THE PUBLIC AS CORPORATE STAKEHOLDER:

EVIDENCE FROM TOXIC RELEASE AND FINANCIAL REPORTING

by

Xiaolu Zhou

APPROVED BY SUPERVISORY COMMITTEE:

Dr. William M. Cready, Co-Chair

Dr. Ningzhong Li, Co-Chair

Dr. Ying Huang

Dr. Stanimir Markov

Dr. Ram Natarajan

To my beloved parents and husband

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XIAOLU ZHOU, BA, MS

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Xiaolu Zhou, PhD
The University of Texas at Dallas, 2020

Supervising Professors: Dr. William M. Cready, Co-Chair
Dr. Ningzhong Li, Co-Chair

This paper aims to show the role of the public as corporate stakeholder by examining the financial reporting of polluting firms. Because pollution damages the living environment of the public, the public "invests", though passively, their health and life quality into polluting firms and thus essentially is a stakeholder of polluting firms. I argue that polluting firms have incentives to report lower profits to reduce the cost related to the pressure from the public over environmental issues. Using corporate toxic release data, I find that polluting firms are more likely to engage in income-decreasing earnings management when their toxic release increases. Importantly, the effect is stronger for toxic release produced by plants located in states where residents are more likely to pressure firms for lower pollution, suggesting that the public plays an important role. Further, the effect is stronger for toxic release subject to stricter regulatory monitoring, for firms with higher media coverage, and for firms in consumer product industries. However, the public still plays a role after the influences of regulators, the media, and customers are controlled for.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Jensen and Meckling (1976) view a firm as "a nexus of contracts" with various economic agents. Compared with explicit contractual relationships, such as those firms share with shareholders and creditors, implicit contractual relationships, such as those they have with the general public, are not well understood. The general public is an important group of corporate stakeholders because it bears the costs of negative externalities (e.g., pollution) generated by firms. While the literature on financial reporting and disclosure has examined the impact of explicit stakeholders such as shareholders, creditors, and customers (e.g., Bowen et al. 1995; Sengupta 1998; Lang et al. 2006), the evidence on the impact of the public as stakeholder is limited. In this study, I investigate the role of the public as corporate stakeholder by examining the effect of pollution on polluting firms' financial reporting, and how the effect varies with the pressure from the public to lower pollution.

Pollution is an ideal setting to examine the role of the general public as corporate stakeholder because it is caused by firms' production activities and can seriously damage the living environment of the public. In this sense, the public is "investing", though passively, its health and life quality in the polluting firms, and thus essentially becomes a stakeholder of polluting firms. To fight against pollution, the public imposes pressure on polluting firms through various channels. The public may directly negotiate with polluters over pollution reduction, or hold a protest or an on-site demonstration to voice opposition to the pollution caused (e.g., O'Rouke and Macey 2003; Schlosberg 1999; Carmin 1999). The public may also indirectly pressure polluting firms through government regulation, media coverage, or consumer boycotts (e.g., Delma and Toffel 2010;

Stephan et al. 2011). Such public pressure imposes substantial costs on polluting firms, including the high cost of pollution reduction, reputational damage, stricter environmental regulation, and the loss of product market share.

Because polluting firms are often criticized as deriving profits from their unpaid environmental externalities (Trucost 2013), they are likely to be subject to greater public pressure if they report high profits. A highly profitable polluting firm is more likely to be viewed as extracting profits at the cost of the wellbeing of the public. Therefore, polluting firms may have incentives to appear less profitable to the public in order to mitigate this unfavorable perception, and reduce the public pressure. Furthermore, such incentives should be stronger when the pollution increases, incurring greater public pressure. Hence, I predict that polluting firms are more likely to engage in income-decreasing earnings management to hide their profits when their pollution increases.

This prediction, however, is not obvious ex ante, because managing earnings downward may not be the most cost-effective way to reduce the public pressure. Downward earnings management is costly for both the firm and its management because it may adversely impact the capital market's evaluation of the firm and the managers' compensation (e.g., DeFond et al. 1994; Armstrong et al. 2013). Managers may not manage earnings downward if the cost outweighs the benefit coming from reducing the public pressure. Further, adjusting financial reporting is an indirect way of addressing the public complaint. Relative to the more direct and visible ways of addressing the public pressure, such as switching to low-pollution production technology or giving back to the local community by increasing corporate social responsibility investment (e.g.,

donating to charity or schools), managing earnings downward may not be the best choice for the polluting firms.

I use the toxic release data from Toxic Release Inventory ("TRI") program to measure firm pollution. TRI is the most comprehensive industrial pollution disclosure program in the US (Environment America 2009). It requires the disclosure of 675 toxic chemicals that are released into the air, water, land, and underground, and has been a national yardstick for measuring pollution and waste generation. The TRI data is publicly accessible, allowing the public and related interest groups to monitor polluting facilities in the communities. I manually match the parent firms of reporting facilities to the Compustat data, and aggregate the plant-level toxic release at the firm level. I then follow prior research and measure pollution as lagged total toxic release scaled by lagged total revenue (e.g., Patten 2002).

I use Dechow and Dichev (2002)'s accruals model to measure earnings management (e.g., Dechow et al. 2011; Dechow et al. 2012).[1] Using polluting firms with toxic release data available for the period from 1996 to 2016 and a model with firm and year fixed effects, I document strong evidence that firms are more likely to manage earnings downward when their toxic release increases. The effect is economically significant: a one-standard-deviation increase of toxic release leads to income-decreasing discretionary accruals of about 0.5% of total assets.

I next examine how the effect of toxic release on downward earnings management varies with the public pressure to lower pollution. If the downward earnings management by polluting firms is attributed to the pressure of the general public, the effect would be stronger for toxic

[1] My main results are robust to estimating discretionary accruals using McNichol's (2002) and Kothari et al.'s (2005) models. In addition, I find similar results when measuring downward earnings management with the likelihood of income-decreasing restatements.

release produced in states where residents are more likely to pressure firms to reduce pollution. To test this prediction, I partition the total toxic release into the toxic release produced in states with higher public pressure and the toxic release produced in states with lower public pressure. I follow prior literature and measure the public pressure using 1) state-level number of local environmental organizations, 2) local residents' preference for eco-friendly lifestyle, 3) population density, 4) average education level of local residents, and 5) internet penetration rate (e.g., Arora and Carson 1999; Khanna and Vidovic 2001; Horton 2004). Consistent with my prediction, I find that the effect of pollution on downward earnings management is stronger for toxic release produced in states with higher public pressure. These findings indicate that the public has substantial influence on polluting firms' financial reporting.

While the public could pressure polluting firms directly through their own efforts, they may also call for the help of regulators, the media, and customers. [2] Further, these parties may take action on polluting firms independent of the public. Hence, I further explore i) whether the effect of pollution on downward earnings management I document could be attributed to the influence of regulators, the media, and customers, and ii) whether the public still plays a role after the influence of these parties is controlled for. I measure regulation risk using the distance from a plant to its supervisory Environmental Protection Agency ("EPA") regional office. I find that the effect of pollution on downward earnings management is stronger for the toxic release produced by plants that are subject to higher regulation risk. Next, I measure media coverage by counting the number of news articles covering a polluting firm, and find that the effect is more pronounced for

[2] The effects of regulators, the media, and customers are not necessarily alternative explanations of my findings because the public could also seek their help with imposing pressure on polluting firms.

polluting firms with higher media coverage. Finally, I classify the industries in which the sample firms operate into consumer product and non-consumer product industries and document a stronger effect of pollution on downward earnings management for firms that are in consumer product industries, which face higher risk of customer boycotts. Taken together, these findings are consistent with regulators, the media, and customers exerting influence on polluting firms.

Assuming that the aforementioned analyses fully capture the influences of regulators, the media, and customers, I then examine whether the public still has a residual effect on polluting firms after controlling for the effects of these parties. I find that the measures of public pressure described above still significantly explain the cross-sectional variation of the effect of pollution on downward earnings management when the effect of regulators, the media, or customers is controlled for, and when the effects of these parties are all controlled for. To the extent that regulators, the media, and customers are the major indirect channels through which the public pressures polluting firms, this finding also suggests that the public influences polluting firms directly through their own efforts.

Endogeneity, such as a correlated omitted variables problem, is obviously a concern for my analyses. The use of firm fixed effects and the extensive cross-sectional tests described above mitigate the concern to some extent. To further address the endogeneity concern, I utilize the change of TRI disclosure requirements to capture the exogenous increase in disclosed toxic release that is not due to changes in firm fundamentals. Specifically, several times during the sample period, the EPA added new toxic chemicals into the TRI required chemical reporting list. This mandatory addition results in the disclosure of new chemicals which is unrelated to firm fundamentals, such as the production level or change of production technology. Using a difference-

in-differences design, I find that firms reporting the new chemicals and hence affected by the new disclosure requirement, increase downward earnings management following the new TRI disclosure requirement relative to firms that do not release the new chemicals and thus are not affected by the new disclosure requirement. This analysis further mitigates the endogeneity concern.[3]

Finally, I examine whether the downward earnings management mitigates the cost of public pressure for polluting firms. Measuring the cost of public pressure with future EPA enforcement actions and negative environmental media coverage, I find that for the average firm in the sample, higher toxic release leads to higher likelihood of future EPA enforcement actions and negative media coverage. However, this effect is significantly weaker and becomes insignificant for firms with lower discretionary accruals. This finding suggests that downward earning management effectively mitigates the cost of the public pressure for pollution firms.

My study makes several contributions. First, I contribute to the accounting literature on financial reporting. My study differs from prior literature in that I examine how the public, who "invests" its physical health and living environment in polluting firms and hence is a stakeholder of the polluting firms, shapes corporate financial reporting. The incentive to manage earnings in my study comes from the pressure that the general public imposes on polluting firms, while prior studies focus on the earnings management incentives related to the influences of other stakeholders, such as shareholders, creditors, suppliers, and customers (Dechow et al. 2010).

[3] I present a set of additional analyses in Section 5.5 to address other alternative explanations. In particular, I show that firm profitability is not a driver of toxic release, which mitigates the reverse causality concern that the main finding could be due to underperforming firms choosing high-pollution technology. I also provide evidence that the main finding is unlikely to be due to the mechanical effect of the recognition of contingent environmental liabilities related to pollution, or the fact that the pollution level may proxy for the production level.

My study is broadly consistent with the literature of political cost hypothesis to the extent that the cost of public pressure is viewed as one type of political cost. The political cost hypothesis literature argues that the fear of government scrutiny and the associated costs from wealth transfers in the regulatory process incentivize managers to manipulate earnings downward (Watts and Zimmerman 1978, 1986). My study differs from prior studies of political cost hypothesis in that I focus on the impact of the general public, and importantly, I show that the public has a residual effect after controlling for the effect of environmental regulation, suggesting that the influence of the public works beyond that of regulation.

Second, I add to the literature of the impact of the public on firm behavior (e.g., Dyreng et al. 2016; Huang 2018). Dyreng et al. (2016) document how public scrutiny on firms' compliance with the subsidiary disclosure requirements affects subsequent disclosure and tax avoidance. Huang (2018) documents that firms receiving government subsidies increase their disclosures to lower the costs of the public scrutiny from tax payers. My study adds to this line of literature by showing that polluting firms manage earnings downward to reduce the cost of public pressure related to pollution. My study is different from these related studies in that I focus on the general public as a corporate stakeholder and explicitly conduct extensive analyses to establish this role.

The remainder of the paper proceeds as follows. Chapter 2 provides institutional background. Chapter 3 reviews related literature and develops the hypotheses. Chapter 4 describes the empirical design. Chapter 5 presents the empirical analyses. Chapter 6 concludes.

CHAPTER 2

INSTITUTIONAL BACKGROUND

The United States has made great progress in pollution reduction. The reported industrial pollution has plummeted by half since 1980s. However, firms still dump 4 billion pounds of toxic chemicals into the environment (EP 2017), which does not include the enormous unreported pollution caused by unidentified toxic chemicals.[4] The pollution-related problems, such as pollution of rivers, lakes, and reservoirs, and contamination of soil and water by toxic waste, have been the top environmental concerns of the public throughout the past three decades.[5]

Pollution, especially the routine discharge of toxic chemicals, has been called "the invisible killer", making subtle and long-lasting adverse impacts on the public (Environment America, 2009). For instance, according to a report by the World Bank,[6] the diseases caused by exposure to toxic pollution are often mistakenly identified as being caused by other factors, and in many cases, the poison accumulates and damages bodies for years before being noticed.[7] Pollution also negatively affects the public by damaging the habitat of plants and animals and destroying biodiversity, which is vital for maintaining a healthy and balanced ecosystem. The consequent

[4] Of the more than 80,000 chemicals currently used in the United States, most have not been adequately tested for their effects on human health (See https://www.nrdc.org/issues/toxic-chemicals#priority-why-matters).

[5] Comparatively, global warming only recently rose to be among the top environmental concerns, but is still ranked after the pollution problem. See: https://news.gallup.com/poll/1615/environment.aspx.

[6] "What You Need to Know About Toxic Pollution: A Conversation with Richard Fuller" (World Bank 2015)

[7] For example, after inhaling the toxic air released by Tonawanda Coke Corp. for more than thirty years, the residents of Tonawanda community suffered from bladder cancer, leukemia, and respiratory diseases at a rate much higher than the rest of the state, and some of their health issues are not even diagnosable. See http://sustainabilityjjay.org/2015/02/air-pollution-in-tonawanda-n-y-sickens-and-kills-according-to-pending-civil-suits/.

deterioration of the ecosystem not only impairs the life quality of the public, but also eventually threatens the sustainability of human beings.

The last few decades have witnessed the rising power of the public in fighting pollution. People join together to monitor polluters, pushing them to cut pollution and restore a clean environment. Such efforts are manifested in the formation of numerous local environmental organizations.[8] Many local environmental organizations start out protecting the well-being of the residents from pollution hazards (Freudenberg et al. 1991). Their agendas are later extended to broader environmental issues such as maintaining the biodiversity of the local ecosystem, sparking a new wave of local environmental mobilization (Bevington 2009).

The local environmental organizations usually rely on a wide range of tactics, both legal and extralegal, to address their environmental complaints. They usually take initiative to address pollution problems directly through their own efforts. Some organizations voluntarily police the pollution generation of facilities and negotiate and forge agreements with polluting companies (O'Rouke and Macey 2003).[9] When necessary, some local environmental groups resort to more expressive and unconventional tactics, such as holding demonstrations and marches, or even sit-ins and blockades. Such open public opposition sometimes proves to be the best strategy when local environmental petitions conflict with business interests, and polluting firms have stronger political influence than local environmental organizations (Doherty 2005). Local environmental

[8] There were more than 18,000 "kitchen table" local environmental organizations across the United States by 2005 (Urban Institute 2005). However, the actual number of local environmental organizations is underestimated because local environmental organizations tend to be short-lived with many disbanded once the environmental issues are addressed (Carmin 1999).

[9] For example, in 2004 Pilsen Environmental Rights and Reform Organization, a local environmental organization formed by residents of Chicago's Pilsen neighborhood, pushed the nearby brass foundry for air testing and secured agreements from the company to reduce toxic emissions (See https://www.foreffectivegov.org/node/791).

organizations might also take their complaint to the court by filing lawsuits against polluting firms (Carmin 1999). However, because major environmental laws set a high threshold for citizen lawsuits, it is generally difficult for the public to sue polluting firms.[10]

In addition, local environmental organizations may push polluting firms indirectly through the government, the media, or customers. Pushing the government to tighten the enforcement of environmental regulation or lobbying for stringent environmental legislations seems to be an obvious strategy. However, many local environmental organizations do not have much access to local politicians and government, nor could they alter the government's decisions without accumulating sufficient public pressure (Doherty 2005).[11] Therefore, after the public pressure is built up by the direct efforts of local environmental organizations as discussed above, the government may respond to the petitions of the public by enhancing the enforcement of environmental laws or setting higher regulation standards, both of which increase the compliance burden for polluting firms. Media is another weapon local environmental groups may use to pressure polluting firms.[12] Unfavorable media coverage could severely damage a firm's reputation, "even one negative occurrence of media coverage (on pollution) would be well enough (for polluting firms)" (Stephan et al. 2011). Further, the local environmental groups may call for a

[10] Many environmental laws authorize citizen lawsuits only "if the Federal, State, and local agencies fail to exercise their enforcement responsibility." Therefore, before suing polluting firms, a plaintiff is required to prove that the government does not "diligently prosecute" the polluters (Mullikin and Smith 2002).

[11] For example, the Tonawanda residents had urged government to address the pollution for more than 30 years but their efforts were fruitless. As the pollution got more serious, in 2005 the local residents formed the Clean Air Coalition, a local environmental organization. It took them four years to draw public attention and build up public pressure through their own efforts, which eventually resulted in government enforcement actions toward the polluting firm in 2009 (See https://renewnrg.blogspot.com/2009/12/feds-raid-carcinogen-emitting-coke.html).

[12] For example, Cook Inletkeeper, a citizen group in Alaska, used media coverage highlighting industrial pollution released into the inlet to make polluting firms aware that their toxic pollution was under public scrutiny and to force them to reduce pollution (See https://www.foreffectivegov.org/node/791).

boycott against polluting firms' products. The boycott from customers could damage polluting firms' customer relationships and hurt their market position (Delmas and Toffle 2011).

Despite their grassroots nature, local environmental organizations have made great contributions to the major progress overall in environmental protection. The environmental movement led by local organizations has pushed firms to consider more carefully the environmental consequence of their actions and forced firms and government to reduce pollution at the source. It also promotes the passage of legislation that enhances and expands the rights of citizens to participate in environmental decision making (Freudenberg et al. 1991). Importantly, successful local environmental movements have encouraged more people to stand up against polluters and participate in environmental protection.

CHAPTER 3

PRIOR LITERATURE AND HYPOTHESIS DEVELOPMENT

3.1 Prior Studies

The role of the public as stakeholder is first established in Freeman (1984) who argues that public interest groups and communities where firms are located are stakeholder groups of the firm. Although the public has long been considered a stakeholder of firms, empirical evidence that specifically establishes this role is limited. Some recent research documents the impact of the public on firm behavior (e.g., Dyreng et al. 2016; Huang 2018). Dyreng et al. (2016) find that firms increase subsidiary disclosure in response to pressure from the public. Specifically, they measure public pressure by a nonprofit activist group pressuring FTSE 100 firms to disclose the information of their subsidiaries. Huang (2018) finds that firms receiving government subsidies provide more disclosure to enhance their transparency in order to reduce the cost of public scrutiny. In Huang (2018), the public refers to taxpayers, who implicitly have stakes in subsidized firms because government subsidies are funded by taxpayer money. Different from Dyreng et al. (2016) and Huang (2018), my study examines the role of the general public, who is potentially affected by firm pollution and thereby is essentially a stakeholder of the polluting firm.

My study also relates to research that examines the effect of pollution on corporate disclosure. This line of literature focuses on the relation between corporate environmental performance and voluntary environmental disclosures (e.g., Patten 2002; Clarkson et al. 2008), documenting mixed evidence. One line of research is based on the stakeholder theory and predicts that firms with poor environmental performance use environmental disclosures to address the environmental concerns of the stakeholders (e.g., Patten 2002). Another line of research predicts

that companies use environmental disclosures to signal improved environmental performance (e.g., Clarkson et al. 2008). Different from these environmental disclosure literatures, my study focuses on financial reporting and aims to explicitly establish the role of the public as stakeholder through an extensive set of empirical analyses. While the stakeholder argument in the literature (e.g., Patten 2002) is consistent with mine, prior studies provide no direct empirical evidence of the influence of the public. My study is also connected to the line of research that examines how social responsibility disclosure affects the disclosing firm's behavior (e.g., Christensen et al. 2017; Chen et al. 2018). [13] While my study uses toxic release as a proxy for the actual or perceived pollution level, polluting firms publicly disclose the toxic release data. Thus, it is a form of mandated social responsibility disclosure. Hence, my study also provides evidence on how firms' pollution disclosure impacts their financial reporting.

Since firms' dealing with pollution is part of corporate social responsibility,[14] another related stream of research studies corporate social responsibility (CSR). The majority of CSR studies examine the economic consequences of firms engaging in CSR projects (CSR firms). These studies generally argue that CSR firms tend to be more trustworthy and ethical, and thus have superior performance over their less responsible counterparts (e.g., Dhaliwal et al. 2011; Kim et al. 2012). Most closely related to my study are Kim et al. (2012) who document that CSR firms have better earnings quality. The theoretical arguments underlying Kim et al. (2012) and my study, however, are fundamentally different. Kim et al. (2012) argue that CSR firms are trustworthy and

[13] Christensen et al. (2017) focus on the disclosure of mine-safety records, and Chen et al. (2018) examines the disclosure of corporate social responsibility.

[14] The corporate social performance measure from Kinder et al. (2006), or the KLD data, extensively used in CSR research, evaluates CSR in various aspects, including corporate governance, community relations, diversity, employee relations, environment, product, human rights, firearms, alcohol, gambling, military contracting, nuclear power, and tobacco.

ethical and hence are less likely to engage in earnings management, both upward and downward. In contrast, I argue that polluting firms manage earnings downward to reduce pressure from the public.

3.2 Hypothesis Development

A stakeholder is "any group or individual who can affect or is affected by the achievement of the firm's objectives" (Freeman 1984). As discussed in Section 2, the public is affected by the negative environmental externalities generated by the production process of polluting firms. In this sense, the public passively "invests" its health and life quality in polluting firms. On the other hand, because the public bears the costs of pollution, it can affect the polluting firms by imposing pressure on them through various channels as discussed in Section 2. In this sense, the public is essentially a stakeholder of polluting firms.

Because the public pressure related to pollution may impose substantial costs on polluting firms, the firms are incentivized to reduce the public pressure. One possible action they might take is to manage their earnings downward. Polluting firms are often criticized as deriving profits from their unpaid-for environmental externalities. A considerable portion of polluting firms' profits would be wiped out if the environmental damage were to be fully internalized and recognized as a cost of their business activities (Trucost 2013). This brings the financial performance of polluting firms more into the scrutiny of the public. A highly profitable polluting firm is more likely to be viewed as extracting profits at the cost of the well-being of the community, and thus is more likely to become the target of public pressure and criticism. For example, firms that generate a great

amount of pollution have been given a "Toxic Profit" label by the media[15]. When Clean Air Coalition, a local environmental organization, accused Honeywell of causing severe pollution, it pointed out that the company did little to restore the environment in spite of the high profits it extracted and the big compensation package it gave to its CEO.[16] Hence, polluting firms have an incentive to appear less profitable in order to mitigate the unfavorable public perception and reduce the cost of public pressure. Furthermore, such incentives are stronger when pollution increases. Therefore, I hypothesize that polluting firms have greater incentive to engage in income-decreasing earnings management when their pollution increases.

H1: All else equal, firms are more likely to manage earnings downward when their pollution increases.

This prediction, however, is not obvious ex ante. First, downward earnings management can be costly to firms and managers as it may adversely impact firms' market valuation and managers' compensation (e.g. DeFond et al. 1994; Armstrong et al. 2013). Managers may not choose to hide profits if the costs outweigh the benefits of mitigating the public pressure related to pollution. Second, downward earnings manipulation may not be the only choice to reduce the public pressure. Firms may choose to improve their public image by giving back to the local community (e.g., donating to charity or schools), because a positive public image can also help reduce the costs of pollution-related public pressure. Another choice is to directly solve the pollution problem, for instance, by switching to low-pollution production technology. If the alternative approaches are more cost-efficient, firms may prefer them over manipulating earnings.

[15] "Toxic Profit: Meet the Top Super Polluters in the US" (The Real News Network 2018).
[16] Source: https://www.cacwny.org/blog-2/

Next, because pollution is generated at the manufacturing plant level, and plants in different locations are subject to different levels of public pressure, I further examine how firms' incentive to manage earnings downward varies with the public pressure imposed on their local plants. If some plants of a polluting firm are located in places where local residents care more about their living environment and are more likely to fight against polluters, these local plants are subject to higher public pressure. If firms indeed manage earnings down to lower the cost of public pressure, firms would care more about the pollution generated by those of their plants that face higher local public pressure and thus would be more likely to minimize the public pressure through downward earnings management. Accordingly, I propose the following hypothesis:

H2: The effect of pollution on a firm's tendency to manage earnings downward is more pronounced for the pollution produced by plants facing greater public pressure.

CHAPTER 4

VARIABLE MEASUREMENT AND RESEARCH DESIGN

4.1 Measure of Pollution

I use the toxic release data provided by the Toxic Release Inventory (TRI) program to measure firm pollution. The TRI program was established by the Emergency Planning and Community Right-to-Know Act (EPCRA) in 1986. It requires facilities in manufacturing (primary SIC code in 20-39) and utility industries that have at least 10 full-time workers and use, process, or produce toxic chemicals above certain amounts dictated on the TRI chemicals list to report any releases of those chemicals on the Toxic Chemical Release Inventory Form.[17] The toxic release information of a calendar year must be submitted to the EPA before July of the next calendar year. The TRI program is the most comprehensive source of industrial pollution information (Environment America 2009).[18] Since the establishment of the TRI program, the list of reported chemicals has been expanded several times. It currently includes 675 toxic chemicals that are released into the air, water, land, or underground. While TRI data is self-reported by facilities, the EPA monitors the data for potential errors[19] and can initiate civil enforcement actions for non-compliance.[20]

[17] A facility must file a toxic chemical release inventory form if it manufactures more than 25,000 pounds, or processes more than 25,000 pounds, or uses more than 10,000 pounds per year of a listed toxic chemical, or manufactures, processes, or uses a listed persistent bioaccumaltive toxic (PBT) chemical above the respective PBT reporting threshold.

[18] Alternative programs usually focus on pollution through one specific medium. For example, the National Emissions Inventory (NEI) targets releases into the atmosphere.

[19] The EPA conducts quality checks to ensure the quality of TRI data. It queries "red-flagged" facilities, including the facilities reporting large increases or decreases of releases, facilities with zero releases or that discontinue reporting, and the facilities that report the same release quantities as in the previous reporting form.

[20] For example, Lucas-Milhaupt Warwick LLC paid a penalty of $69,265 for failing to file the proper toxic release inventory reporting forms for copper and silver (See https://19january2017snapshot.epa.gov/newsreleases/metal-products-company-settles-epa-chemical-reporting-lapses-warwick-ri-facility_.html).

Because the goal of TRI is to empower the public to identify and monitor the polluting facilities in their communities (Atlas 2007), TRI data is congressionally mandated to be publicly available. [21] Local media further promotes the public awareness and use of TRI data through its coverage of the data.[22] Local environmental groups rely heavily on TRI data to monitor pollution. Some even provide training for local community members on how to use the TRI dataset to monitor polluters.[23] Thus the public is able to access and process TRI data and become informed of the pollution disclosed through the data.

I use total amount of toxic release to capture the level of firm pollution. Since TRI data is reported at plant level, in order to obtain the firm-level toxic release data, I manually match a plant's parent company to Compustat based on the company name, and then aggregate the plant-level toxic release at the firm level. Appendix A describes the matching procedure in detail. I then follow prior research and measure pollution as total toxic release scaled by total revenue, denoted as *TRI* (e.g., Patten 2002; Clarkson et al. 2008). To avoid a potential mechanical relation between toxic release and firm performance (and thus the dependent variable, discretionary accruals), I measure firm pollution using lagged toxic release. Since the TRI data is at the calendar year level while the dependent variable is measured for the fiscal year, I calculate lagged *TRI* as the toxic release for the most recent calendar year prior to fiscal year *t* (does not overlap with fiscal year *t*)

[21] Libraries in communities all across the United States are committed to providing public access to TRI data. The EPA also makes TRI data accessible online at https://www.epa.gov/trinationalanalysis/where-you-live.

[22] For example, Sun Sentinel, a local newspaper in South Florida, used TRI data to identify the top polluting facilities in South Florida (See https://www.sun-sentinel.com/news/fl-xpm-2011-03-29-fl-toxic-releases-broward-20110328-story.html#). It also provides its own processed TRI data to help local residents track major local polluters.

[23] For example, one of the goals of Buckeye Environment Network, a grassroots environmental group in Ohio, is to equip the community members with the knowledge of accessing and utilizing TRI data to protect the public health and environment (CHEJ 2018).

scaled by the weighted average sales for that calendar year. Appendix B provides the calculation details.

4.2 Measure of Earnings Management

I measure earnings management with discretionary accruals, estimated using the model proposed by Dechow and Dichev (2002). Specifically, I estimate the following equation:

$$ACC_{it}/A_{it-1} = \lambda_0 + \lambda_1 CFO_{it-1}/A_{it-2} + \lambda_2 CFO_{it}/A_{it-1} + \lambda_3 CFO_{it+1}/A_{it} + \varepsilon_{it.} \quad (1)$$

ACC_{it} is total accruals calculated as income before extraordinary items minus operating cash flows. A_{it-1} is the total assets of a firm at the beginning of year. CFO_{it} (CFO_{it-1}, CFO_{it+1}) is the cash flow from operations in year t ($t-1$, $t+1$). I estimate Equation (1) separately for each 2-digit SIC industry and year, using all observations with required data, requiring that each industry-year has at least ten observations. The residuals of the regression are used as the measure of discretionary accruals, denoted as *Discretionary_Accruals*. In Section 5.7, I show that the main results are robust to measuring earnings management with discretionary accruals estimated using McNichol (2002)'s model and the performance-matched approach in Kothari et al. (2005), and the likelihood of income-decreasing restatements.

4.3 Measures of Public Pressure Related to Pollution

One important innovation of my study is to explicitly show the influences of the general public on financial reporting through the test of Hypothesis 2. To this end, I need to measure cross-sectional variation in the public pressure related to pollution. I employ both direct and indirect measures of public pressure. To measure public pressure directly, I expect that local residents who

advocate green lifestyles or more actively form and participate in local environment organizations are more likely to impose pressure on polluting firms. Specifically, I expect plants in states with higher presence of local environmental organizations or in states where the residents prefer greener lifestyles to face greater public pressure.

Data on state-level number of local environmental organizations is retrieved from the network of Center for Health, Environment & Justice ("CHEJ").[24] Started as a local environmental group fighting toxic pollution, CHEJ later developed into a national non-profit to help communities address local environmental issues by building a nationwide network for local environmental organizations (Schlosberg 1999). The group provides a list of local environmental organizations in each state that receive support from CHEJ. I measure state-level green lifestyle using the 2019 WalletHub state ranking of eco-friendly behavior, which they quantify based on the number of LEED-certified[25] buildings, the percentage of renewable energy consumption, gasoline consumption, and the percentage of recycled waste.

I follow prior literature to use socioeconomic community characteristics to indirectly capture the degree of public pressure concerning pollution (e.g., Khanna and Vidovic 2001; Delmas and Toffel 2010). First, I expect plants located in more populous areas will face greater public pressure (e.g., Arora and Carson 1999; Khanna and Vidovic 2001). Second, the higher the average education level of a community, the more likely residents are to be informed about the risk of deteriorating environment quality, which may translate into greater pressure on firms to reduce pollution (e.g., Hamilton 1999; Khanna and Vidovic 2001). Third, wider local internet

[24] Source: http://chej.org/about-us/our-network/
[25] LEED, or Leadership in Energy and Environmental Design, is the most widely used green building rating system, which provides a framework for constructing healthy, highly efficient and cost-saving green buildings.

coverage not only enables people to track the polluting firms easily, but also allows more effective mobilization of local environmental movements (e.g., Horton 2004; Hodges and Stocking 2016). I employ the American Community Survey ("ACS") data and the U.S. Census data to calculate population density, average education levels, and percentage of families with internet access (or internet penetration rate).

4.4 Model Specification

I estimate the following model to test the Hypothesis 1:

$$\begin{aligned} Discretionary\_Accruals_{it} = {} & a_0 + a_1 TRI_{it-1} + a_2 Size_{it} + a_3 MTB_{it} + a_4 ROA_{it} + a_5 Loss_{it} + \\ & a_6 Leverage_{it} + a_7 Sales\_Growth_{it} + a_8 Age_{it} + a_9 Cash\_Flow_{it} + a_{10} Finance_{it} + \\ & a_{11} Meet\_Beat_{it} + a_{12} Tight\_Cov_{it} + a_{13} M\&A_{it} + a_{14} Delta_{it} + a_{15} Vega_{it} + a_{16} Inst\_Own_{it} \\ & + a_{17} Big5_{it} + a_{18} Discretionary\_Accruals_{it-1} + Year\ FE + Firm\ FE + \delta_{it}. \end{aligned} \quad (2)$$

$Discretionary\_Accruals_{it}$ and TRI_{it-1} are as defined above. Firm-fixed effects are included to capture the time-invariant firm heterogeneity that is associated with earnings management. Standard errors are clustered by firm to account for within-dependence of the error terms (Petersen 2009). I predict a negative coefficient on TRI_{it-1}, consistent with Hypothesis 1 which predicts that polluting firms are more likely to engage in downward earnings management when their pollution increases.

The other explanatory variables in Equation (2) are control variables capturing various factors that prior papers have shown to influence firms' earnings management decisions (e.g., Armstrong et al. 2013; DeFond and Zhang 2014; Dou et al. 2016). First, I include a series of fundamental firm characteristics, including firm size (*Size*), market-to-book ratio (*MTB*), return on

asset (*ROA*), an indicator variable for loss firms (*Loss*), financial leverage (*Leverage*), sales growth (*Sales_Growth*), operating cash flow (*Cash_Flow*), and firm age (*Age*). Second, I include equity and debt financing (*Finance*), meeting or beating earnings benchmarks (*Meet_Beat*), the strictness of debt covenants (*Tight_Cov*), and merger and acquisition activities (*M&A*) to control for the capital market incentives of earnings management. Third, I control for the earnings management incentives related to executive compensation by including the average delta (*Delta*) and vega (*Vega*) of top executives. Fourth, I control for the influence of institutional investors by including ownership of institutional investors (*Inst_Own*), and the effect of audit quality by including an indicator variable for large auditors (*Big5*). Lastly, I control for lagged discretionary accruals ($Discretionary\_Accrual_{t-1}$) to capture the serial correlation of accruals over time. Detailed definitions of theses variables are provided in Appendix C.

To test Hypothesis 2, for each of the five state-level measures of public pressure described in Section 4.3, I classify the top quintile states as states of high public pressure, and the other states as states of low public pressure.[26] I then partition the total toxic release (TRI_{t-1}) into the toxic release produced by plants located in states of high public pressure ($TRI\_HiPressure_{t-1}$) and that produced by plants in states of low public pressure ($TRI\_LoPressure_{t-1}$). I estimate equation (2) by replacing TRI_{t-1} with $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$, and expect the coefficient of $TRI\_HiPressure_{t-1}$ to be more negative than that of $TRI\_LoPressure_{t-1}$.

[26] I multiply the ranking of eco-friendly lifestyles by minus one so that a high numerical value of the ranking indicates more eco-friendly lifestyles.

CHAPTER 5

EMPIRICAL ANALYSIS

5.1 Data and Descriptive Statistics

As discussed in 4.1, I use the toxic release data from the TRI Program. I obtain financial statement data from Compustat, stock return data from CRSP, analyst forecast data from IBES, executive compensation data form Execucomp, institutional ownership data from Thomson Reuters, loan covenant data from Dealscan, and restatement data from AuditAnalytics. The EPA enforcement data is sourced from the Integrated Compliance Information System for Federal Civil Enforcement Case Data (ICIS FE&C), and the media coverage data is from RavenPack. The sample period is from 1996 to 2016.[27] I start the sample in 1996 because beginning in 1995 the EPA required firms to report an additional 286 new toxic chemicals, doubling the number of chemicals in the TRI chemical reporting list. After requiring non-missing values for variables used in the main regression analysis, the main sample consists of 9,187 firm year observations, representing 808 polluting firms with toxic release data. [28]

Table 1, Panel A reports the summary statistics for the sample. The mean of discretionary accruals is -0.038. The average market capitalization is $10.9 billion and the average firm age is 35 years. An average firm has ROA of 4.7%, and 14% of firms report a loss. The average book to market ratio is 52.2% and the average leverage ratio is 25.2%. 96% of firms are audited by big 5 auditors. Overall, the polluting firms in my sample are large mature companies. The mean of *TRI*

[27] The main results are qualitatively similar when the sample period from 1988 to 2016 is used.

[28] The average number of observations per year is smaller than the number of years in the sample period due to the availability of toxic release data, as the TRI program only requires firms that are in the manufacturing and utilities industries and that deal with at least a certain amount of chemicals to report their chemical release (please refer to detailed TRI disclosure requirements in Footnote 16).

is 0.641 pound per thousand dollars, and the median is 0.029 pound per thousand dollars.[29] Panel B reports the correlation matrix. The correlations between discretionary accruals and the control variables are generally consistent with prior studies (e.g., Dechow et al. 2010).

Table 1. Descriptive Statistics and Correlations

This table presents descriptive statistics and correlations for variables used in the main test. Panel A shows the summary statistics, and Panel B reports the Pearson correlation matrix. The sample consists of 9,187 firm-year observations of 808 polluting firms with toxic release data available. The sample period is from 1996 to 2016. All continuous variables are winsorized at the 1% level. Variable definitions are in Appendix C.

Panel A Summary Statistics

	N	Mean	S.D.	25th	Median	75th
Discretionary_Accruals	9,187	-0.038	0.141	-0.084	-0.013	0.031
TRI (pound/$ thousand)	9,187	0.641	3.631	0.002	0.029	0.219
Size	9,187	7.890	1.656	6.720	7.778	9.001
BTM	9,187	0.522	0.405	0.283	0.441	0.643
ROA	9,187	0.047	0.077	0.022	0.051	0.085
Loss	9,187	0.140	0.347	0.000	0.000	0.000
Leverage	9,187	0.252	0.152	0.147	0.251	0.355
Sales_Growth	9,187	0.079	0.216	-0.022	0.058	0.147
Cash_Flow	9,187	0.107	0.071	0.065	0.100	0.143
Age	9,187	3.426	0.636	2.996	3.638	3.951
Finance	9,187	0.105	0.165	0.009	0.046	0.126
Meet_Beat	9,187	0.211	0.408	0.000	0.000	0.000
Tight_Cov	9,187	0.019	0.138	0.000	0.000	0.000
M&A	9,187	0.189	0.391	0.000	0.000	0.000
Delta	9,187	4.555	1.273	3.691	4.553	5.418
Vega	9,187	3.190	1.572	2.223	3.346	4.312
Inst_Own	9,187	0.710	0.210	0.595	0.740	0.859
Big5	9,187	0.957	0.203	1.000	1.000	1.000

[29] Consistent with prior literature, the toxic release data is right-skewed (e.g., Clarkson et al. 2008).

Table 1. Continued

Panel B Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Discretionary_Accruals	1	1.00																
TRI	2	0.01	1.00															
Size	3	-0.09***	-0.05***	1.00														
BTM	4	0.13***	0.04***	-0.44***	1.00													
ROA	5	-0.03**	-0.08***	0.29***	-0.42***	1.00												
Loss	6	-0.01	0.06***	-0.26***	0.34***	-0.67***	1.00											
Leverage	7	0.09***	0.05***	0.07***	0.03***	-0.26***	0.13***	1.00										
Sales_Growth	8	-0.03***	0.03***	0.03***	-0.14***	0.21***	-0.19***	-0.01	1.00									
Cash_Flow	9	-0.46***	-0.04***	0.22***	-0.34***	0.56***	-0.34***	-0.26***	0.18***	1.00								
Age	10	0.03**	-0.01	0.36***	-0.07***	0.09***	-0.11***	0.05***	-0.15***	-0.02**	1.00							
Finance	11	-0.03***	0.01	-0.11***	-0.01	-0.08***	0.05***	0.28***	0.12***	-0.01	-0.14***	1.00						
Meet_Beat	12	0.01	-0.02**	0.12***	-0.05***	0.03***	-0.09***	0.08***	-0.01	-0.01	0.06***	-0.00	1.00					
Tight_Cov	13	0.03***	-0.00	-0.04***	0.02**	-0.05***	0.03***	0.10***	0.01	-0.06***	-0.02**	0.10***	0.00	1.00				
M&A	14	-0.11***	-0.02**	0.14***	-0.03**	-0.01	-0.02*	0.04***	0.05***	-0.01	0.02**	0.09***	-0.00	0.01	1.00			
Delta	15	-0.09***	-0.09***	0.68***	-0.46***	0.32***	-0.26***	-0.00	0.13***	0.26***	0.12***	-0.05***	0.09***	-0.01	0.05***	1.00		
Vega	16	-0.07***	-0.07***	0.57***	-0.28***	0.14***	-0.11***	0.07***	0.02*	0.12***	0.17***	-0.07***	0.08***	-0.01	0.01	0.62***	1.00	
Inst_Own	17	-0.07***	-0.09***	0.06***	-0.10***	0.02*	-0.02	-0.02**	0.02*	-0.01	-0.07***	0.04***	-0.04***	0.02*	0.16***	-0.01	0.06***	1.00
Big5	18	0.05***	-0.02**	0.22***	-0.05***	-0.02*	-0.02**	0.09***	-0.00	-0.02**	0.03***	-0.07***	0.04***	-0.01	-0.01	0.17***	0.18***	0.01

5.2 The Effect of Pollution on Earnings Management (H1)

Table 2 reports the regression results of testing H1. Column (1) reports the results of

Table 2. Toxic Release and Earnings Management: Baseline Results

This table presents the results of estimating the effect of toxic release on discretionary accruals. The sample consists of 9,187 firm-year observations of 808 polluting firms. The sample period is from 1996 to 2016. TRI_{t-1} is lagged total toxic release (in pounds) scaled by revenue (in dollars) measured for the same period as the toxic release. Both regressions include year and firm fixed effects. Standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable:	*Discretionary_Accruals*$_t$			
	(1)		(2)	
	Coefficient	P-value	Coefficient	P-value
TRI_{t-1}	**-1.625*** **	**0.001**	**-1.402*** **	**0.000**
$Size_t$			-0.007	0.122
BTM_t			-0.006	0.215
ROA_t			0.709***	0.000
$Loss_t$			0.004	0.367
$Leverage_t$			-0.025	0.167
$Sales\_Growth_t$			-0.005	0.551
$Cash\_Flow_t$			-1.135***	0.000
Age_t			-0.011	0.472
$Finance_t$			0.028***	0.007
$Meet\_Beat_t$			-0.000	0.973
$Tight\_Cov_t$			0.014*	0.069
$M\&A_t$			-0.003	0.570
$Delta_t$			0.002	0.381
$Vega_t$			-0.003	0.157
$Inst\_Own_t$			-0.015	0.269
$Big5_t$			0.008	0.616
$Discretionary\_Accruals_{t-1}$			0.148***	0.000
Year Fixed Effects	Yes		Yes	
Firm Fixed Effects	Yes		Yes	
Adj. R-Squared	0.326		0.521	
Observations	9,187		9,187	

estimating equation (2) by including only TRI_{t-1} and year and firm fixed effects. The estimated coefficient of TRI_{t-1} is -1.625 and significant. Column (2) presents the results of estimating equation (2) after including other control variables. The estimated coefficient of TRI_{t-1} is -1.402 and significant (*p*-value=0.000). These results suggest that managers are more likely to manage earnings downward when the toxic release increases, consistent with H1. The effect of toxic release on discretionary accruals is also economically significant. The coefficient estimate of the full model in column (2) indicates that a one-standard-deviation increase in TRI_{t-1} leads to a reduction of discretionary accruals by about 0.51% of total assets. The effects of the control variables are generally consistent with prior studies (e.g., Dechow et al. (2010)). Discretionary accruals are larger for smaller (*Size*) and more profitable (*ROA*) firms, and firms with higher growth prospects (*BTM*) and lower operating cash flows (*Cash_Flow*). When financing incentive (*Finance*) or the incentive to avoid loan covenant violations (*Tight_Cov*) is stronger, firms tend to report higher discretionary accruals. The positive and significant coefficient on lagged discretionary accruals suggests the persistence of discretionary accruals across adjacent years (e.g., Allen et al. 2013; Dou et al. 2016).

5.3 Cross-Sectional Tests Based on Public Pressure (H2)

Table 3 reports the results of testing H2, which predicts that the effect of pollution on downward earnings management is more pronounced for the toxic release generated by plants in states with higher public pressure. Since the data on local environmental organizations and eco-friendly lifestyle are only available for recent years, I restrict the analyses related to these two

Table 3. Toxic Release and Earnings Management: Effect of Pressure from the Public

This table presents the results of examining how the effect of pollution on firms' tendency to manage earnings downward varies with public pressure. TRI_{t-1} is partitioned into the toxic release produced by plants in high vs. low public pressure states, labeled as $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$, where high (low) public pressure states are states in the top quintile (the other quintiles) of the following measures: i) the number of local environmental organizations, ii) eco-friendly lifestyle, iii) population density, iv) average education years of local residents, and v) average internet penetration rate. The sample period is from 2007 to 2016 for columns (1) and (2) and from 1996 to 2016 for columns (3) to (5). All regressions include year and firm fixed effects. Standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable:	*Discretionary_Accruals*$_t$				
Measures of Public Pressure:	# of Local Environmental Organizations	Eco-Friendly Lifestyle	Population Density	Average Education Years	Internet Penetration Rate
	(1)	(2)	(3)	(4)	(5)
***TRI_HiPressure*$_{t-1}$**	**-22.264****	**-35.060*****	**-14.513*****	**-19.793****	**-22.700*****
	(0.026)	**(0.001)**	**(0.000)**	**(0.039)**	**(0.007)**
TRI_LoPressure$_{t-1}$	5.068	2.507	-1.288***	-1.280***	-1.074***
	(0.178)	(0.430)	(0.000)	(0.001)	(0.002)
P-value of Diff. in Coefficients of *TRI_HiPressure*$_{t-1}$ and *TRI_LoPressure*$_{t-1}$	**0.020**	**0.002**	**0.001**	**0.058**	**0.011**
Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj. R-Squared	0.569	0.569	0.522	0.521	0.522
Observations	4,402	4,402	9,187	9,187	9,187

measures to the recent ten years from 2007 to 2016.[30] For the analyses related to the other measures, I use the full sample period from 1996 to 2016.[31]

Columns (1) and (2) report the results for the two direct measures of public pressure: the number of local environmental organizations and eco-friendly lifestyle, respectively. In both columns, the estimated coefficients of $TRI\_HiPressure_{t-1}$ are negative and significant (-22.264, *p*-value=0.026, in column (1); -35.060, *p*-value=0.001 in column (2)), whereas the coefficients of $TRI\_LoPressure_{t-1}$ are positive and insignificant. The difference between the coefficients of $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$ is significant in both columns. The magnitude of coefficients of $TRI\_HiPressure_{t-1}$ suggests that a one-standard-deviation increase of toxic release in states with more local environmental organizations (more eco-friendly lifestyle) leads to downward earnings management of 0.8% (0.7%) of total assets.

Columns (3) to (5) report the results for the three indirect measures of public pressure: population density, average years of education, and internet penetration rate, respectively. The results are qualitatively similar to those in columns (1) and (2). In all columns, the estimated coefficients of $TRI\_HiPressure_{t-1}$ are negative and significant, whereas the coefficients of $TRI\_LoPressure_{t-1}$ are negative but insignificant. In addition, the differences between the coefficients of $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$ are all significant. Overall, the results in Table 3 indicate that the effect of pollution on downward earnings management is stronger for the

[30] I manually search the founding date of each environmental organization on CHEJ's network and make sure that the ones included in my study were founded prior to 2007.

[31] The ACS has provided the socioeconomic data annually since 2001 on IPUMS, and before 2001 the data was provided decennially by US census. I use the decennial data in 2000 for period 1996 to 1999. The results are qualitatively similar if a sample period from 2001 to 2016 is used.

toxic release produced by plants that are subject to higher public pressure. These results suggest that the local public plays an important role in influencing the financial reporting of polluting firms.

5.4 The Effects of Regulation, Media Coverage, and Customer Boycotts

As I argue in Section 2, the public can impose pressure on polluting firms directly through their own efforts, and they may also seek the help from regulators, the media, and customers. In addition, these parties may take actions on polluting firms without the requests from the public. In this section, I first examine the effects of regulators, the media, and customers by investigating how the effect of pollution on firms' tendency to manage earnings downwards varies with the intensity of environmental regulation, media coverage and customer boycotts. Next, I examine whether the public pressure has a residual effect after controlling for the effects of regulators, the media, and customers. To the extent that regulators, the media, and customers are the major indirect channels through which the public pressures polluting firms, the residual effect of the public pressure sheds light on whether the public influences polluting firms directly through their own efforts.

5.4.1 The Effect of Regulation

I first examine the effect of regulation by testing whether the effect of pollution on polluting firms' tendency to manage earnings down is stronger for toxic release produced by plants facing higher environmental regulation risk. The EPA promulgates national environmental regulations and standards, and serves as the central authority for developing and implementing a compliance and enforcement policy. Its Office of Enforcement and Compliance Assurance sets the general framework for federal enforcement work, and its 10 regional offices perform the day-to-day

enforcement activities (Esworthy 2014). Therefore, because the EPA regional offices are responsible for implementing national environmental policy, I use the distance between a polluting plant and its supervisory regional EPA office to proxy for regulation risk. I classify plants in the top quintile of proximity to EPA regional offices as plants facing high regulation risk, and the other plants as those facing low regulation risk. I then partition total toxic release (TRI_{t-1}) into that produced by plants facing high regulation risk (TRI_HiReg_{t-1}) and that produced by plants facing low regulation risk (TRI_LoReg_{t-1}), and estimate equation (2) by replacing TRI_{t-1} with TRI_HiReg_{t-1} and TRI_LoReg_{t-1}

Table 4, Panel A reports the results of this analysis. The estimated coefficient of TRI_HiReg_{t-1} is negative and significant (-15.359, *p*-value=0.031). The coefficient of TRI_LoReg_{t-1} is also negative and significant, whereas the magnitudes are much lower (-1.367, p-value=0.000). The *p*-values of the difference between the coefficients of TRI_HiReg_{t-1} and TRI_LoReg_{t-1} are 0.051. The coefficient of TRI_HiReg_{t-1} suggest that a one-standard-deviation increase of toxic release by plants facing higher regulation risk leads to downward earnings management of 0.28% of total assets. Overall, Table 4, Panel A suggests that the effect of pollution on downward earnings management is more pronounced for toxic release produced by plants facing higher environmental regulation risk.

Next, I explore whether public pressure has a residual effect after controlling for the effect of environmental regulation, by adding TRI_HiReg_{t-1} as an additional control to the regressions in Table 3. Table 4, Panel B presents the results. For all regressions, the coefficients of $TRI\_HiPressure_{it-1}$ are still negative and significant, and the differences between the coefficients of $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$ are all significant, suggesting that the effect of public

pressure on polluting firms is incremental to the effect of regulators. The coefficients on TRI_HiReg_{it-1} are negative but mostly insignificant, indicating that the effect of regulators is subsumed by the effect of public pressure. Overall, the results suggest that the public still plays a role when the effect of regulation is controlled for.

Table 4. Effect of Environmental Regulation

This table reports the effect of environmental regulation and the residual effect of the public after controlling for the effect of environmental regulation. Panel A presents the results of examining how the effect of pollution on firms' tendency to manage earnings downward varies with environmental regulation. TRI_{t-1} is partitioned into the toxic release produced by high regulation risk plants, TRI_HiReg_{t-1}, and the toxic release produced by low regulation risk plants, TRI_LoReg_{t-1}, where high (low) regulation risk plants are plants in the top quintile (the other quintiles) of the plant's proximity to its supervisory EPA regional office. The sample period is from 1996 to 2016. Panel B present the results of examining how the effect of pollution on firms' tendency to manage earnings downward varies with public pressure after controlling for the effect of environmental regulation. TRI_{t-1} is partitioned into the toxic release produced by plants in high vs. low public pressure states, labeled as $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$, where high (low) public pressure states are states in the top quintile (the other quintiles) of the following measures: i) the number of local environmental organizations, ii) eco-friendly lifestyle, iii) population density, iv) average education years of local residents, and v) average internet penetration rate. TRI_HiReg_{t-1} is the toxic release produced by plants facing high regulation risk, defined as plants in the top quintile of the plant's proximity to its supervisory EPA regional office. The sample period is from 2007 to 2016 for columns (1) and (2) and from 1996 to 2016 for columns (3) to (5). All regressions include year and firm fixed effects. Standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Effect of Environmental Regulation

Dependent Variable:	$Discretionary\_Accruals_t$
TRI_HiReg_{t-1}	**-15.359****
	(0.031)
TRI_LoReg_{t-1}	**-1.367*****
	(0.000)
Controls	Yes
Year Fixed Effects	Yes
Firm Fixed Effects	Yes
P-value of Diff. in Coefficients of TRI_HiReg_{t-1} vs TRI_LoReg_{t-1}	**0.051**
Adj. R-Squared	0.521
Observations	9,187

Table 4. Continued

Panel B: Residual Effect of the Public

Dependent Variable:	*Discretionary_Accruals*$_t$				
Measures of Public Pressure:	# of Local Environmental Organizations	Eco-Friendly Behavior	Population Density	Average Education Years	Internet Penetration Rate
	(1)	(2)	(3)	(4)	(5)
TRI_HiPressure$_{t-1}$	**-20.880****	**-34.429*****	**-13.602*****	**-17.674***	**-21.675****
	(0.047)	**(0.001)**	**(0.000)**	**(0.062)**	**(0.011)**
TRI_LoPressure$_{t-1}$	5.384	3.209	-1.269***	-1.264***	-1.061***
	(0.148)	(0.334)	(0.000)	(0.001)	(0.002)
TRI_HiReg$_{t-1}$	-22.993	-28.987	-10.970	-12.047*	-11.538
	(0.468)	(0.376)	(0.137)	(0.100)	(0.120)
P-value of Diff. in Coefficients of *TRI_HiPressure*$_{t-1}$ and *TRI_LoPressure*$_{t-1}$	**0.030**	**0.001**	**0.001**	**0.088**	**0.017**
Other Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj. R-Squared	0.569	0.569	0.522	0.521	0.522
Observations	4,402	4,402	9,187	9,187	9,187

5.4.2 The Effect of Media Coverage

To examine whether media coverage influences the polluting firms' financial reporting, I investigate whether the effect of pollution on firms' tendency to manage earnings down is more pronounced for firms that are subject to higher media coverage. I use the number of news articles covering a firm, excluding press releases initiated by the firm, in RavenPack Dow Jones edition to measure media coverage, and compare the effect of pollution for firms in the top vs. bottom quartile of media coverage. Table 5, Panel A presents the results of this analysis. The coefficient of TRI_{t-1} for high media coverage firms is negative and significant (-3.834, *p*-value = 0.000, column (1)), whereas the coefficient for low media coverage firms is negative but insignificant (-1.132, p-value = 0.466, column (2)). The *p*-value for the difference of the two coefficients is 0.092. The results suggest that the effect of pollution on downward earnings management is more pronounced for firms with higher media coverage.

I further explore the effect of public pressure when the role of media is controlled for. To this end, I repeat the analyses in Table 3 for firms with top quartile media coverage. This test helps show the influence of the public beyond that of the media for two reasons. First, to the extent that firms in the same quartile of media coverage have the similar level of media coverage, the effect of media coverage is controlled for. Second, finding the influence of public pressure for firms with the highest media coverage indicates that the public plays a role even for firms that are closely monitored by the media, a set of firms for which the influence of the public is likely to be relatively small. The results are reported in Table 5, Panel B. Except for public pressure measured by the

number of local environmental organizations and average education levels (columns (1) and (4)),[32] the coefficients of *TRI_HiPressure*$_{t-1}$ are still negative and significant and are more negative than those of *TRI_LoPressure*$_{t-1}$, and the differences between the coefficients of *TRI_HiPressure*$_{t-1}$ and

Table 5. Effect of Media Coverage

This table reports the effect of media coverage and the residual effect of the public after controlling for the effect of media coverage. Panel A presents the results of examining how the effect of pollution on firms' tendency to manage earnings downward varies with media coverage. Columns (1) and (2) partition the sample based on the general media coverage, where general media coverage is the average number of a firm's non-press-release news coverage in years *t-1* and *t*. High (low) group consists of firms with the top (bottom) quartile of general media coverage. The sample period is from 2001 to 2016 for columns (1) and (2). Panel B presents the results of examining how the effect of pollution on firms' tendency to manage earnings downward varies with public pressure after controlling for the effect of media coverage. The sample consists of top quartile general media coverage firms in column (1) of Table 5, Panel A. *TRI*$_{t-1}$ is partitioned into the toxic release produced by plants in high vs. low public pressure states, labeled as *TRI_HiPressure*$_{t-1}$ and *TRI_LoPressure*$_{t-1}$, respectively, where high (low) public pressure states are states in the top quintile (the other quintiles) of the following measures: i) the number of local environmental organizations, ii) eco-friendly lifestyle, iii) population density, iv) average education years of local residents, and v) average internet penetration rate. The sample period is from 2007 to 2016 for columns (1) and (2) and from 2001 to 2016 for columns (3) to (5). All regressions include year and firm fixed effects. Standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A Effect of Media Coverage

Dependent Variable:	*Discretionary_Accruals*$_t$	
	General Media Coverage	
	(1)	(2)
	High	Low
***TRI*$_{t-1}$**	**-3.834*** **	**-1.132**
	(0.000)	**(0.466)**
P-value of Diff. in *TRI*$_{t-1}$	**0.092**	
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Adj. R-Squared	0.569	0.577
Observations	1,659	1,673

[32] In column (4), when the public pressure is measured along with the average education levels, the estimated coefficient of *TRI_HiPressure*$_{t-1}$ is -53.290 and the related *p*-value is 0.128. This coefficient is also much larger in magnitude than that of *TRI_LoPressure*$_{t-1}$ (-3.063), and the *p*-value for the difference is 0.160.

Table 5. Continued

Panel B Residual Effect of the Public

Dependent Variable:	*Discretionary_Accruals*$_t$				
Measures of Public Pressure:	# of Local Environmental Organizations	Eco-Friendly Behavior	Population Density	Average Education Years	Internet Penetration Rate
	(1)	(2)	(3)	(4)	(5)
TRI_HiPressure$_{t-1}$	**-5.944**	**-53.355****	**-18.732****	**-53.290**	**-49.861*****
	(0.788)	**(0.011)**	**(0.045)**	**(0.128)**	**(0.003)**
TRI_LoPressure$_{t-1}$	3.410	5.221	-3.304***	-3.063***	-2.044*
	(0.644)	(0.404)	(0.000)	(0.005)	(0.069)
P-value of Diff. in Coefficients of *TRI_HiPressure*$_{t-1}$ and *TRI_LoPressure*$_{t-1}$	**0.707**	**0.020**	**0.101**	**0.160**	**0.007**
Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj. R-Squared	0.569	0.570	0.568	0.568	0.568
Observations	1,044	1,044	1,659	1,659	1,659

TRI_LoPressure$_{t-1}$ are either significant (columns (2) and (5), p-values equal to 0.020 and 0.007, respectively) or marginally significant (column (3), p-value =0.101). Although the results are not that strong due to the small sample size, I still document the effect of public pressure after the influence of the media is considered, suggesting that the effect of public pressure is incremental to the effect of the media.

5.4.3 The Effect of Customer Boycotts

Because firms producing consumer products are more likely to face customer boycotts, I expect that the effect of pollution on downward earnings management is stronger for this category of firms than for other firms. I differentiate polluting firms into those in consumer product industries and those in non-consumer product industries according to the product description of 4-digit SIC industries.[33] Specifically, I define a 4-digit SIC industry as a consumer product industry if an industry manufactures final products that are mainly consumed by individuals or households.

To examine the effect of customer boycotts, I partition the full sample into firms in consumer product industries and those in non-consumer product industries, and separately estimate equation (2). The results are reported in Table 6, Panel A. While for both subsamples, the coefficients of *TRI*$_{t-1}$ are negative and significant, the coefficient is significantly larger in magnitude for firms in consumer product industries (column (1)), suggesting that the effect of pollution on downward earnings management is stronger for firms that are in consumer product industries and thus face higher risk of customer boycotts. Panel B further examines the effect of public pressure beyond that of customers by repeating the analysis in Table 3 using only firms in non-consumer product industries. The results are qualitatively similar to those in Table 3. The

[33] Source: https://www.naics.com/sic-codes-industry-drilldown/

coefficients of $TRI\_HiPressure_{t-1}$ are all negative and significant, and larger in magnitude than those of $TRI\_LoPressure_{t-1}$, with the differences between the coefficients of $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$ being significant. These results suggest that the public pressure has a residual effect after accounting for the influence from customers.

Table 6. Effect of Customer Boycotts

This table reports the effect of customer boycotts and the residual effect of the public after controlling for the effect of customer boycotts. Panel A presents the results of examining how the effect of pollution on firms' tendency to manage earnings downward varies with customer boycotts. The sample is partitioned based on whether a firm operates in a consumer product industry, defined based on the product description of 4-digit SIC industries. A 4-digit SIC industry is a consumer product industry if firms in that industry manufacture final products that are mainly consumed by individuals or households. The sample period is from 1996 to 2016. Panel B presents the results of examining how the effect of pollution on firms' tendency to manage earnings downward varies with public pressure after controlling for the effect of customer boycotts by restricting the sample to polluting firms in non-consumer-product industries. TRI_{t-1} is partitioned into the toxic release produced by plants in high vs. low public pressure states, labeled as $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$, respectively, where high (low) public pressure states are states in the top quintile (the other quintiles) of the following measures: i) the number of local environmental organizations, ii) eco-friendly lifestyle, iii) population density, iv) average education years of local residents, and v) average internet penetration rate. The sample period is from 2007 to 2016 for columns (1) and (2) and from 1996 to 2016 for columns (3) to (5). All regressions include year and firm fixed effects. Standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A Effect of Customer Boycotts

Dependent Variable:	*Discretionary_Accruals*$_t$	
	Consumer Product Industry	
	(1)	(2)
	Yes	No
***TRI*$_{t-1}$**	**-16.046***	**-1.286****
	(0.055)	**(0.000)**
P-value of Diff. in Coefficients of TRI_{t-1}	**0.050**	
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Adj. R-Squared	0.686	0.505
Observations	778	8,409

Table 6. Continued

Panel B Residual Effect of the Public

Dependent Variable:	*Discretionary_Accruals*$_t$				
Measures of Public Pressure:	# of Local Environmental Organizations	Eco-Friendly Behavior	Population Density	Average Education Years	Internet Penetration Rate
	(1)	(2)	(3)	(4)	(5)
TRI_HiPressure$_{t-1}$	**-17.933***	**-32.848*****	**-12.776*****	**-22.790****	**-20.407****
	(0.082)	**(0.001)**	**(0.001)**	**(0.032)**	**(0.019)**
TRI_LoPressure$_{t-1}$	4.935	3.062	-1.187***	-1.148***	-0.993***
	(0.194)	(0.324)	(0.001)	(0.004)	(0.005)
P-value of Diff. in Coefficients of *TRI_HiPressure*$_{t-1}$ and *TRI_LoPressure*$_{t-1}$	**0.057**	**0.002**	**0.003**	**0.045**	**0.027**
Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj. R-Squared	0.548	0.548	0.506	0.505	0.506
Observations	4,054	4,054	8,409	8,409	8,409

5.4.4 The Effect of the Public beyond That of Regulation, Media Coverage, and Customer Boycotts

Finally, I examine the effect of public pressure after controlling the effects of environmental regulation, media coverage, and customer boycotts. To do so, I restrict the sample to the polluting firms with high media coverage in non-consumer product industries and estimate equation (2) with TRI_HiReg_{t-1} as an additional control. The results are reported in Table 7. Except for the public pressure measured using the number of local environmental organizations and population density (columns (1) and (3)), the coefficients of $TRI\_HiPressure_{t-1}$ are all significantly negative and much more negative than the coefficients of $TRI\_LoPressure_{t-1}$, with differences between the coefficients of $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$ being significant.

Although the effect of public pressure becomes weaker after controlling for the effects from regulation, media coverage, and customer boycotts, the effect of public pressure is still significant. Note that the weaker results could also be due to the smaller sample size for each column relative to the corresponding column in Table 3. Thus, I conclude that the influence of the public is incremental to the effects of regulator, media and customers. To the extent that regulation, media coverage, and customer boycotts capture all indirect ways by which the public could pressure the polluting firms, these results also suggest that the public does put pressure on polluting firms through their own efforts, such as direct negotiation, or open public opposition.

Table 7. The Effect of Pubic Pressure: Controlling for the Effects of Regulators, the Media, and Customers

This table presents the results of the effect of public pressure on firms' tendency to manage earnings downward controlling for the effects of regulators, the media and customers. The sample consists of the highest quartile general media coverage firms in Table 5 Panel A column (1), excluding firms in consumer product industries. TRI_{t-1} is partitioned into the toxic release produced by plants in high vs. low public pressure states, labeled as $TRI\_HiPressure_{t-1}$ and $TRI\_LoPressure_{t-1}$, respectively, where high (low) public pressure states are states in the top quintile (the other quintiles) of the following measures: i) the number of local environmental organizations, ii) eco-friendly lifestyle, iii) population density, iv) average education years of local residents, and v) average internet penetration rate. TRI_HiReg_{t-1} is the toxic release produced by plants facing high regulation risk, defined as plants in the top quintile of the plant's proximity to its supervisory EPA regional office. The sample period is from 2007 to 2016 for columns (1) and (2) and from 2001 to 2016 for columns (3) to (5). All regressions include year and firm fixed effects. Standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable:	*Discretionary_Accruals*$_t$				
Measures of Public Pressure:	# of Local Environmental Organizations	Eco-Friendly Behavior	Population Density	Average Education Years	Internet Penetration Rate
	(1)	(2)	(3)	(4)	(5)
***TRI_HiPressure*$_{t-1}$**	**7.703**	**-59.064****	**-11.748**	**-63.188****	**-60.027*****
	(0.740)	**(0.012)**	**(0.249)**	**(0.034)**	**(0.003)**
TRI_LoPressure$_{t-1}$	6.120	9.668	-2.723***	-2.218**	-0.911
	(0.403)	(0.133)	(0.004)	(0.038)	(0.471)
TRI_HiReg$_{t-1}$	2.338	-1.754	-5.022	-5.624	-13.469
	(0.954)	(0.967)	(0.770)	(0.750)	(0.409)
P-value of Diff. in Coefficients of *TRI_HiPressure*$_{t-1}$ and *TRI_LoPressure*$_{t-1}$	**0.950**	**0.013**	**0.382**	**0.046**	**0.005**
Other Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj. R-Squared	0.480	0.481	0.498	0.499	0.499
Observations	906	906	1,447	1,447	1,447

5.5 An Analysis Based on Changes to TRI Disclosure Requirements

The evidence above suggests that polluting firms are more likely to manage earnings downward when pollution increases. However, it is possible that certain omitted firm fundamental change leads to both the change of toxic release and the change of financial reporting. Such an omitted variable problem might not be fully addressed by using lagged toxic release and including firm fixed effects. Therefore, in this section, I utilize the change of TRI disclosure requirements to address the endogeneity concern. Specifically, I capture the exogenous increase in disclosed toxic release due to the mandatory reporting of new toxic chemicals and investigate its impact on downward earnings management.

The EPA is authorized by Section 313 of the Emergency Planning and Community Right-to-Know Act to add new toxic chemicals[34] as warranted to the TRI reporting list in order to better inform the public of their chemical exposure. Since the initiation of the TRI program, the reporting list of toxic chemicals has been expanded several times.[35] The biggest expansion occurred in 1995 when 286 new chemicals were added to the chemical list, almost doubling the number of chemicals reported. New toxic chemicals are added for two main reasons. First, many new chemicals have already been reported by polluting firms under other regulatory programs, but the information has only been available to the government agencies (EPA 1994). Although many polluting firms complain that adding new chemicals only results in "unduly burdensome" duplicative reporting, the inclusion of these chemicals in the TRI program makes the information publicly accessible,

[34] The EPA also drops chemicals from the list because those chemicals are either banned by laws or are no longer used due to the improvement of production methods or product elimination. In the untabulated test, I find no significant effect when firms stop reporting the deleted chemicals.
[35] New chemicals were added to the TRI reporting list by the EPA in 1990, 1991, 1994 1995, 2000, 2011, 2012, 2014, 2015, and 2016.

helping the environmental management in communities. The second reason for adding new chemicals is the progress of the research on chemical toxicity. As chemicals are scientifically proven to be toxic to humans and other organisms, the EPA adds these toxic chemicals into the reporting list to inform the public of the potential risk in a timely manner. These additions are not due to any fundamental changes at the firm itself, such as the introduction of new manufacturing methods or new products. The mandatory disclosure of new chemicals rather captures the exogenous increase of the disclosed toxic chemicals and hence increases the public pressure attributed to these new sources of pollution.

Because there have been a series of chemical list expansions since the initiation of the TRI program, I follow Gormley and Matsa (2011) and use a cohort-based matching approach. Specifically, for each chemical list expansion, I create a cohort consisting of treatment firms that report new chemical release after the new requirements become effective and control firms within the same Fama-French 48 industries of treatment firms that do not release any new chemicals. I keep observations from five years before and after a new regulation becomes effective[36]. For each cohort, I ensure that firms are not affected by other chemical list expansions. Finally, all cohorts are pooled together to form the final sample, which include the expansions in 1990, 1991, 1994, 1995, 2000, 2011, 2012 and 2015. I include firm and year fixed effects and cluster the standard errors at the firm level.

The results are reported in Table 8. The coefficient of *Treat* × *Post* is -0.013 and significant, suggesting that compared with control firms that do not release the new chemical and thus are not affected by the new TRI disclosure requirements, treatment firms that report the new chemical

[36] Results are robust to keeping observations three years before and after a new regulation becomes effective.

release and hence are affected by the new TRI disclosure requirements are more likely to manage earnings downwards after the new requirements become effective. The effect is economically significant with treatment firms managing earnings down by 1.3% of total assets relative to control firms after the change of TRI disclosure requirement. The results mitigate the concern that the results in Table 2 might have been due to firm characteristics that drive both pollution and financial reporting.

Table 8. Change of TRI Disclosure Requirement and Earnings Management

This table presents the results of examining the effect of change of TRI disclosure requirement on discretionary accruals, using a cohort-based matching approach. Specifically, for each expansion year, I create a cohort consisting of treatment firms reporting positive release of new chemicals after the expansion and control firms within the same Fama-French 48 industries of treatment firms that do not release any new chemicals. I keep observations from five years before and after the list expansion year. I require that firms do not report new chemicals required by the other TRI list expansions. Finally, all cohorts are pooled together to form the final sample, which includes the major expansions in 1990, 1991, 1994, 1995, 2000, 2011, 2012 and 2015. *Treat* is an indicator variable, equal to one for treatment firms and zero for control firms. *Post* is an indicator variable equal to one during the five years after the change of the TRI disclosure requirements. The sample period is from 1992 to 2016. Year and firm fixed effects are included and standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable:	*Discretionary_Accruals*$_t$	
	Coefficient	P-value
Treat* × *Post	**-0.013****	**0.045**
Treat	0.005	0.642
Post	0.020***	0.000
Controls	Yes	
Year Fixed Effects	Yes	
Firm Fixed Effects	Yes	
Adj. R-Squared	0.562	
Observations	7,963	

5.6 Effectiveness of Downward Earnings Management

Finally, I explore whether downward earnings management is effective in mitigating the cost of public pressure for polluting firms. Because the public pressure is likely to subject firms to stricter environmental regulation and unfavorable media coverage, I measure costs of public pressure using the occurrence of EPA enforcement actions and negative environmental media coverage. The EPA enforcement data is retrieved from the Integrated Compliance Information System for Federal Civil Enforcement Case Data (ICIS FE&C). I defined an indicator variable, *Future_EPA_Enforcement*, which equals to one if a firm is involved in at least one EPA enforcement action in future three years. I identify negative environmental media coverage as the news articles on RavenPack Dow Jones Edition containing environment-related key words in the headlines[37] and with composite sentiment score below 50, and define an indicator variable, *Future_Neg_Environ_Coverage*, which equals to one if a firm is covered in at least one negative environmental news article in future three year. I regress each indicator variable on TRI_{t-1}, controlling for major firm characteristics, as well as the occurrence of EPA enforcement or negative environmental media coverage in year *t*.[38] Since the dependent variable is a dummy variable, I estimate a probit model. I control for 4-digit SIC industry-fixed effects instead of firm-fixed effects, because a firm fixed effects probit model may cause an incidental parameters problem (Cameron and Trivedi 2005).

[37] Specifically, following Bewley and Li (2000), I search for the key words of ENVIRONMENT, POLLUT, EMISSION, EFFLUENT, DISCHARG, CONTAMINA, CLEANUP, CLEAN and SPILL. I manually check the environmental news identified through these keywords and correct the major measurement errors, such as company names with key words.

[38] Results are qualitatively similar without controlling for the current year's EPA enforcement and negative environmental media coverage.

Table 9 reports the results on the consequence of downward earnings management in terms of EPA enforcement actions and negative environmental media coverage. The reported numbers are estimated average marginal effects and related *z*-statistics. The full sample results in Panel A, column (1) and Panel B, column (1) imply that overall pollution leads to higher likelihood of future EPA enforcement and negative environmental media coverage. The estimated marginal effect, 50.331 (2.035) in Panel A (B) column (1) indicates that a one-standard-deviation increase of toxic release increases the likelihood of EPA enforcement actions (negative environmental media coverage) by 19.5% (0.8%); the effect is also economically significant, representing 39.7% (9.8%) of the sample mean value of the likelihood of EPA enforcement actions (negative environmental media coverage). Column (2) and (3) of Panels A and B further partition the sample into top and bottom quartiles based on discretionary accruals in year *t*. In Panel A, for firms with higher discretionary accruals, toxic release is positively and significantly associated with the probability of future EPA enforcement actions,[39] whereas for firms with lower discretionary accruals, the relation is positive but insignificant with *p*-value of the difference in the effects of TRI_{t-1} 0.042. In Panel B, higher toxic release significantly increases the future likelihood of negative environmental media coverage for firms with higher discretionary accruals,[40] whereas the relation is insignificant for firms with lower discretionary accruals. The difference in the effects of TRI_{t-1} is also significant (*p*-value = 0.071). The results of Table 9 suggest that managing earnings

[39] The estimated marginal effect, 70.352 in Panel A column (3) indicates that a one-standard-deviation increase of toxic release increases the likelihood of EPA enforcement actions by 20.0%, representing 40.7% of the sample mean value of the likelihood of EPA enforcement actions.

[40] The estimated marginal effect, 19.063 in Panel B column (3) indicates that a one-standard-deviation increase of toxic release increases the likelihood of negative environmental media coverage by 4.3%, representing 54.3% of the sample mean value of the likelihood of negative environmental media coverage.

downward helps firms reduce the cost of public pressure in terms of future EPA enforcement actions and negative environmental media coverage.

Table 9. Effectiveness of Earnings Management

This table presents the effectiveness of earnings management in reducing the cost of public pressure. Panel A reports the results of examining the effectiveness of downward earnings management in reducing future EPA enforcement action. *Future_EPA_Enforcement* is an indicator variable equal to one if a firm is involved in at least one EPA enforcement action during years *t+1* to *t+3*. Column 1 reports the results for the full sample. In columns 2 and 3, the sample is partitioned based on discretionary accruals in year *t* with high (low) group consisting of firms with the top (bottom) quartile of discretionary accruals. The sample period is 1996 to 2013. Panel B presents the results of examining the effectiveness of downward earnings management in reducing future negative environmental media coverage. *Future_Neg_Environ_Coverage* is an indicator variable equal to one if a firm is covered in at least one negative environmental news during years *t+1* to *t+3*, where negative environmental news is identified if a news article contains environment-related key words in the headline (Bewley and Li 2000) and has a composite sentiment score below 50. Column 1 reports the results for the full sample. In columns 2 and 3, the sample is partitioned based on discretionary accruals in year *t* with high (low) group consisting of firms with the top (bottom) quartile of discretionary accruals. The sample period is 2000 to 2013. All regressions include year and 4-digit SIC industry fixed effects. Standard errors are clustered at the firm level. I estimate a probit model and report average marginal effects and related *p*-values in parentheses. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A Future EPA Enforcement Actions

Dependent Variable:	*Future_EPA_Enforcement*		
	(1)	(2)	(3)
Discretionay_Accruals$_t$	Full	Low	High
***TRI*$_{t-1}$**	**50.331****	**28.104**	**70.352****
	(0.012)	**(0.108)**	**(0.014)**
Size$_t$	0.123***	0.083***	0.149***
	(0.000)	(0.000)	(0.000)
BTM$_t$	0.122***	0.079	0.105*
	(0.000)	(0.183)	(0.053)
ROA$_t$	-0.060	0.132	-0.119
	(0.695)	(0.577)	(0.751)
Loss$_t$	0.010	-0.038	0.007
	(0.728)	(0.538)	(0.915)
Leverage$_t$	0.137	0.187	0.169
	(0.136)	(0.207)	(0.292)
Sales_Growth$_t$	-0.050	-0.115	-0.040
	(0.191)	(0.119)	(0.598)
Age$_t$	0.078***	0.143***	0.038

Table 9. Continued

	(0.003)	(0.001)	(0.322)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
P-value of Diff. in TRI_{t-1}		**0.042**	
Adj. R-Squared	0.263	0.275	0.264
Observations	7,964	1,998	1,984

Panel B Future Negative Environmental Media Coverage

Dependent Variable:	*Future_Neg_Environ_Coverage*		
	(1)	(2)	(3)
$Discretionay\_Accruals_t$	Full	Low	High
$\boldsymbol{TRI_{t-1}}$	**2.035***	**0.722**	**19.063****
	(0.061)	**(0.221)**	**(0.023)**
$Size_t$	0.065***	0.036***	0.075***
	(0.000)	(0.000)	(0.000)
BTM_t	0.060***	0.048	0.078**
	(0.003)	(0.126)	(0.030)
ROA_t	-0.187	-0.168*	0.433
	(0.120)	(0.090)	(0.124)
$Loss_t$	-0.012	-0.017	0.032
	(0.575)	(0.505)	(0.455)
$Leverage_t$	0.064	0.015	0.334**
	(0.358)	(0.807)	(0.013)
$Sales\_Growth_t$	0.056*	0.079**	0.047
	(0.052)	(0.017)	(0.409)
Age_t	0.028	0.011	0.062*
	(0.175)	(0.435)	(0.095)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
P-value of Diff. in TRI_{t-1}		**0.071**	
Adj. R-Squared	0.233	0.353	0.260
Observations	6,267	1,572	1,562

5.7 Additional Tests

5.7.1 Alternative Measures of Discretionary Accruals

I also estimate discretionary accruals using McNichol (2002)'s accrual model and the performance-matched approach in Kothari et al. (2005). Table 10, columns (1) and (2) suggest that the main results are robust to both ways of estimating discretionary accruals. I further employ income-decreasing restatements as another measure of downward earnings management. The

Table 10. Toxic Release and Earnings Management: Alternative Measures

This table presents the results of the effects of toxic release on alternative measures of earnings management. Column (1) uses discretionary accruals estimated based on McNichol (2002)'s accruals model. Column (2) uses discretionary accruals estimated based on the performance-matched approach in Kothari et al. (2005). Column (3) reports the results based on the likelihood of income decreasing restatement. *Income_Decrease_Restate* is a dummy variable equal to one if a firm misstates its financial report by reducing net income during a fiscal year. The sample period is from 1996 to 2016 for columns (1) and (2), and from 2000 to 2016 for column (3). All regressions include year and firm fixed effects. Standard errors are clustered at the firm level. All continuous variables are winsorized at the 1% level. All variables are defined in Appendix C. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable:	*Discretionary_Accruals*$_t$ Based on McNichol's Model		*Discretionary_Accruals*$_t$ Based on Performance-Matched Approach		*Income_Decrease_Restate*$_t$	
	(1)		(2)		(3)	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
***TRI*$_{t-1}$**	**-0.825*** **	**0.009**	**-2.173*** **	**0.000**	**2.124** **	**0.049**
Size$_t$	-0.014**	0.022	0.010*	0.096	0.005	0.393
BTM$_t$	-0.008	0.337	0.018**	0.031	0.012	0.226
ROA$_t$	0.662***	0.000	0.814***	0.000	-0.067	0.178
Loss$_t$	-0.002	0.764	0.003	0.773	0.008	0.388
Leverage$_t$	-0.043*	0.075	-0.015	0.656	-0.003	0.916
Sales_Growth$_t$	0.047***	0.000	-0.016	0.293	-0.009	0.403
Cash_Flow$_t$	-1.009***	0.000	-1.205***	0.000	0.014	0.730
Age$_t$	0.014	0.440	-0.037**	0.035	0.008	0.682
Finance$_t$	0.029*	0.095	0.033	0.202	-0.004	0.779
Meet_Beat$_t$	0.001	0.752	0.003	0.599	0.004	0.339
Tight_Cov$_t$	0.031**	0.015	0.025	0.190	0.025	0.118
M&A$_t$	-0.001	0.872	0.000	0.964	0.007	0.205
Delta$_t$	0.009**	0.013	-0.004	0.355	0.004	0.233
Vega$_t$	-0.006**	0.014	-0.003	0.300	0.001	0.718

Inst_Own$_t$	-0.010	0.539	-0.011	0.564	-0.012	0.457
Big5$_t$	-0.026	0.109	0.001	0.965	0.013	0.641
Discretionary_ Accruals$_{t-1}$	0.036**	0.046	-0.030*	0.067		
Income_Decrease_Restate$_{t-1}$					0.457***	0.000
Year Fixed Effects	Yes		Yes		Yes	
Firm Fixed Effects	Yes		Yes		Yes	
Adj. R-Squared	0.308		0.136		0.393	
Observations	9,054		9,060		7,781	

results in Table 10, column (3) show that toxic release is positively and significantly associated with likelihood of income-decreasing restatements. An untabulated analysis suggests that the relation between toxic release and probability of income-increasing restatements is insignificant, indicating that the relation between toxic release and income-decreasing restatements is not driven by a general positive relation between toxic release and restatements.

5.7.2 The Effects of Recognizing Contingent Liabilities

Another possible alternative explanation for the finding in Table 2 is that firms are more likely to record contingency liabilities when pollution increases, which in turn drives down the current year's earnings, leading to a mechanical relation between pollution and discretionary accruals. As pointed out in Section 2, due to the substantial threshold of citizen environmental lawsuits, the litigation cost of polluting firms is mainly the cost of government sanctions. Thus, the contingent liability recorded by polluting firms is more likely to be the estimated cost of government regulation. Therefore, to rule out the effect of contingent liability, I first directly control for the total dollar amount of fines imposed by EPA in the future enforcement actions. Assuming that polluting firms perfectly expect and record the cost of future environmental regulation as a contingent liability, this approach controls for the effect of contingent liabilities. I find that the results in Table 2 are not sensitive to this additional control (untabulated).[41] Second,

[41] Results are qualitatively similar whether EPA fines are summed for future 1, 2, 3, 4, or 5 years.

I include the toxic release as an additional determinant of non-discretionary accruals in the accruals model and re-estimate the discretionary accruals. Again, my finding is robust to this approach (untabulated).

5.7.3 Pollution as Proxy for Production

Another possible explanation for my results is that pollution is a proxy for production, which may be associated with discretional accruals. Because I use the lagged toxic release and scale the toxic release by sales, the concern has been mitigated. The analyses based on the change of TRI disclosure requirements in Section 5.3 also help rule out this alternative explanation. To further address the concern, I include sales of years *t-1*, *t*, and *t+1* as additional controls of production activities. The results are qualitatively similar to those reported in Table 2 (untabulated).

CHAPTER 6

CONCLUSION

Because the public bears the costs of pollution caused by firm production activities, it is essentially a stakeholder of polluting firms. This study establishes the role of the public as stakeholder by examining the impact of pollution on corporate financial reporting. I argue that polluting firms are incentivized to manage earnings downward in order to reduce the costs of public pressure. Consistent with this argument, I find that firms are more likely to manage earnings downward when pollution increases and that the effect is more pronounced for pollution generated by plants located in states where local residents are more likely to pressure the polluting firms.

I find that the effect of pollution on polluting firms' tendency to manage earnings downwards could also be attributed to the influences of regulators, the media, and customers. Specifically, I find that the effect is more pronounced for pollution generated by plants under higher regulation risk and for firms that have higher media coverage and firms that face greater threat of consumer boycotts. Further, I find that the public has a residual effect after controlling for the effects of regulators, the media and customers. To the extent that regulators, the media, and customers capture all the major indirect channels through which the public pressures polluters, this finding suggests that the public directly pressures polluting firms through their own efforts, such as direct negotiation and open public opposition. Lastly, I find that downward earnings management is effective in lowering the cost of public pressure, reflected in future EPA enforcement actions and negative environmental media coverage.

My study contributes to the accounting literature on financial reporting (e.g., Dechow et al. 2010) by proposing and documenting earnings management incentives due to the influence of the

general public, an important but under-explored corporate stakeholder. In my study, the incentive to manage earnings comes from the pressure that the public impose on polluting firms, which is different from the incentives due to the influences of other stakeholders, such as shareholders, creditors, suppliers, and customers. My study also adds to the literature on the impact of the public on firm behavior (e.g., Dyreng et al. 2016; Huang 2018). It establishes the role of the public as a corporate stakeholder by evidencing its impact on polluting firms' financial reporting.

While the public plays a prominent role in pressuring firms to reduce pollution, their efforts and behaviors are usually costly to measure. In absence of a direct measure of the public's anti-pollution actions, my study relies on several state-level proxies for the intensity of public pressure on pollution. I acknowledge that such an indirect approach may not precisely reflect the pollution-related public actions. In particular, my measures of public pressure may also capture the impact of other forces than the general public, such as socially responsible investors and employees, who may also be incentivized to impose pressure on polluting firms due to their social preference and safety concern, respectively. Therefore, measures that are directly related to the public's actions and efforts in environmental protection would better capture the influence of the public on polluting firms.

APPENDIX A

MATCHING THE TRI DATA TO COMPUSTAT

The TRI program reports toxic release at the plant level. I use the parent firm name reported by a plant to match the plant to a firm in Compustat. Before matching, I ensure that the reported parent firm name is correct and then manually identifying all higher level parent firms of the reporting plant, taking into account the ownership or name change due to mergers and acquisitions (M&A), reorganization, or bankruptcies.

I mainly rely on Bloomberg Private Company Information, Wikipedia and firm websites to obtain parent firm information. If a reported parent firm is not the ultimate parent firm, I search for all subsidiaries between the reported parent firm and the ultimate parent firm, and code all of the higher level parent firms as parent firms of a plant. If a parent firm, Firm A, started as a stand-alone but subsequently became a subsidiary of another firm, Firm B, through an M&A, I code Firm A as the parent firm of the plant for the period before the M&A and Firm B as the parent firm for the period after the M&A. For a parent firm that changes its firm name due to reorganizations or bankruptcies, I code the alternative firm names as the parent firms of the plant. In a few cases of joint ownership, unless the detailed information on percentage of ownership is available for allocating the respective toxic release to each parent firm, I allocate all toxic release to each parent firm.

After identifying all parent firms of a plant, I match them to Compustat based on firm name. I supplement the current company names in Compustat with the historical company names extracted from the 10-K and 10-Q files.[42] I cross-check the consistency of the industry sectors reported in the TRI dataset and the industry code of the matched Compustat firms. I also utilize the information of the years a firm is recorded in Compustat to cross-check whether the coded ownership change of a parent firm is correct.

For example, a plant named “Burlington Industries Inc. Pioneer Plant” reports its parent firm as “Burlington Industries Inc.” in the TRI dataset. I first check the correctness of the parent firm information by verifying whether the parent firm operates in the same industry of the plant. The information of “Burlington Industries Inc.” on Wikipedia suggests that this company is a “fabric maker”, consistent with the “textile product” industry sector reported by the plant. Besides, Wikipedia suggests that Burlington Industries Inc. entered Chapter 11 bankruptcy protection in December 2001 with its assets acquired by International Textile Group (“ITG”) out of bankruptcy in late 2003. Therefore, I code “Burlington Industries Inc.” as the parent firm of the plant for the the period prior to 2003, and “ITG” as the parent firm for the subsequent period, and then match them to Compustat based on firm name. I further check the information of the matched Compustat firms to ensure a correct matching. I find that both matched Compustat firms operate in textile mill product industries, and that the last available year for Burlington Industries Inc. is 2002, which is exactly the last year before its 2003 acquisition. Finally, I add the toxic release produced by

[42] The extracted 10-K and 10-Q items are downloaded from Notre Dame Software Repository for Accounting and Finance (Source: https://sraf.nd.edu/).

Burlington Industries Inc. Pioneer Plant to the release of Burlington Industries Inc. for the period prior to 2003, and to the release of ITG for the subsequent period.

APPENDIX B

MEASUREMENT OF THE VARIABLE TRI_{T-1}

I measure TRI_{t-1} using toxic release during the most recent non-overlapping calendar year prior to fiscal year *t* scaled by sales in the same period. If the fiscal year end is December, both toxic release and sales are measured for fiscal year *t-1*, which is the same as calendar year *t-1*. If the fiscal year end is not December, toxic release is measured for calendar year *t-1* if the fiscal year-end month falls in January through May, or *t-2* if the fiscal year-end month falls in June through November, and sales are calculated as the weighted average sales for the calendar year for which the toxic release is measured. Below I provide an example for the cases where TRI_{t-1} is measured in calendar year *t-1* (Figure 1) and one for the cases where TRI_{t-1} is measured in calendar year *t-2* (Figure 2).

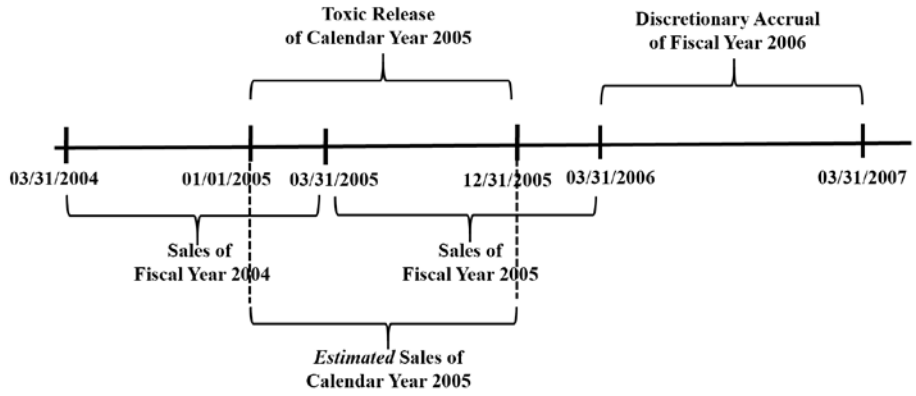

Figure 1. Measurement Timeline For A March Fiscal Year End Firm

In Figure 1, the firms' fiscal year-end month is March. For fiscal year 2006, TRI_{t-1} is measured as toxic release of calendar year 2005 scaled by the weighted average sales for calendar year 2005, which is calculated as $3/12 \times Sales_{fiscal\ year\ 2004} + 9/12 \times Sales_{fiscal\ year\ 2005}$. The weight assigned to fiscal year 2004 (2005) is 3/12 (9/12) because it has three (nine) months in calendar year 2004 (2005).

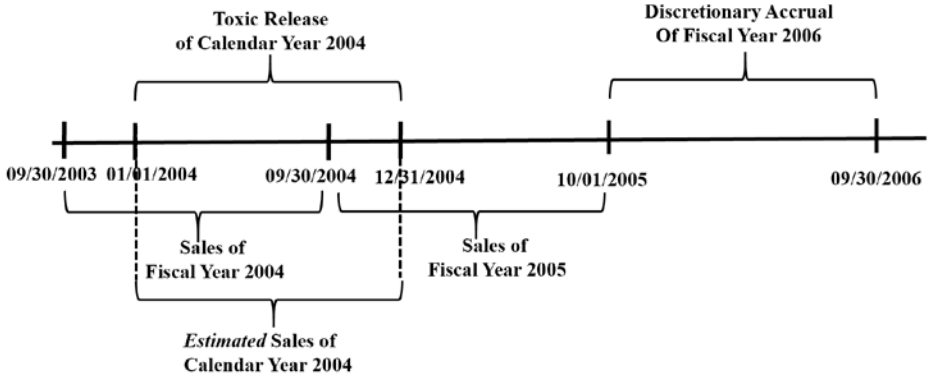

Figure 2. Measurement Timeline For A September Fiscal Year End Firm

In Figure 2, the firms' fiscal year-end month is Semptember. For fiscal year 2006, TRI_{t-1} is measured as toxic release of calendar year 2004 scaled by the weighted average sales for calendar year 2004, which is calculated as $9/12 \times Sales_{fiscal\ year\ 2004} + 3/12 \times Sales_{fiscal\ year\ 2005}$. The weight assigned to fiscal year 2004 (2005) is 9/12 (3/12) because it has nine (three) months in calendar year 2004 (2005).

APPENDIX C

VARIABLE DEFINITIONS

Variable	Description
Age	Natural logarithm of one plus current fiscal year minus the first fiscal year that a firm appears on Compustat.
Big5	An Indicator variable equal to one if firms are audited by big 5 auditors in fiscal year t.
BTM	Stock equity divided by market capitalization at the end of fiscal year t.
Cash_Flow	Operating cash flows in fiscal year t divided by total assets at the end of fiscal year t.
Cheps	An indicator variable equal to one if a firm's earnings per share increases during fiscal year t.
Delta	Natural logarithm of one plus mean delta of the top five executives at the end of fiscal year t, where portfolio delta is sensitivity of an executive's equity portfolio to a 1% change in stock price, constructed following Core and Guay (2002).
Discretionary_Accruals	Estimated on 2-digit SIC industry and year based on Dechow and Dichev (2002).
Finance	Sum of equity and debt financing divided by total assets at the end of fiscal year t.
Income_Decrease_Restate	An indicator variable equal to one for restatements reducing income.
Inst_Own	Percentage of institutional ownership at the end of fiscal year t.
Leverage	Sum of short-term and long-term debt divided by total assets at the end of fiscal year t.
Future_EPA_Enforcement	Indicator variable equal to one if there is at least one EPA enforcement event during fiscal year t+1 to t+3.
Future_Neg_Environ_Coverage	Indicator variable equal to one if there is at least one negative environmental media coverage event during fiscal year t+1 to t+3.
Loss	An indicator variable equal to one if net income in fiscal year t is less than zero.
M&A	An indicator variable equal to one if a firm is involved in mergers and acquisitions during fiscal year t.

Variable	Description
Meet_Beat	An indicator equal to one if net income before extraordinary items scaled by total assets lies in [0,0.005), change in net income before extraordinary items scaled by total assets lies in [0,0.005), or EPS beats analyst forecasts by one cent per share or less during fiscal year t.
ROA	Net income in fiscal year t divided by total assets at the end of fiscal year t.
Sales_Growth	Change of total revenue in fiscal year t relative to year t-1 divided by total revenue in fiscal year t-1.
Size	Natural logarithm of market capitalization at the end of fiscal year t.
Tight_Cov	An indicator equal to one if at least one of a firm's loan covenants falls into the lowest decile of slack during fiscal year t, and covenant slack is calculated following Demerjian and Owens (2014).
TRI_HiPressure	Total toxic release (pounds) in the most recent non-overlapping calendar year before fiscal year t produced by plants located in the high public pressure states, scaled by the relevant total revenue in that calendar year.
TRI_HiReg	Total toxic release (pounds) in the most recent non-overlapping calendar year before fiscal year t produced by plants with high regulation risk, scaled by the relevant total revenue in that calendar year.
TRI_LoPressure	Total toxic release (pounds) in the most recent non-overlapping calendar year before fiscal year t produced by plants located in the low public pressure states, scaled by the relevant total revenue in that calendar year.
TRI_LoReg	Total toxic release (pounds) in the most recent non-overlapping calendar year before fiscal year t produced by plants with low regulation risk, scaled by the relevant total revenue in that calendar year.
Vega	Natural logarithm of one plus mean vega of the top five executives at the end of fiscal year t, where portfolio vega is sensitivity of an executive's equity portfolio to a 0.01 change in stock volatility, constructed following Core and Guay (2002).

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BIOGRAPHICAL SKETCH

Xiaolu Zhou was born in Taizhou, Zhejiang, China. She graduated from Shanghai Datong High School in 2008. She received both her master's and bachelor's degree in finance from Fudan University in China. She also studied at University of California, Berkeley and University of Toronto as an exchange student. She joined the PhD program in Management Science with concentration in Accounting at The University of Texas at Dallas in 2014. She is broadly interested in empirical archival research in accounting. Her main research area is corporate disclosure and financial reporting.

CURRICULUM VITAE

Xiaolu (Sheryl) Zhou

Naveen Jindal School of Management
The University of Texas at Dallas
800 W Campbell Rd, Richardson, TX 75080
E-mail: xiaolu.zhou@utdallas.edu

EDUCATION

University of Texas at Dallas, Richardson, TX
PhD in Accounting, expected 2020

Fudan University, Shanghai, China

MS in Finance, 2015; *BA in Finance,* 2012

Exchange Student at **University of Toronto**, Aug. 2013 – Dec. 2013

Exchange Student at **University of California, Berkeley**, Aug. 2010 – Dec. 2010

RESEARCH

Job Market Paper

[1] "The Public as Corporate Stakeholder: Evidence from Toxic Release and Financial Reporting"

Other Working Papers

[2] "The Effect of Managerial Litigation Risk on Earnings Warnings: Evidence from a Natural Experiment", with Ying Huang, Ningzhong Li, and Yong Yu

[3] "Unemployment Risk and Debt-Contract Design", with Christopher Armstrong, Daniel Cohen, and Nir Yehuda

[4] "Materiality Uncertainty and Corporate Disclosure", with Ying Huang and Jieying Zhang

[5] "Equity Financing Incentive and Corporate Disclosure: New Causal Evidence", with Ningzhong Li

[6] "Principle-Based Materiality Standards and Auditor Behavior", with Ying Huang and Jieying Zhang

TEACHING

Teaching Interests
Financial Accounting, *Financial Statement Analysis*

Instructor
Financial Accounting (Evaluation: 4.67/5.0; class size: 60 students) 2018
Financial Accounting (Evaluation: 4.81/5.0; class size: 60 students) 2017

Teaching Assistant
Financial Accounting (for Prof. Nir Yehuda) 2015-2019

Financial Accounting (for Prof. Ying Huang) 2018
Accounting for Managers (for Prof. Ying Huang) 2018
Financial Accounting (for Prof. Yibin Zhou) 2017
Financial Statement Analysis (for Prof. Daniel Cohen) 2017
Financial Statement Analysis (for Prof. Bin Li) 2014

PRESENTATIONS AND CONFERENCES

2019 University of Texas at Dallas, Richardson, TX (presenter)
2019 Lone Star Accounting Conference, Austin, TX (presenter)
2019 AAA Annual Meeting, San Francisco, CA
2017 London Business School Trans-Atlantic Doctoral Conference, London, UK (presenter and discussant)
2017 University of Texas at Dallas, Richardson, TX (presenter)
2017 AAA IAS Midyear Meeting, Tampa, FL (discussant)
2017 AAA Annual Meeting, San Diego, CA
2017 AAA FARS Midyear Meeting, Charlotte, NC
2016 University of Texas at Dallas, Richardson, TX (presenter)
2016 MIT Asia Conference in Accounting, Xiamen, China
2016 AFA Annual Meeting, San Francisco, CA
2015 University of Texas at Dallas, Richardson, TX (presenter)
2015 Lone Star Accounting Conference, Richardson, TX

HONORS AND AWARDS

2017 Betty and Gifford Johnson Travel Award, University of Texas at Dallas
2016 Accounting Doctoral Fellowship, University of Texas at Dallas
2014 Graduate Academic Excellence Scholarship and Tuition Waiver, Fudan University
2014 Overseas Exchange Academic Excellence Scholarship, Fudan University
2013 Graduate Academic Excellence Scholarship and Tuition Waiver, Fudan University
2013 University of Toronto Exchange Program, University of Toronto
- Selected 1 out of 110 students, offering tuition waiver
2012 Graduate Academic Excellence Scholarship and Tuition Waiver, Fudan University
2011 Undergraduate Excellent Student Scholarship, Fudan University
2010 University of California Education Abroad Program, University of California, Berkeley
- Selected 2 out of 353 students, offering tuition waiver
2010 Undergraduate Excellent Student Scholarship, Fudan University
2009 Undergraduate Excellent Student Scholarship, Fudan University

PROFESSIONAL EXPERIENCE

Employment

Standard Chartered Bank, wealth management intern, Shanghai, China 2011-2012
Bain & Company, consulting intern, Shanghai, China 2011

Professional Accreditation

Chartered Financial Analyst (CFA) Level III Candidate 2017

COMPUTER SKILLS

SAS, STATA, Python, MATLAB

REFERENCES

William Cready (co-chair)
Adolf Enthoven Distinguished Professor in Accounting and Information Management
Naveen Jindal School of Management
The University of Texas at Dallas
Email: cready@utdallas.edu
Phone: 972-883-4185

Ying Huang
Assistant Professor of Accounting
Naveen Jindal School of Management
The University of Texas at Dallas
Email: ying.huang1@utdallas.edu
Phone: 972-883-5989

Ram Natarajan
Associate Professor of Accounting
Naveen Jindal School of Management
The University of Texas at Dallas
Email: nataraj@utdallas.edu
Phone: 972-883-2739

Ningzhong Li (co-chair)
Associate Professor of Accounting
Naveen Jindal School of Management
The University of Texas at Dallas
Email: ningzhong.li@utdallas.edu
Phone: 972-883-5822

Stanimir Markov
Ashbel Smith Professor of Accounting
Naveen Jindal School of Management
The University of Texas at Dallas
Email: stan.markov@utdallas.edu
Phone: 972-883-5166