133	0.126	0.068	-0.094	0.360	2844
Sales growth	0.098	0.073	0.217	-0.445	1.143	2844
Tobin's q	1.640	1.405	0.776	0.707	5.170	2844

Table 3: Dividend tax cut and toxic release

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm toxic releases. The main dependent variable is the natural logarithm of one plus the total annual toxic releases scaled by firm sales. *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable that equals one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Ln(Total Toxic Release)	(2) Ln(Total Toxic Release)	(3) Ln(Onsite Toxic Release)	(4) Ln(Offsite Toxic Release)	(5) Ln(Stack Toxic Release)	(6) Ln(Fugitive Toxic Release)
Treated· Post	0.42**	0.41**	0.56***	0.23	0.81***	0.44**
	(2.09)	(2.09)	(2.75)	(0.90)	(3.06)	(1.99)
ln(assets)		0.07	-0.09	0.08	-0.39**	-0.04
		(0.45)	(-0.56)	(0.37)	(-2.35)	(-0.19)
Cash		-0.14	-0.04	0.51	-0.16	-0.12
		(-0.26)	(-0.07)	(0.59)	(-0.24)	(-0.25)
PPE		-0.82***	-0.62**	-0.47	-0.13	-0.56*
		(-3.46)	(-2.18)	(-0.97)	(-0.34)	(-1.69)
ln(sales)		-0.67***	-0.32**	-0.62***	-0.21	-0.34**
		(-4.44)	(-2.05)	(-2.65)	(-1.27)	(-2.24)
CAPEX		1.42*	-0.75	1.84	-1.20	-0.37
		(1.90)	(-0.93)	(1.20)	(-1.07)	(-0.41)
Leverage		0.27	0.26	0.60	0.43	0.70*
		(1.01)	(0.82)	(1.58)	(1.06)	(1.90)
ROA		0.59	-0.35	1.16	-1.49*	0.40
		(0.98)	(-0.52)	(1.32)	(-1.80)	(0.59)
Constant	3.23***	7.68***	5.67***	2.65**	5.78***	2.11**
	(78.83)	(9.80)	(6.31)	(2.12)	(6.64)	(2.07)
R-squared	0.93	0.93	0.94	0.90	0.93	0.91
Observations	2842	2824	2824	2824	2824	2824
Firm and Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 4: Dividend tax cut and dividend policy

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm dividend policy. The dependent variables are dividend payout (dividends per share over earnings per share), dividend yield (dividends per share over stock price), dividend ratio (common dividends over total assets). *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable that equals one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Dividend payout	(2) Dividend yield	(3) Dividend ratio
Treated· Post	0.07	-0.00	0.00
	(0.92)	(-1.41)	(0.27)
RE/TE	0.01	0.00	0.00
	(0.68)	(0.43)	(0.93)
ROA	-0.95***	-0.01*	0.02***
	(-3.23)	(-1.68)	(3.72)
ROA_{t-1}	0.18	0.02**	0.02***
	(0.78)	(2.56)	(3.61)
Sales growth	-0.00	-0.00***	-0.00
	(-0.04)	(-2.62)	(-1.00)
ln(assets)	0.03	0.00**	-0.00***
	(0.74)	(2.02)	(-3.08)
Cash	-0.31*	-0.01***	-0.00
	(-1.89)	(-2.68)	(-0.80)
D_payout_{t-1}	0.09**	0.00***	0.00***
	(2.50)	(4.42)	(3.66)
Constant	0.12	-0.01	0.03***
	(0.41)	(-0.64)	(3.72)
R-squared	0.37	0.65	0.75
Observations	2651	2839	2839
Firm and Year FE	Yes	Yes	Yes

Table 5: Dividend tax cut and investment

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm investment. The dependent variable is the ratio of capital expenditures to total assets and investment efficiency. *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable that equals one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) CAPEX	(2) Inv_eff
Treated· Post	0.01**	0.04***
	(2.39)	(2.78)
ln(assets)	-0.02***	0.05***
	(-4.33)	(4.38)
Tobin's q	0.02***	-0.00
	(7.32)	(-0.74)
Cash	0.02	-0.11**
	(1.00)	(-2.28)
Leverage	-0.04***	0.15***
	(-3.65)	(5.60)
Age	-0.01	-0.01
	(-1.54)	(-0.71)
Constant	0.18***	-0.40***
	(5.20)	(-4.25)
R-squared	0.53	0.19
Observations	2823	2820
Firm and Year FE	Yes	Yes

Table 6: Dividend tax cut and abatement activities

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm abatement activities. We use three variables to measure firm abatement activities. *Abatement investment* is a binary variable that takes a value of one if a firm invests in pollution abatement for operations or processes. *Pollution reduction* is a binary variable that equals one if a firm has active programs and performance in reducing toxic emissions. *Clean energy investment* is a binary variable that equals one if a firm proactively invests in clean technologies. *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable equal to one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Abatement investment	(2) Pollution reduction	(3) Clean energy investment
Treated· Post	-0.13***	-0.01	-0.03**
	(-3.00)	(-0.52)	(-2.34)
ln(assets)	-0.01	-0.01	0.03**
	(-0.49)	(-1.35)	(2.00)
Tobin's q	-0.01	-0.01**	-0.01
	(-0.60)	(-2.42)	(-1.18)
Cash	-0.05	0.01	0.05
	(-0.39)	(0.21)	(0.74)
Leverage	0.04	-0.03	0.05
	(0.47)	(-1.13)	(1.38)
Age	0.04	0.01	-0.05*
	(0.94)	(0.36)	(-1.78)
Constant	0.39	0.15	-0.02
	(1.62)	(1.61)	(-0.14)
R-squared	0.65	0.66	0.47
Observations	2823	2823	2823
Firm and Year FE	Yes	Yes	Yes

Table 7: Dividend tax cut and Toxic release: agency problem

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm toxic releases. We partition the sample based on five agency problem measures: whether the CEO holds the title of board chairman, CEO pay slice, excess cash, competition, and the number of analysts covering the firm. The dependent variable is the natural logarithm of one plus the total annual toxic releases scaled by firm sales. *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable equal to one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) high CEO power	(2) low CEO power	(3) high CEO pay slice	(4) low CEO pay slice	(5) low COV	(6) high COV	(7) high HHI	(8) low HHI	(9) high excess cash	(10) low excess cash
Treated· Post	1.35***	-0.09	1.53***	0.62	0.97**	0.52	0.64***	0.17	0.73**	0.08
	(3.93)	(-0.37)	(3.92)	(1.63)	(2.35)	(0.87)	(2.59)	(0.56)	(2.43)	(0.28)
ln(assets)	-0.28	0.41*	-0.29*	-0.26	-0.43	0.19	0.06	0.08	0.32	-0.25
	(-1.37)	(1.96)	(-1.66)	(-0.79)	(-0.72)	(0.72)	(0.37)	(0.29)	(1.58)	(-1.16)
Cash	-0.37	0.11	-0.10	-0.13	2.22**	-0.71	-1.18	0.66	-0.95*	1.38
	(-0.57)	(0.14)	(-0.15)	(-0.15)	(2.23)	(-0.65)	(-1.56)	(0.97)	(-1.67)	(1.57)
PPE	-0.32	-1.13***	-0.30	-0.46	-0.81	-1.18***	-0.55	-1.14***	-1.03***	-0.58*
	(-1.06)	(-3.11)	(-1.11)	(-1.13)	(-1.03)	(-3.49)	(-1.64)	(-3.32)	(-3.06)	(-1.67)
ln(sales)	-0.32**	-1.01***	-0.20	-0.66***	-0.35	-0.57***	-0.64***	-0.73***	-0.88***	-0.40*
	(-2.17)	(-4.09)	(-1.24)	(-2.92)	(-0.78)	(-2.86)	(-3.53)	(-2.84)	(-4.32)	(-1.95)
CAPEX	-0.63	3.01***	0.43	0.03	0.11	0.59	0.08	2.94**	1.77	0.95
	(-0.57)	(2.92)	(0.50)	(0.02)	(0.07)	(0.44)	(0.08)	(2.45)	(1.60)	(0.98)
Leverage	-0.30	0.65*	-0.09	-0.26	0.76	0.37	0.13	0.38	0.39	0.03
	(-0.58)	(1.91)	(-0.24)	(-0.44)	(0.94)	(1.02)	(0.33)	(1.01)	(1.01)	(0.07)
ROA	-0.25	1.46*	-0.52	1.83	-2.68	1.19	1.11	0.21	2.74***	-1.81**
	(-0.29)	(1.69)	(-0.63)	(1.51)	(-1.45)	(1.32)	(1.53)	(0.21)	(3.64)	(-2.08)
Constant	8.19***	7.19***	7.05***	10.24***	9.04***	6.05***	7.46***	8.10***	7.14***	8.37***
	(6.97)	(6.96)	(6.65)	(5.85)	(3.03)	(4.24)	(7.91)	(6.16)	(7.33)	(6.61)
R-squared	0.93	0.93	0.95	0.91	0.92	0.93	0.93	0.92	0.94	0.92
Observations	1501	1323	1075	1023	553	712	1393	1431	1352	1472
Firm and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The (Unintended) Environmental Impacts of the 2003 Dividend Tax Cut

Supplementary results

Appendix A Dividend tax cut and Toxic release: establishment level

In this section, we examine the effects of dividend tax reforms on toxic releases at the plant level. We estimate Equation 2, where the dependent variable is the natural logarithm of one plus the total annual toxic releases (including on-site, off-site, stack, and fugitive emissions) for each plant. Table A1 reports the results. The coefficients on $Treated \cdot Post_t$ are positive and statistically significant in all columns, which aligns with our main findings.

Table A1: Dividend tax cut and Toxic release: establishment level

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm toxic releases at the establishment level. The main dependent variable is the natural logarithm of one plus the total annual toxic releases. *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable that equals one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Ln(Total Toxic Release)	(2) Ln(Total Toxic Release)	(3) Ln(Onsite Toxic Release)	(4) Ln(Offsite Toxic Release)	(5) Ln(Stack Toxic Release)	(6) Ln(Fugitive Toxic Release)
Treated· Post	0.34***	0.36***	0.44***	0.42***	0.47***	0.35**
	(2.95)	(3.11)	(3.90)	(2.68)	(3.53)	(2.43)
ln(assets)		-0.08	-0.05	0.29**	-0.25***	0.14
		(-0.96)	(-0.58)	(2.52)	(-3.10)	(1.41)
Cash		-0.60*	-0.79**	-0.11	-0.34	-0.54
		(-1.81)	(-2.40)	(-0.25)	(-1.00)	(-1.41)
PPE		0.14	-0.13	0.05	0.06	-0.06
		(0.85)	(-0.95)	(0.22)	(0.47)	(-0.35)
ln(sales)		0.17**	0.21**	-0.13	0.24***	-0.02
		(2.02)	(2.31)	(-1.30)	(3.34)	(-0.14)
CAPEX		0.10	-0.57	0.64	-0.06	-0.82
		(0.19)	(-1.12)	(0.92)	(-0.11)	(-1.34)
Leverage		0.37*	0.46**	0.47*	0.47**	0.56***
		(1.85)	(2.30)	(1.87)	(2.23)	(2.77)
ROA		0.98**	0.48	1.83***	-0.02	0.56
		(2.53)	(1.24)	(4.00)	(-0.05)	(1.21)
Constant	8.81***	7.82***	6.41***	2.26***	6.29***	3.39***
	(350.95)	(14.08)	(12.20)	(3.16)	(12.83)	(5.47)
R-squared	0.44	0.44	0.47	0.32	0.50	0.37
Observations	16105	16003	16003	16003	16003	16003
Firm and Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Appendix B Dividend tax cut and Toxic release: chemicals that harm human health

In this section, we test whether the increase in toxic releases is harmful to humans and the environment. A potential concern is that the observed increase in toxic releases may reflect only a general rise in reported emissions rather than an increase in chemicals that pose a direct risk to human health. To address this, we refine our measure by replacing the dependent variables in Equation 2 with toxic releases that are explicitly identified as harmful to humans in the EPA's Integrated Risk Information System (IRIS). IRIS assesses, characterizes, and standardizes the health hazards of over 400 chemicals in the environment.[1] Table B1 reports the results. Our interpretation of these results remains qualitatively unchanged from the main paper.

[1]Detailed information about IRIS is available online (https://www.epa.gov/iris).

Table B1: Dividend tax cut and Toxic release: chemicals that harm human health

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm toxic releases that harm human health. The main dependent variable is the natural logarithm of one plus the total annual toxic releases scaled by firm sales. *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable that equals one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Ln(Total Toxic Release)	(2) Ln(Total Toxic Release)	(3) Ln(Onsite Toxic Release)	(4) Ln(Offsite Toxic Release)	(5) Ln(Stack Toxic Release)	(6) Ln(Fugitive Toxic Release)
Treated· Post	0.58**	0.66***	0.58**	0.07	0.95***	0.47**
	(2.29)	(2.62)	(2.42)	(0.26)	(3.29)	(2.10)
ln(assets)		-0.04	-0.04	0.21	-0.39*	0.28
		(-0.22)	(-0.20)	(0.76)	(-1.92)	(1.54)
Cash		-1.04	-0.89	-0.03	-0.21	-1.23**
		(-1.54)	(-1.26)	(-0.04)	(-0.27)	(-2.23)
PPE		-0.54*	-0.69**	0.53	-0.16	-1.17***
		(-1.70)	(-2.01)	(0.90)	(-0.37)	(-3.19)
ln(sales)		-0.42**	-0.33*	-0.74**	-0.17	-0.66***
		(-2.21)	(-1.70)	(-2.41)	(-0.86)	(-4.20)
CAPEX		-0.75	-1.06	-2.51*	-1.83	-0.75
		(-0.65)	(-0.97)	(-1.70)	(-1.61)	(-0.74)
Leverage		0.96**	0.98**	0.32	0.79*	0.84**
		(2.52)	(2.50)	(0.61)	(1.71)	(2.06)
ROA		-0.89	-0.61	1.44	-1.17	0.62
		(-0.91)	(-0.64)	(1.48)	(-1.22)	(0.89)
Constant	1.15***	4.64***	3.77***	-0.89	3.92***	1.36
	(21.72)	(4.99)	(3.65)	(-0.61)	(4.01)	(1.23)
R-squared	0.93	0.94	0.94	0.84	0.93	0.91
Observations	2842	2824	2824	2824	2824	2824
Firm and Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Appendix C Dividend tax cut and Firm Value

In this section, we test whether the dividend tax cut enhances firm value. Previous studies find that firm valuation increases and the cost of equity decreases following a dividend tax cut (Auerbach and Hassett, 2005; Dhaliwal et al., 2007). In line with these findings, we examine how firms respond to the tax cut and its implications for firm value. Our results, presented in Table C1, show that the interaction term $Treated \cdot Post_t$ is positive and statistically significant across all specifications, indicating that firms with higher individual investor ownership experience a significant increase in market valuation after the tax cut. Specifically, the market-to-book ratio and Tobin's q increase following the reform, consistent with the notion that investors capitalize on the tax advantages. Taken together, these results suggest that the tax cut led to a rise in firm value, potentially through increased investment and growth, but also accompanied by higher toxic releases and reduced abatement efforts. Hence, raising concerns about the broader environmental implications of these corporate responses.

Table C1: Dividend tax cut and Firm Value

This table presents the OLS regression results examining the effect of the 2003 dividend tax cut on firm value. The dependent variables are market-to-book value (M/B) and Tobin's Q. *Treated* represents the proportion of outstanding shares held by individual investors in a firm in 2002. *Post* is a binary variable that equals one for years after 2003 and zero otherwise. Other variables are defined in Table 1. t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) M/B	(2) Tobin's q	(3) M/B	(4) Tobin's q
Treated· Post	0.32***	0.36***	0.19*	0.24***
	(3.16)	(4.06)	(1.96)	(2.79)
ln(assets)			-0.43***	-0.38***
			(-5.19)	(-5.30)
Cash			0.55**	0.56**
			(2.03)	(2.29)
PPE			0.25*	0.20*
			(1.89)	(1.70)
ln(sales)			0.07	0.05
			(0.99)	(0.76)
CAPEX			0.03	0.26
			(0.07)	(0.63)
Leverage			0.12	0.12
			(1.00)	(1.02)
ROA			1.92***	1.87***
			(5.81)	(6.25)
Constant	1.56***	1.58***	3.80***	3.58***
	(65.01)	(76.46)	(6.97)	(7.47)
R-squared	0.68	0.71	0.70	0.73
Observations	2842	2842	2824	2824
Firm and Year FE	Yes	Yes	Yes	Yes

Appendix D Parallel Trends

Identification in a DID setting relies on the parallel trends assumption, which states that treated and control firms would follow the same trends in the absence of the treatment. To test this assumption, we compare the outcome variable $Ln(Toxic\ Release)$ for treated and control firms annually during the sample period and report the results in Figure 1. This pattern indicates that the effects on toxic release emerge only after the dividend tax cut, supporting the validity of the parallel trends assumption.

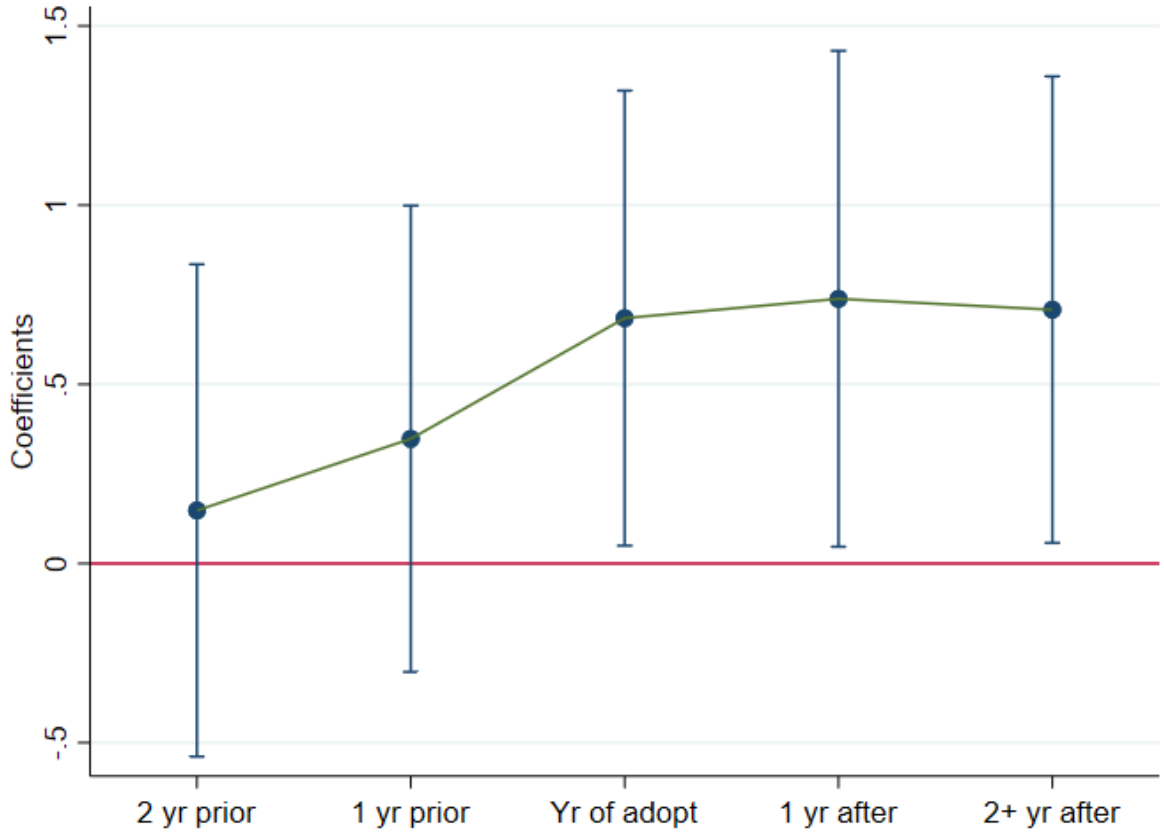


Figure 1: Parallel trend test