Assessing the Objective Function of the SEC against Financial Misconduct: A Structural Approach

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Abstract

We examine the objective function of the SEC against financial misconduct by estimating a structural model of the interaction between the SEC and regulated firms. Identification exploits SOX as a shock to enforcement intensity. Three insights emerge from counterfactual analyses. First, the SEC's heterogeneous preferences explain 75% of the cross-sectional variation in its enforcement. Second, removing regulatory discretion would result in higher enforcement costs but little effect on earnings management. Third, regulatory outcomes respond more to changes in social costs than to changes in enforcement costs, casting doubts over the potential efficacy of increasing the SEC's budget to reduce financial misconduct.

Keywords: Financial Misconduct, SEC, Enforcement, Regulator Discretion, Regulator Preferences, Social Costs.

JEL Classifications: D78, G34, H41, K42, M42, M48

I. Introduction

The U.S. Securities and Exchange Commission (hereafter the SEC) was created by the Securities Exchange Act of 1934 (hereafter the Exchange Act) as the financial market regulator after the Wall Street Crash of 1929. As the regulator of the world's largest financial market, the SEC plays an important role in the U.S. and the world economy. Section 21(a)(1) of the Exchange Act grants the SEC ample authority and discretion to investigate and seek sanctions related to violations of the securities laws, with the goal of protecting investors; maintaining fair, orderly, and efficient markets; and facilitating capital formation (SEC, 2013). To be sure, this is the SEC's *stated* objective. Like most regulatory agencies, the SEC is subject to resource constraints – as well as to pressures from both the political and business spheres – that might steer it away from the absolute fulfillment of its mission. In practice, the SEC can use its discretion to make choices concerning the allocation of its limited resources and prioritize enforcement efforts against some violations at the expense of others.

In this paper, we directly assess the SEC's actual objective function, as revealed by the observed SEC regulatory policies. Our study contributes to the understanding of securities markets in two important ways. First, it allows us to recover the key parameters that determine the enforcement of securities laws. Second, given an estimate of the SEC's objective function, we can evaluate how enforcement standards and securities violations would fare in counterfactual scenarios with reduced regulatory discretion. Our analysis thus offers insight into whether potential policy interventions forcing the SEC to adopt alternative regulatory stances would help it achieve its stated goals.

To that end, we follow the framework by Kang and Silveira (2021, hereafter KS), who study the role of discretion in the enforcement of water quality regulation in California. We adapt that framework to analyze the SEC's enforcement actions against firms' financial reporting concerning the13(b) provisions of the Exchange Act. The 13(b) data have been widely used in finance and accounting research to examine financial misconduct (e.g., Karpoff, Lee, and Martin, 2008; Fang, Huang, and Karpoff, 2016). We start with a theoretical model, similar to KS, in which the SEC considers three types of costs when making enforcement decisions: (1) the SEC's perceived social costs of financial misconduct (associated, for example, with its impact on investors' confidence and trust); (2) the SEC's perceived enforcement costs (associated, among other things, with the political and administrative costs of conducting investigations and imposing penalties); and (3) firms' expected benefits of committing financial misconduct (or, equivalently, the negative of the firms' costs of reducing financial misconduct). The first two costs relate to the SEC's private concerns and are referred to as "regulator preferences." We assume the benefits of financial misconduct are known to the firm managers but not to the regulator, so there is information asymmetry between the regulator and firm managers. The SEC's objective is to minimize the sum of the three aforementioned costs for each firm by choosing an enforcement schedule. Given such a schedule, the firm chooses the level of financial misconduct to maximize its net payoff.

We structurally estimate the above model, exploiting a shock to enforcement intensity due to the passage of the Sarbanes-Oxley Act (SOX) in 2002. Anecdotal evidence, prior research, and our own data suggest that the SEC strengthened enforcement against large firms, and firms' financial reporting quality improved post-SOX (Cox and Thomas, 2005; Chhaochharia and Grinstein, 2007; Cohen, Dey, and Lys, 2008). Based on these pieces of evidence, we focus our

analysis on large firms with a market capitalization above median market capitalization each year in Compustat. In our estimation, the pre-SOX period spans from 1996 to 1999, and the post-SOX period ranges from 2002 to 2005. We measure financial misconduct based on unsigned discretionary accruals, which are used by the SEC to assess a firm's accounting quality and are known to be associated with accounting misstatements (Dechow, Ge, Larson, and Sloan, 2011).[1,2,3] We measure SEC penalties using the one-day abnormal returns surrounding enforcement announcements and recover the objective functions of firm managers and the SEC using SOX as a shock to the SEC's enforcement intensity. Our estimation indicates a significant increase in marginal social costs post-SOX and significant decrease in marginal enforcement costs. The evidence is consistent with the decline in the market confidence shortly after SOX (Financial Executives Research Foundation, 2005; Hochberg, Sapienza, and Vissing-Jørgensen, 2009), and the decline in the severity of misreporting cases due to enhanced public enforcement (Cohen et al., 2008; Coates and Srinivasan, 2014).

As a preview of our results, we discuss the three cost components of the SEC that are estimated from our model. To demonstrate the heterogeneity of our estimates in the cross-section, we use two firms as examples, where the first firm has the median level of market capitalization ($668 million) and the second one has a large level of market capitalization ($89 billion). In equilibrium, we find that the benefits of earnings management for the median firm are 0.354% of the market capitalization, evaluated at the median value of abnormal accruals (0.046 of total assets). The corresponding expected penalties are 0.001% of the market capitalization. The low penalties

[1] We use the terms *earnings management* and *financial misconduct* interchangeably in this study.
[2] See https://www.sec.gov/news/speech/2012-spch121312cmlhtm for more information on the SEC's use of unsigned discretionary accruals.
[3] Discretionary accruals, which capture the level of earnings management in this paper, are conceptually equivalent to the "negligence level" in KS.

due to lax enforcement are consistent with the evidence from prior studies that earnings management is pervasive (e.g., Dyck, Morse, and Zingales, 2021; Zakolyukina, 2018) and that 60% of the surveyed CFOs believe earnings management will not be detected (Dichev, Graham, Harvey, and Rajgopal, 2013). For the same firm, the SEC incurs enforcement costs of 0.0004% of the market capitalization to impose penalties and bears social costs of 0.001% of the market capitalization. In contrast, the large firm has perceived firm benefits of 0.188% of the market capitalization, also evaluated at the median value of abnormal accruals. The corresponding estimated enforcement costs and social costs for the large firm are 0.007% and 0.026% of the market capitalization, respectively. Overall, these estimates suggest that, as firm size increases, the marginal benefits of earnings management decline, while enforcement costs and social costs increase.

Leveraging our structural model estimates, we conduct three counterfactual analyses to evaluate the outcomes of alternative enforcement policies. The first counterfactual analysis addresses the scenario of a regulator with homogenous preferences (i.e., having the same marginal social costs and marginal enforcement costs) across all firms. We find that homogenizing the regulator's preferences would decrease the disparity in enforcement by 75%, suggesting that a substantial amount of disparity in SEC enforcement is due to the heterogeneity in regulator preferences.

Next, we evaluate the outcomes of a scenario in which the SEC faces lower enforcement costs. Specifically, we find a 10% decrease in marginal enforcement costs leads to an increase in average penalty costs by 6.0% and a decrease in average earnings management by 0.8%. The modest elasticity of earnings management to marginal enforce costs suggests that expanding the SEC's budget might have a limited impact on financial misconduct.

Last, we limit the regulator's discretion by constraining the penalty schedule to be the same across all firms. We show that adopting such a policy would result in unambiguously undesirable outcomes, including higher enforcement costs (at least tenfold) but little effect on earnings management, relative to the baseline policy that involves discretion. Given the regulator's preferences, removing its discretion by imposing one-size-fits-all enforcement policies would lead to worse outcomes.

Our study makes several contributions. First, prior research (Siegel, 2005; Jackson and Roe, 2009; Kedia and Rajgopal, 2011; Yu and Yu, 2011; Blackburne, 2014) suggests that the preferences of firms (e.g., shareholders' private enforcement) and the regulator (e.g., public enforcement costs) are associated with the SEC's enforcement decisions against corporate fraud. To our knowledge, we are the first to comprehensively evaluate the objective functions of the SEC in enforcement against financial misconduct – taking into consideration both the incentives of firms and those of the regulator. Our model accounts for three types of costs in enforcement, and we find that all three vary considerably in the cross-section. Our study thus offers a framework for understanding the SEC's enforcement role in financial markets (Karpoff et al., 2008; Dyck et al., 2010).

Second, the findings of our paper will be informative to policy makers. We show that the regulator's discretion improves enforcement outcomes, underscoring that the removal of discretion would result in higher enforcement costs with little impact on financial misconduct. Our evidence also points to the limit of increasing the SEC's budget in curbing financial misconduct. These findings will inform the debate on whether the financial regulator should be given discretion and whether the SEC's budget represents a major constraint to create a healthy financial market.

Third, our paper relates to several recent studies in finance and accounting that conduct structural analyses of regulatory models, such as Kang, Lowery, and Wardlaw (2015) and Alvero, Ando, and Xiao (2022) on bank regulators. From a methodological perspective, our paper relates to a growing empirical literature analyzing game-theoretic structural models (Gentry and Stroup, 2019; Gorbenko, 2019). Lastly, our study relates to recent literature that studies earnings management using a structural approach (Zakolyukina, 2018, Beyer, Guttman, and Marinovic, 2019; Bertomeu et al., 2020). We depart from these papers in that we focus on the regulator while prior studies tend to treat regulatory penalties as exogenously given.

The remainder of this paper proceeds as follows. Section 2 presents the theoretical model. Section 3 discusses the identification strategy and institutional details. Section 4 describes the data. Section 5 describes the structural estimation. Section 6 presents the results, and Section 7 presents the counterfactual exercises. Section 8 concludes.

2. Theoretical Model

2.1. Model setup

We model the interactions between the SEC and a manager of an individual company in a static game, similar to the framework proposed by KS. We assume that the manager's objective is to maximize current stock price. Earnings management, on one hand, increases shares prices, and one the other hand, increases SEC enforcement likelihood and thus penalty costs. Formally, managers in our model set the level of earnings management to maximize their expected net payoff, which consists of gains from compensation and private benefits, and costs of earnings management (e.g., loss of labor market reputation, effort in designing earnings management strategy, and

penalty imposed by the SEC). The benefits depend on the company's endowed type, θ, and the level of actual earnings management, a. We assume that managers can set the level of a and reap the gross private benefits of $\theta b(a)$.

The regulator, which is the SEC in our case, imposes a penalty on the company based on a given schedule. We assume the value of θ is known to the manager but not the regulator, and thus there is information asymmetry between the regulator and the firm manager. The regulator only knows that θ is a realization of a random variable Θ, which follows a strictly increasing and continuously differentiable distribution function $F(.)$ with support $(0, \bar{\theta})$ and with an associated density denoted by $f(.)$. Assuming that the manager is risk-neutral, we can restrict our attention to the expected penalty, conditional on a, denoted by $e(a)$.

The expected payoff to a manager who chooses a certain level of earnings management a is then

$$\theta b(a) - e(a). \qquad (1)$$

We define that the earnings management level, $a(.)$, is *implemented* by a penalty schedule, $e(.)$, if $a(\theta)$ maximizes (1) for all $\theta \in \Theta$. We assume $b(.)$ is concave. In this case, if $a(.)$ is implemented by $e(.)$, we have

$$\theta \mathrm{b}'[\mathrm{a}(\theta)] = e'[a(\theta)], \qquad (2)$$

whenever $a(\theta) > 0$. Given a penalty schedule $e(.)$, the regulator's expected costs are

$$\int_0^{\bar{\theta}} (h[a(\theta)] + \psi e[a(\theta)] - \theta b[a(\theta)])\, f(\theta) d\theta, \qquad (3)$$

where $\psi > 0$ is the marginal cost of imposing a penalty, and $h(.)$ is the regulator's perceived social costs (i.e., external costs of earnings management) due to earnings management. In our

paper, the enforcement costs, $\psi e[a(\theta)]$, consist of the SEC's administrative, political, and opportunity costs associated with enforcement actions against the company (Mehta and Zhao, 2020; Correia, 2014; Heese, 2019).

The regulator's problem is to minimize (3) by choosing $e(.)$, subject to the constraint that the expected penalty for any a must be nonnegative and not exceed the company's current market value, w:

$$0 \leq e(a) \leq w \qquad (4)$$

for any a.

2.2. Characterization of model solution

Assumption 1.

1) $b(.)$ *and* $h(.)$ *are continuously differentiable and strictly increasing.*
2) $(1-\psi)\theta + \psi[1-F(\theta)]/f(\theta)$ *is positive and strictly increasing in* θ.
3) $h(.)$ *is convex, and* $b(.)$ *is strictly concave (or* $h(.)$ *is strictly convex, and* $b(.)$ *is concave).*

Following KS, we constrain $h(.)$ to be linear by assuming $h(a) = \gamma(\theta)a$ to facilitate the interpretation of the empirical results. KS show that the above assumption is sufficient to guarantee the earnings management schedule $a^*(\theta)$, which is characterized by the following first-order condition, is optimal, and strictly increasing in θ for any $a^*(\theta) > 0$:

$$h'[a(\theta)] - b'[a(\theta)]\left\{(1-\psi)\theta + \frac{\psi[1-F(\theta)]}{f(\theta)}\right\} = 0. \qquad (5)$$

As shown by KS, the equilibrium earnings management level in our model is not equal to the first-best scenario, in which marginal firm benefits for earnings management equal marginal social costs, unless there are no enforcement costs or the SEC can perfectly observe the company type.

2.3. Model interpretations

We consider three components in the SEC's cost function: (1) social costs (i.e., external costs of earnings management), (2) enforcement costs associated with assessing and imposing penalties, and (3) the manager's expected benefits. The first two components are related to regulators' private concerns, termed as "regulator preferences" by KS. Below we discuss the three components in detail.

2.3.1 Social Costs $(h(.))$

The SEC's stated mission is to "protect investors; maintain fair, orderly, and efficient markets; and facilitate capital formation. The SEC strives to promote a market environment that is worthy of the public's trust" (SEC, 2014). Therefore, we assume that the SEC is concerned about the health of the financial markets and refer the damage imposed on the capital markets stemming from financial frauds as social costs.

First, prior literature shows that financial frauds result in investors' deviation from the optimal portfolio choice, and investors financially suffer. For example, Giannetti and Wang (2016) show that the revelation of financial frauds in a state reduces the household holding of both fraudulent and non-fraudulent firms in that state because the fraud revelation "undermine[s] [households'] trust in the stock market." In addition, they find that both households holding the stock of fraudulent firms and those who do not own the stock reduce their holdings. Bloomfield

and Wilks (2000) find consistent results in the laboratory financial markets that greater disclosure quality leads to greater liquidity. Second, financial frauds disrupt the order of the capital markets and have real effects on the economy. For example, high-profile accounting frauds mislead peers and adversely affect peers' investments because managers learn about investment opportunities from peer firms' financial reports (Beatty, Liao, and Yu, 2013; Durnev and Mangen, 2009). Files and Gurun (2018) find that there are negative spillover effects on suppliers of restating firms in that the loan spread of the suppliers significantly increases after a major customer restates. In sum, paramount evidence demonstrates that financial frauds are detrimental to both investors and other stakeholders, which in turn affects the cost consideration of the SEC.

2.3.2 Enforcement Costs $(\psi(.))$

Enforcement costs are the sum of administrative costs, political costs, and opportunity costs. Administrative costs are associated with time and resources devoted to SEC investigations. The Division of Enforcement incurs additional travel and other related costs when staff needs to travel outside of their geographic areas. This "constrained cop" hypothesis predicts that proximity is one of the determinants of SEC investigation. Consistent with this prediction, Kedia and Rajgopal (2011) find that the SEC is more likely to investigate firms close to its regional offices. In addition, resource constraints increase opportunity costs. According to a 2007 report by the General Accounting Office (GAO), the "SEC's Chairman, officials from his office and the Office of the Executive Director and enforcement officials said that the division has not always been able to prioritize or ensure an efficient allocation of limited investigation staff resources." Similarly, in 2017, the SEC faced a significant shortage of staff due to tight budgetary constraints and hiring freeze. Former SEC Commissioner Robert Jackson commented that "the tragedy of these reductions in staff is that it means fewer investigations, fewer actions, and ultimately, few dollars

returned to investors." Indeed, the level of enforcement actions decreased by 13% from 868 enforcement actions in 2016 to 754 enforcement actions in 2017.[4] Furthermore, the application of advanced tools, such as data analytics for financial misconduct detection and investigation, can decrease investigation and enforcement costs. Despite the benefits of technological development, the SEC faces difficulties in obtaining additional funding to improve technological tools. In 2014, the SEC experienced a cutback of $25 million set aside for technological improvements.[5] Lastly, the effectiveness of internal coordination across different divisions and external coordination with other enforcement agencies can also affect enforcement costs.[6]

The SEC also faces political costs. For example, the SEC is more likely to investigate in cases with higher media coverage because "targeting more visible firms has the added benefit of allowing the SEC to deal with political allegations that the SEC is lax in prosecuting known cases of corporate misconduct" (Kedia and Rajgopal, 2011). The SEC's enforcement choices also partially reflect the government's preference because Congress sets the SEC's budget and congressional committees oversee the SEC. Prior research shows that politically connected firms contributing to politicians are less likely to face SEC enforcement (e.g., Yu and Yu, 2011; Correia, 2014, Heese, 2019).

2.3.3. Manager's Benefits from Earnings Management ($\theta[b(a)]$)

The last component we consider in the SEC's utility function is the manager's benefits from earnings management. Following the regulatory economics literature (e.g., Baron and Myerson, 1982; Laffont and Tirole, 1993), the manager's benefits enter the SEC's utility function

[4] See "SEC hiring freeze hits enforcement staff hard" (Bloomberg Law, 2018).
[5] See "Congress slashes SEC's funding for technology upgrades" (The Washington Post, 2014).
[6] For example, the SEC cooperates with the Financial Industry Regulatory Authority in policing brokers and exchange markets and the Commodity Futures trading Commission in regulating the derivatives markets.

in a positive way. That is, the SEC bears a lower cost when the regulated firm derives higher benefits from earnings management, holding constant other types of costs. The manager's benefits represent the net benefits the manager enjoys in the absence of SEC enforcement penalties. Prior studies provide evidence of managers' incentives to manage earnings management, including their compensation and career concerns. When compensation is closely tied to earnings (e.g., earnings-based bonuses), managers have a strong incentive to manage earnings to maximize their bonuses (Healy, 1985; Holthausen, Larcker, and Sloan, 1995). Also, the close tie between managers' total compensation and stock price incentivizes managers to report higher earnings to maintain higher stock prices (Bergstresser and Philippon, 2006; Burns and Kedia; 2006; Cheng and Warfield, 2005).

Job security and reputation also motivate managers to manage earnings. DeAngelo (1988) documents that incumbent managers tend to report higher earnings during a proxy contest to secure their jobs. Meanwhile, Bennett, Bettis, Gopalan, and Milbourn (2017) show that the forced turnover rate significantly increases if CEOs fail to meet their compensation targets linked to earnings. In addition, reputable CEOs who need to maintain their celebrity status may manage earnings to surpass market expectations (Malmendier and Tate, 2009; Francis, Huang, Rajgopal, and Zang, 2008). Lastly, survey evidence in Graham, Harvey, and Rajgopal (2005) confirms that managers' career concerns have a significant influence on their financial reporting decisions.

3. Model identification strategy

3.1. Data-generating process

The market consists of many companies, indexed by i, and one regulator (i.e., the SEC). We observe the market over various periods, indexed by t. Every period t, company i has a cost type $\Theta_{i,t}$ and faces a penalty schedule $e_{i,t}$. Given $\Theta_{i,t}$ and $e_{i,t}$, the company sets its optimal level of earnings management for period t. Because it is a function of $\Theta_{i,t}$ the level of earnings management of company i in period t is a random variable, with a distribution function $G_{i,t}$.

The model primitives include four elements: (1) the distribution of company cost types, $F_{i,t}$; (2) the company's benefit function, $b'_{i,t}$; (3) the SEC's perceived marginal social cost, $\gamma_{i,t}$; and (4) the SEC's marginal enforcement cost, $\psi_{i,t}$. The observables include: (1) the level of earnings management, (2) the SEC's enforcement level, and (3) companies' characteristics $x_{i,t}$, which include both firm specific characteristics such as firm size, and industry characteristics such as industry growth.

In our model, the primitives are heterogeneous across companies and time regimes. In other words, we allow each company to have different model primitives in different time periods. However, we assume that the heterogeneity in model primitives is mediated through the observable characteristics $x_{i,t}$. Formally, we have $F_{i,t}(.) = F_t(.|x_{i,t})$, $b_{i,t}(.) = b_t(.|x_{i,t})$, $\gamma_{i,t}(.) = \gamma_t(.|x_{i,t})$, and $\psi_{i,t}(.) = \psi_t(.|x_{i,t})$. Accordingly, we have $e_{i,t}(.) = e_t(.|x_{i,t})$ and $G_{i,t}(.) = G_t(.|x_{i,t})$. The key identification assumption is that, conditional on the companies' characteristics $x_{i,t}$, the distribution of the company cost types and the cost functions do not change in different time regimes. Formally:

Assumption 2. $F_t(.|x_{i,t}) = F(.|x_{i,t})$ *and* $b_t(.|x_{i,t}) = b(.|x_{i,t})$.

In this paper, we explore the Sarbanes-Oxley Act as an exogenous shifter to the SEC's enforcement standards. Section 3.3 provides details of the institutional setting, especially how

provisions in SOX affect the regulator's preferences. We consider two regimes of SEC enforcement schedule ($e(.)$) – before and after the passage of SOX in 2002. We assume that the SEC's marginal enforcement costs and marginal social costs of violations can change after SOX, and thus the enforcement schedules can also change after SOX. But regulatory preference does not change within each regime. The pre-SOX period, denoted as "pre", spans from 1996 to 1999, and the post-SOX period, denoted as "$post$", ranges from 2002 to 2005.

3.2. Identification

The identification strategy of the model largely follows KS, which relates to d'Haultfoeuille and Février (2020) and Luo, Perrigne, and Vuong (2018). The strategy proceeds in two steps. In the first step, we obtain the distribution of earnings management levels set by each company in each period from our data sample. Then, we partially identify the firm type (θ) distribution and the marginal benefits function ($b'(.)$) using an exogenous change in the SEC's penalty schedule. In the second step, we recover marginal social costs of earnings management (γ) and marginal enforcement costs (ψ) using the restrictions imposed by the first-order conditions of the SEC. That is, we identify γ and ψ as the parameters that rationalize the enforcement standards observed in the data – before and after the changes in the penalty schedule. Lastly, with some additional assumptions discussed below, we provide full identification of the firm type distribution and the marginal benefits function.

The structural model takes as inputs the distribution of earnings management levels and the enforcement schedule – which are both identified from our data. We provide the details of our estimation of these two components in Section 5. We make the following assumption about the enforcement schedule:

Assumption 3. *Let $e_t(.)$ be the expected penalty for period t. $e_t(.) = e_{pre}(.)$ for any t < 1999; and $e_t(.) = e_{post}(.)$ for any t > 2002. Further, $e'_{post}(a) > e'_{pre}(a)$ for any $a > 0$.*

The last part of the assumption indicates that the enforcement is stricter in the post-SOX period.

The change entails a modification in the SEC's preference (i.e., social costs or enforcement costs), and it is exogenous in that it can only affect managers' behavior through changes in SEC enforcement. Intuitively, the extent to which the firms respond to the change in the enforcement standards allows us to assess the manager's preferences for engaging in financial misconduct. This step does not require any assumptions on the SEC's behavior. The following proposition allows us to partially identify F(.) and $b'(.)$. As discussed before, all the model primitives vary with $x_{i,t}$. We abstract away from $x_{i,t}$for notation simplicity.

Proposition 1. *Given a normalization of θ_0, recursively define $a_l = G_{pre}^{-1}\left[G_{post}(a_{l-1})\right]$ and $\theta_l = \left[e'_{post}(a_l)/e'_{pre}(a_l)\right]\theta_{l-1}$. If assumptions 1-3 hold, for any $l \in \{0,1,3,\dots,L\}$ and period $j \in \{pre, post\}$, the following elements are identified: 1) the equilibrium earnings management level $\hat{a}(\theta_l, j)$, 2); the distribution of firm types $F(\theta_l)$; and 3) the derivative of the firm benefits function $b'\left(\hat{a}(\theta_l, j)\right)$.*[7]

We provide a brief discussion and some intuition of the proof here. As mentioned above, $G_{pre/post}(a)$ and $e'_{pre/post}(a)$ are directly identified from our data. Given these objects and starting from a normalization point of θ, we can recursively obtain $\theta_{l\in\{0,1,3,\dots,L\}}$ and the corresponding $\hat{a}(\theta_l, pre)$ and $\hat{a}(\theta_l, post)$. For every pair of $\hat{a}(\theta_l, j)$ and θ_l, we obtain

[7] See page 11 in the Online Appendix of KS for a detailed proof of Proposition 1.

$b'\big(\hat{a}(\theta_l, j)\big) = e'\big(\hat{a}(\theta_l, j)\big)/\theta_l$ using the first-order condition of the firm's problem. Furthermore, with assumptions 1 and 2, there is a one-to-one mapping between θ_l and $\hat{a}(\theta_l, j)$. Employing such a mapping, we can obtain $F(\theta_l) = G_j\big(\hat{a}(\theta_l, j)\big)$.

The above provides partial identification of the model. To obtain the complete model identification, we make the following additional assumption:

Assumption 4. *There is an interval $U \in \mathbb{R}_+$ such that the functions $e'_{post}(a)/e'_{pre}(a)$ and $a^r/e'_j(a)$ for all $r \in \{1,2,\dots,R\}$ are strictly monotone in $a \in U$.*

Assumption 4 is a technical assumption to guarantee that we can recover γ and ψ from the first-order condition of the SEC's problem.

Proposition 2. *If assumptions 1-4 hold and $L \geq 1$, given some normalization level of θ_0, the following elements are identified: 1) the distribution of firm types $F(.)$, 2) the derivative of the firm benefits function $b'(a)$, and 3) marginal social costs γ_j and marginal enforcement costs ψ_j, for $j \in \{pre, post\}$.*

The proof for Proposition 2 starts with the identification of γ_j and ψ_j, evaluated at $\theta_{l\in 0,1,3,\dots,L}$ from Proposition 1, based on the first-order condition of the SEC's problem. Once we have γ_j and ψ_j, we can recover $\hat{a}(\theta, j)$ for all θ using the first-order condition of SEC's problem again. Given $\hat{a}(\theta, j)$, we obtain the full identification of $F(.)$ and $b'(.)$, following methods similar to those descripted in the Proposition 1. See the detailed proof of Proposition 2 in KS.[8]

3.3. Institutional changes – the Sarbanes-Oxley Act

[8] See pages 11-12 in the Online Appendix of KS for a more detailed discussion.

SOX was passed on July 25, 2002, as a result of a number of major accounting scandals, including the collapse of Enron in late 2001. The large accounting scandals significantly undermined investors' trust in the capital markets. Those scandals were reported on the front pages and widely publicized by the media for an extended period of time. The record bankruptcies of Enron and WorldCom and the collapse of Arthur Andersen further destabilized the capital markets. Using poll data, Romano (2004) demonstrates that only 20% of the public had "either a great deal or quite a lot of confidence in big business in 2002," the lowest level in recent history since the great depression and a significant decline from the 29% average between 1997 and 2001. In addition, Giannetti and Wang (2016) show that states with a higher fraction of clients of Arthur Andersen experienced an economically significant decrease in household participation in the stock market. The low market confidence increased the SEC's marginal social costs and pressed it to step up its level of enforcement and restore trust in the capital markets.

SOX contains eleven sections, including auditor independence, internal controls, and the requirement for the SEC to make rules to implement the law. Prior studies (e.g., Zhang, 2007; Wang, 2010; Gipper, Leuz, and Maffett, 2020) focus on five key provisions of SOX, including the establishment of the Public Company Accounting Oversight Board (PCAOB), separation of audit service from non-audit services, the increase of corporate accountability and criminal penalties, internal controls, and whistleblower protection.

SOX Sections 101-109 created the PCAOB to inspect auditors of SEC-registered companies. The establishment of the PCAOB reduces the SEC's marginal enforcement costs in two ways. First, the PCAOB is composed of audit experts and industry practitioners with specialized knowledge in regulating the audit market. The PCAOB performs annual inspections for PCAOB-registered public accounting firms and provides inspection reports. Prior studies find

that PCAOB inspections are effective at improving auditors' audit quality (Krishnan, Krishnan, and Song, 2017; Lamoreasuz, 2016). The regulatory work performed by the PCAOB reduces the SEC's burden to regulate the audit market. With the help of the PCAOB to reduce the SEC's opportunity costs, the SEC can allocate more resources to non-audit cases. Second, the SEC has oversight authority over the approval of the PCAOB's budget, while the source of the PCAOB's budget is independent of the SEC. The majority of the PCAOB's funding comes from the "accounting support fee" collected from issuers and brokers and dealers whose financial statements are audited by the PCAOB-registered public accounting firm.[9] One can consider the PCAOB's budget as an indirect increase to the SEC's budget. Expenses that should have been borne by the SEC are now covered by the PCAOB, reducing the SEC's opportunity costs of enforcement.

SOX Section 404 (SOX 404) requires large firms to file an Internal Control Report and their external auditors to attest to the accuracy of assertions made by the management. SOX 404 likely reduces the SEC's marginal enforcement costs. For example, an internal control system is similar to the "internal police" that the SEC deploys inside the firm, reducing the costs of the SEC to pursue violations against internal control weakness (e.g., Section 13(b)(2)(B) of the Exchange Act). Prior studies suggest that SOX 404 is effective in improving financial reporting quality. For example, Iliev (2010) shows that firms complying with SOX 404 exhibit fewer abnormal accruals and fewer meet-beat behaviors than those who are temporarily exempt from complying. Feng, Li, and McVay (2009) show that higher quality internal information environment due to better internal control helps managers produce more accurate management guidance. Furthermore, SOX Section 806, also known as the whistleblower-protection provision, can strengthen the protection for

[9] See https://pcaobus.org/about/accounting-support-fee for more information.

whistleblowers against retaliatory actions – which in turn increases the probability of the SEC receiving tips from whistleblowers, reducing investigation costs. Consistent with this argument, Call, Martin, Sharp, and Wilde (2018) show that the SEC responds more quickly to whistleblower tips with enforcement proceedings, and the information provided by whistleblowers allows the SEC to build a stronger case, as reflected by the large monetary penalties.

Some SOX provisions also increase the legal liability for executives. For example, SOX Section 302 on Corporate Responsibly for Financial Reports requires the CEO and CFO to review and certify all financial reports and senior executives to be responsible for the accuracy of such financial reports. This provision requires senior executives to make explicit representation regarding the accuracy of the financial statements, it makes it easier for the SEC to demonstrate a sufficient connection between violations and the firm's senior executives' involvement in such violations. Therefore, marginal costs of enforcement for the SEC to prove the senior executives' involvement in earnings management decrease.

The political sentiment against financial frauds culminated during the passage of SOX. Therefore, the political costs for SEC enforcement decreased.[10] The politician's objective to restore investor confidence by reducing the incidence of accounting fraud led them to support increased SEC enforcement, as evidenced by an increase of 39.4% in the SEC's budget from $413,989,000 in 2002 to $716,350,000 in 2003. This large increase is in stark contrast to the pre-SOX period: the budget only increases slightly by 8.4%, from $315,000,000 in 1998 to $341,574,000 in 1999, and 1.3% from $311,100,000 in 1997 to $315,000,000 in 1998. Taken

[10] In his 2003 speech on the implementation of SOX, former Commissioner Atkins said that: "Last year, in fact, the market decline and large corporate failures led to just such a general sense that politicians should 'do something.' Because these corporate failures stemmed from lax accounting and corporate governance practices, 'Corporate Responsibility' became an important political issue in the United States, for the first time in perhaps 70 years. In late July of 2002, Congress passed the Sarbanes-Oxley Act, with only three members voting 'no', since then, corporate responsibility still remains as a critically important political issue in the U.S."

together, SOX likely reduces marginal enforcement costs and increases marginal social costs, as perceived by the SEC.

3.4. SEC enforcement over time

As SOX increases the SEC's perceived social costs and reduces enforcement costs, the number of SEC enforcement activities substantially increases following SOX (Coates and Srinivasan, 2014; Cox and Thomas, 2005). Figure 1 shows the total number of enforcement actions concerning 13(b) violations over time, plotted based on the last year of violations. There are 22 SEC enforcement actions against misconduct ending in 1999. Meanwhile, the number of SEC enforcement actions increases to 57 in 2002, the year in which SOX was enacted. Partitioning the sample into large versus small firms based on the median market capitalization of all public firms in Compustat each year, we present the number of SEC enforcement actions separately for large (represented by the solid line) and small firms (represented by the dotted line) over time in Figure 2. The total number of enforcement actions is 14 in 1999 for large firms, and it jumps to 40 in 2002. In contrast, the total number of enforcement actions for small firms remains fairly stable, without exhibiting any time trend. The evidence suggests the aggregate increase in the number of enforcement activities is driven by large firms, consistent with the findings of Cox and Thomas (2005). This evidence motivates us to focus on large firms for the remaining analysis, as our structural estimation requires a shift in SEC enforcement post-SOX.

[Insert Figure 1 and Figure 2 here]

4. Descriptive Statistics

4.1. Data sources and variables

We obtain our data from three sources for the period between 1996 and 2005. First, the SEC enforcement data used in Call et al. (2018) is from the *Journal of Accounting Research* online supplements and datasheets. We further complement their data by hand collecting the beginning and the ending quarters of each misconduct by reading through the relevant SEC's complaints.[11] According to the violations end date and the initial regulatory proceeding date, we classify each case into either the pre-SOX or post-SOX period. We exclude 14 cases whose violations occurred in the pre-SOX period, but enforcement was conducted in the post-SOX period. We focus on litigations related to financial reporting, which must include a violation of one or more of the following 13(b) provisions of the Exchange Act and associated regulations:

(i) Section 13(b)(2)(a) that requires firms to "make and keep books, records, and accounts, which, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the issuer;"

(ii) Section 13(b)(2)(b) that requires firms to "devise and maintain a system of internal accounting controls sufficient to provide reasonable assurances;"

(iii) Section 13(b)(5) that prohibits firms from "knowingly circumvent or knowingly fail to implement a system of internal accounting controls or knowingly falsify any book, record, or account;"

(iv) 17 CFR Section 240.13b2-1 that states "[n]o person shall directly or indirectly, falsify or cause to be falsified, any book, record or account subject to section 13(b)(2)(A) of the Securities Exchange Act;" and

[11] The SEC's complaints filed with the federal courts can be found at the "Litigation Release- Federal Court Actions" webpage: < https://www.sec.gov/litigation/litreleases.htm> and the complaints filed with the administrative court can be found at the "Administrative Proceedings" webpage: < https://www.sec.gov/litigation/admin.htm>.

(v) 17 CFR Section 240.13b2-2 that regulates management's representations to auditors and bars certain conduct by management while preparing certain reports and documents.

Second, the data on class actions is obtained from Cornerstone Research (2009) and Stanford Law School. Lastly, we obtain the financial data from Compustat.

Table 1 presents the summary statistics of the variables used in our analysis. There are 11,719 firm-year observations in the pre-SOX period and 9,268 firm-year observations in the post-SOX period. There are 23 (122) enforcement actions against large firms with non-missing data in the pre-SOX (post-SOX) period. We also observe a significant negative market reaction to the announcement of SEC enforcement actions for both pre- and post-SOX period, although the former has a larger absolute magnitude. A possible explanation for this result is that, due to the SEC's expanded enforcement effort in the post-SOX period, firms become more compliant, and the accounting violations cases are less severe.

[Insert Table 1]

5. Structural Estimation

5.1. Construction of expected penalty

Our measure of penalties (*AbRet*) is the one-day value-weighted market-adjusted return around the initial public disclosure of the regulatory enforcement action. The one-day event window allows us to gauge the market's expectation of SEC penalties for firms receiving

regulatory enforcement actions.[12] For penalty schedules, we estimate the following Tobit regression for all firms in our sample:

$$AbRet_{ijT} = \alpha_1 + \beta_1 \mu_{ijt} + \beta_2 z_{jt} + \beta_3 PreSox_t + \exp(\alpha_2 + \beta_4 \mu_{ijt}) * \exp(DA_{ijt}) + \varepsilon_{ijt}, \quad (6)$$

where the subscripts *i*, *j* and *t* index the firm, the industry, and the year, respectively, and *T* refers to the final year of violations. For company attributes (x_{ijt}), we include firm-specific attributes (μ_{ijt}) and industry-specific characteristics (z_{jt}). Specifically, we control for firm-specific attributes including size (market capitalization), capital structure (leverage ratio), profitability (return-on-asset ratio), and growth potential (market-to-book ratio). Industry-specific characteristics (z_{jt}) can also be correlated with the level of earnings management and regulatory scrutiny. We control for the industry median of profitability (*IndROA*) and the industry median of growth (*IndMTB*). In addition, we include *ClassAction*, which is the percentage of public firms in a given two-digit SIC industry that have class-action lawsuits in a year, to capture the intensity of private enforcement. *PreSox* equals one for firms with fiscal years falling in 1996-1999 and equals zero for firms with fiscal years ending in 2002-2005. We exclude the years 2000 and 2001 to avoid salient events, such as AOL's (now Time Warner) accounting scandal in 2000 and Enron's accounting scandal in 2001, which might have changed the SEC's enforcement preferences (i.e., marginal social costs).[13] Lastly, *DA* is the abnormal accruals computed based on Equation (7), as

[12] Our empirical measure of the SEC's expected penalties is calculated based on the market's assessment of e(a). It is a valid measure for our model for two reasons. First, the expected penalties capture equity investors' expected costs imposed on the firm by the SEC, and the firm will bear such penalties only when it is involved in an SEC enforcement action. In other words, as long as the penalties do not capture the costs borne by parties other than the firm, this measure is valid. Second, the SEC needs to have control over the expected penalties. One may argue that the market reaction contains collateral consequences and damages, such as reputation damage or operating loss due to the loss of major customers. Even though those are indirect penalties, it is reasonable to assume that the SEC can form a rational expectation of penalties. Therefore, the indirect penalties are still under the control of the SEC.

[13] A number of high-profile accounting scandals occurred between 2000 and 2002 such as Xerox, WorldCom, Rite Aid, and Sunbeam. Even though this period is before the enactment of SOX in 2002, it is possible that public attention on those accounting scandals already changed the parameters of the SEC's enforcement preference before SOX was officially enacted in 2002.

we explain in the next section. For the estimation of penalty schedules, we include the exponential terms of firm-specific attributes (μ_{ijt}) to allow for heterogeneity in the effect of earnings management on enforcement and also to ensure that the coefficients are positive. The exponential term of *DA* can capture the concave relationship between enforcement and earnings management. Appendix A provides a detailed description of each variable. We construct the expected penalty ($(e(a))$) using the estimates from Equation (6) for each company at various levels of earnings management for both pre- and post-SOX. This variable serves as the input for our structural estimation. Appendix B shows the results from estimating Equation (6) to obtain penalty schedules.

5.2. Measure of earnings management

Following prior studies, we use unsigned abnormal accruals computed from the Jones (1994) model to capture the level of earnings management. We use unsigned abnormal accruals rather than income-increasing abnormal accruals alone because managers sometimes have incentives to manage earnings downward (McAnally, Srivastava, and Weaver, 2008; Gong, Louis, and Sun, 2008; Coles, Hertzel, and Kalpathy, 2006). In addition, managers may strategically use "cookie jar" reserves to smooth earnings, which may involve both income-increasing and income-decreasing accruals in time series. For example, the SEC brought enforcement actions against Xerox and Microsoft in 2002 due to their cookie jar accounting practices. Indeed, Dechow et al. (2011) find that unsigned accruals are significantly higher for AAER firms during misstating years than non-misstating years. Abnormal accruals are computed by estimating the following model for each two-digit SIC-year grouping:

$$\frac{TA_{it}}{Assets_{it-1}} = \beta_1 \frac{1}{Assets_{it-1}} + \beta_2 \frac{\Delta Sales_{it}}{Assets_{it-1}} + \beta_3 \frac{PPE_{it}}{Assets_{it-1}} + \varepsilon_{it}, \qquad (7)$$

where *TA* represents the total assets, *ΔSales* represents the change in sales from the prior year, and *PPE* represents the gross value of property, plant, and equipment. Next, the coefficient estimates obtained from Equation (7) are used to estimate the firm-specific normal accruals. Lastly, the absolute value of the difference between the actual *TA* and the estimated normal accruals is the abnormal accruals (*DA*), which is used to capture the level of earnings management, with higher values representing more frequent earnings management.

5.3. Estimation of earnings management distribution

We assume that abnormal accruals (*DA*), the earnings management level, follow an exponential distribution[14] with the mean (μ) given by:

$$\mu(DA)_{ijt} = \beta_1 \mu_{ijt} + \beta_2 z_{jt} + \beta_3 PreSox_t + \beta_4 Time_t + \beta_5 PreSox_t * Time_t. \quad (8)$$

We estimate the parameters of Equation (8) by MLE using the data from the pre-SOX period (1996-1999) and post-SOX period (2002-2005). Both firm-specific variables (μ_{ijt}) and industry characteristics (z_{jt}) variables are used to estimate the distribution of abnormal accruals (*DA*).

In addition, we include *Time* and *PreSox*Time* to detrend abnormal accruals because there is an upward trend in *DA* before SOX, as shown in Figure 3.[15] *Time* equals the difference between a given fiscal year and 1999 (i.e., the last year of pre-SOX) for the pre-SOX period and the difference between a given fiscal year and 2002 (i.e., the first year of post-SOX) for the post-SOX period. *PreSox*Time* is the interaction between *PreSox* and *Time.*

[Insert Figure 3]

[14] We assume that the distribution of unsigned abnormal accruals follows an exponential distribution because (1) all of the unsigned abnormal accruals are positive and (2) the histogram generated from raw data resembles an exponential distribution. Specifically, the frequency of smaller values (i.e., less severe earnings management) is much higher than that of greater values (i.e., more severe earnings management).

[15] The steady upward trend is also observed in prior studies, such as Cohen et al. (2008).

5.4. Estimation of model primitives

The estimation of model primitives follows the identification strategy discussed in the previous section. The model primitives for any given observables $x_{i,t}$ are the distribution of company types $F(.|x_{i,t})$, the derivative of company benefit function $b'(.|x_{i,t})$, and the SEC's perceived marginal social cost $\gamma_{pre}(x_{i,t})$, $\gamma_{post}(x_{i,t})$ and SEC's marginal enforcement cost $\psi_{pre}(x_{i,t})$, $\psi_{post}(x_{i,t})$. This step takes the estimated earnings management distribution and expected penalty (i.e., penalty schedule) as inputs. We recover the model primitives separately for each company pre and post SOX. For detailed steps of the estimation, see Appendix C in KS.

6. Results

6.1. Model fit

We present the estimated model fit in Table 2. In Panel A, we first compare the cumulative distribution of abnormal accruals (*DA*) as observed in the data with those estimated by the fitted model for each range of *DA*. The estimated model fits the data well for both pre-SOX and post-SOX period, as evidenced by the small differences between the two. The average penalties estimated by the fitted model also have a good fit for the data. In Panel B, we further compare the average penalties predicted by the first-stage estimates (i.e., data) with those estimated by the fitted model for each range of *DA* and find the model performs well again. In summary, the evidence provides confidence in the model fit.

[Insert Table 2]

6.2. Estimated model primitives

Table 3 shows the summary statistics of the estimates of the regulator preference parameters (ψ and γ) and the marginal benefits of earnings management.[16] The benefits of earnings management consist of managers' private benefits net of the expected penalties. In our model setup, each firm has a distribution of types – and the benefits of earnings management are specified as the product of the firm's type and the baseline function $b(a)$, evaluated at the endogenous earnings management level a. For expositional simplicity, we report the firm benefits for the median firm type, given an earnings management level equal to the median value across all firms in the pre-SOX period ($\bar{a}$ =0.046).[17] These median benefits are measured in the same unit as the penalties (*AbRet*).

Marginal enforcement costs (ψ) capture how much the SEC needs to "pay" to issue a penalty that equals one (in the unit of *AbRet*), which is 100% of the firms' market value (i.e., market capitalization). To minimize the overall enforcement costs, we expect that a higher ψ will reduce the SEC's enforcement intensity *ceteris paribus*. Table 3 shows that ψ decreases by 42% from 0.554 before SOX to 0.324 after SOX. This evidence is consistent with our argument that SOX represents the culmination of political concerns due to a series of accounting scandals; the resulting political pressure for stronger enforcement and a larger SEC budget likely reduce ψ.[18] The decrease in marginal enforcement costs is also consistent with the observed increase in enforcement intensity post-SOX, as shown in Figure 1. Furthermore, the decrease in marginal

[16] We compute the model primitives for each of the 3,039 firms active in 1997.

[17] The median value of earnings management ($\bar{a}$ =0.046) is comparable to prior studies. For example, the "ExecuComp Sample" in Cohen et al. (2008), which consists of S&P 1500 firms (i.e., large firms) has an average of 0.07 and a median of 0.04 for abnormal accruals from 1992 to 2005.

[18] A larger budget allows the SEC to hire more employees. In a testimony on the implementation of SOX, Chairman Donaldson said that he planned to use part of the funds to hire 842 new employees. As a result, the average number of employees at the SEC increases by 22% from 2,770 in the pre-SOX period to 3,367 in the post-SOX period. See https://www.sec.gov/foia/docs/fulltimes.htm.

enforcement costs is reflected by the increase in the number of filings reviewed by the Division of Corporation Finance, which increases by 17% from 2,550 in 1999 to 2,975 in 2003.

Lastly, marginal social costs of earnings management (γ) are the damage perceived by the SEC if the firm increases earnings management (*DA*) by one unit. To minimize the damages of earnings management to the capital markets, we expect that a higher γ will increase the SEC's enforcement intensity. Table 3 shows a significant increase in γ (233%) from 0.003 in the pre-SOX period to 0.010 in the post-SOX period, again consistent with our argument that SOX increases the regulator's perceived social costs. Overall, our estimates thus rationalize the observed increase in enforcement intensity post-SOX and support the argument that SOX decreases marginal enforcement costs and increases marginal social costs.

To illustrate the three cost components of the SEC, we use a firm with a median market capitalization of $668 million (firm A) and a firm with a large market capitalization of $89 billion (firm B) as examples. In the pre-SOX period, firm A's total assets are $154 million.[19] Evaluated at the median value of abnormal accruals ($\bar{a}$ =0.046), Firm A obtains benefits of 0.354% of the market capitalization ($2.36 million). Meanwhile, the estimated ψ and γ are 0.365 and 0.001, respectively. The expected penalties from managing earnings are 0.001% of the market capitalization. The SEC incurs $0.003 million to impose the penalties and bears corresponding social costs of $0.005 million.

Now we turn our attention to firm B, which has total assets of $45 billion in the pre-SOX period.[20] Setting its abnormal accruals at the median value ($\bar{a}$ =0.046), its benefits are 0.188% of the market capitalization, a lower ratio than that of firm A. The estimated ψ and γ of firm B are

[19] Firm A's *Lev* is 0, *MTB* is 5.116, *ROA* is 0.433, *Ind_MTB* is 2.073, *Ind_ROA* is 0.134, and *ClassAction* is 0.019.
[20] Firm B's *Lev* is 0.273, *MTB* is 4.822, *ROA* is 0.161, *Ind_MTB* is 1.898, *Ind_ROA* is 0.121, and *ClassAction* is 0.026.

0.651 and 0.011, respectively, which are both greater than those of firm A. The expected penalties of firm B are 0.011% of the total market capitalization, and the SEC incurs $6 million to impose the penalties. The social costs of firm B managing earnings at the median level of abnormal accruals are $24 million. Overall, our model estimates of the three cost components demonstrate significant heterogeneity in the cross-section.

[Insert Table 3]

6.3. The determinants of regulator preferences

Based on the estimated SEC preferences (ψ and γ) and marginal firm benefits, we investigate how and to what extent these estimates vary with firm and industry characteristics in the cross-section. Table 4 shows results from the OLS regressions of the logarithm of the estimated ψ (columns (1)), γ (columns (2)), and marginal firm benefits of earnings management (columns (3)) for the pre-SOX period in Panel A and the post-SOX period in Panel B, respectively.

We first focus on firm size because prior studies show mixed evidence regarding the SEC's enforcement against large firms. On the one hand, Kedia and Rajgopal (2011) argue that there is a "perception that the SEC is more likely to target large firms" and find consistent evidence that Fortune 500 firms are more likely to be targeted because of their high visibility. On the other hand, Bonsall, Holzman, and Miller (2021) find that the SEC is less likely to enforce against large firms when facing resource constraints. Columns (1) shows positive coefficients on *Size*, suggesting that the SEC bears higher marginal enforcement costs (ψ) when taking actions against large firms. This result is consistent with findings from prior literature (e.g., Bonsall et al., 2021) that the SEC faces both higher administrative costs and political costs when enforcing against large firms. First, large firms tend to be more complex and have more dispersed geographical locations; therefore, it is

costlier to investigate these firms (Bonsall et al., 2021). Second, large firms are likely to engage in more lobbying activities and, consequently, the political costs associated with enforcement actions against them are higher (Correia, 2014; Heese, 2019; Mehta and Zhao, 2020).

In columns (2), we observe positive coefficients on *Size*, indicating higher marginal social costs (γ) for large firms. These results are consistent with the argument in Kedia and Rajgopal (2011), suggesting that large firms typically play an important role in economic activities (e.g., employ more workers and attract more investors), and their financial well-being and misconduct are more consequential to the capital markets. Columns (3) show significantly negative coefficients on *Size*, implying that managers of large firms extract lower benefits from earnings management. The lower benefits for large firms are possibly due to better monitoring and more effective corporate governance mechanisms by the boards of directors (Gompers, Ishii, and Metrick, 2003).

Collectively, the findings above suggest that the relationship between firm size and enforcement standards is complex. On the one hand, the positive relation between *Size* and marginal enforcement costs implies a lower level of enforcement against large firms. On the other hand, the positive (negative) relation between *Size* and marginal social costs of earnings management (firm benefits of earnings management) implies a higher level of enforcement against large firms. Ultimately, the relation between firm size and the SEC enforcement intensity depends on the relative dominance of enforcement costs vs. social costs and firm benefits of earnings management. Our findings offer a plausible explanation for the mixed evidence documented in prior research.

We next examine the relation between private enforcement and public enforcement. Prior literature provides mixed evidence on the relation between the two. For example, Jackson and Roe

(2009) show that private enforcement and public enforcement are complementary, while La Porta et al. (2006) suggest that they are substitutes. To contribute to this stream of literature, we specifically examine how the level of class actions in an industry is associated with the marginal enforcement costs and the marginal social costs faced by the SEC. The significantly negative coefficients on *ClassAction* in columns (1) indicates that a higher level of class actions in an industry decreases with the SEC's enforcement costs (ψ), and a lower level of enforcement costs is associated with a higher level of SEC enforcement. One possible explanation is that a high level of class actions reduces the marginal enforcement costs of the SEC by reducing administrative costs because the burden of proof has been satisfied in the shareholder class actions. However, it is also plausible that lawmakers might consider shareholder class action lawsuits as a substitute to the SEC's public enforcement, and therefore, the SEC can bear a higher political cost, namely a higher ψ, in the presence of intensive private enforcement. Our finding suggests that the former dominates the latter for an average firm.

In columns (2), we observe positive coefficients on *ClassAction*, implying higher marginal social costs of earnings management for industries with a higher level of class actions – which, thereby, increases the level of SEC enforcement. One plausible explanation for this result is that active private enforcement might reflect stronger investor discontent with firms' financial information quality, and the SEC's preferences factor in this negative sentiment. In column (3), the positive coefficients on *ClassAction* suggest a higher level of SEC enforcement for industries with a higher level of class actions. Ultimately, the relation between *ClassAction* and the SEC enforcement intensity depends on the relative dominance of enforcement costs and social costs vs. firm benefits of earnings management.

[Insert Table 4]

7. Counterfactual Analyses

7.1. Homogenizing regulator preferences

One key advantage of our structural approach is to consider the economic impact of counterfactual policies. As evidenced from Table 4, there is significant cross-sectional heterogeneity in the SEC's preferences, marginal social cost, and marginal enforcement cost. We start by assessing how much the heterogeneity of the regulator's preferences contributes to the disparities in enforcement intensity across different firms. With this intent, we examine a counterfactual scenario that homogenizes the SEC's perceived marginal enforcement costs and the social costs of each firm to a fixed value. We set the two types of costs to the median value of the original costs recovered by the structural estimation. As a result, the remaining variation in penalties can be solely attributed to the heterogeneity in firm benefits of earnings management. We refer to this scenario as the "median regulator."

Table 5 shows the changes from the baseline scenario to the homogenous preferences scenario, in the mean and the standard deviation of earnings management and expected penalties. We measure changes in expected penalties in terms of percentage points of firms' market value. To facilitate the comparison of the penalty schedules across facilities, we report the expected penalties conditional on the level of abnormal accruals equals to the median in the pre-SOX period ($\bar{a}$ = 0.046). Rows (1) of Table 5 show significant declines in the mean and standard deviation of the expected penalties. The change in the standard deviation of penalties is -0.0017 (-0.0080) in the pre-SOX (post-SOX) period. Divided by the expected penalties in the baseline scenario, the decline accounts for 76% and 75% of the baseline standard deviations in the pre- and post-SOX

periods, respectively.[21] These results suggest that the heterogeneity in SEC preferences contributes significantly to the observed disparities in penalties.

7.2. One-size-fits-all policy

The failure of the SEC to prevent damaging financial misconduct has generated significant negative sentiments. Media, politicians, and legal scholars have long criticized the SEC for favoring certain groups of market participants (New York Times, Feb 24, 2015; Stein, May 4, 2015). The criticism warrants an assessment of the merit of the SEC's discretionary enforcement. To this end, we conduct a counterfactual analysis under a uniform penalty schedule, where the SEC imposes the same penalty schedule across all firms while maintaining heterogeneous preferences.[22] As rows (2) of Table 5 show, firms under the uniform policy on average bear more penalties. The change is 0.0386 and 0.7500 in the pre- and post-SOX period, respectively, thus resulting in significantly more enforcement costs. Moreover, we observe a higher level of earnings management under the uniform penalty policy, even though the difference is not significant with bootstrap standard errors. Therefore, restricting the SEC's enforcement discretion in penalty schedules can lead to worse outcomes, which provides the rationale for implementing size-based regulations and risk-based models.[23]

[Insert Table 5]

[21] The standard deviation of expected penalties in the baseline scenario is 0.0022 in the pre-SOX period and 0.0107 in the post-SOX period.
[22] Online Appendix D.1. of KS provides further details on the implementation of the counterfactual analysis under a uniform penalty schedule.
[23] For example, SOX requires the SEC to review firm filings at least once every three years. The SEC applies a risk-based model to select companies for review.

7.2.1. Additional Analysis of One-Size-Fits-All Policy

In the previous section, our counterfactual analyses suggest that the one-size-fits-all policy yields worse outcomes as it increases enforcement costs significantly. In this section, to illuminate the sources of these undesirable effects, we analyze how the counterfactual outcomes vary in the cross-section. As shown in Table 4, earnings management by larger firms generates higher marginal social costs, higher marginal enforcement costs, and lower benefits than those generated by earnings management in the same level by small firms. Since the SEC aims to minimize the overall costs, higher marginal enforcement costs incentivize it to reduce enforcement, whereas higher social costs and lower firm benefits of earnings management induce it to strengthen enforcement against large firms. Therefore, it is ex ante unclear whether large firms or small firms are disproportionally affected by the removal of the SEC's discretion. Table 6 presents the results of this analysis. The dependent variable is coded as a dummy variable, indicating whether the expected level of earnings management (columns (1)) or the level of enforcement (columns (2)) would increase. The positive coefficients on *Size* in columns (2) suggest that the increase in SEC enforcement under the uniform penalty relative to the baseline is more pronounced for large firms. This inference holds for both pre- and post-SOX in Panels A and B, respectively.

As to earnings management, the negative coefficient on *Size* in Panel A column (1) implies that the increase in earnings management under the uniform policy is less pronounced for large firms in the pre-SOX period. Meanwhile, the positive coefficient on *Size* in Panel B column (1) suggests that the increase in earnings management under the uniform policy is more pronounced for large firms in the post-SOX period. Given the significant decrease in marginal enforcement costs and a significant increase in marginal social costs after SOX, marginal penalties of earnings management increase for large firms in the baseline scenario after SOX. Thus, removing regulatory

discretion in the post-SOX period generates a higher level of decrease in marginal penalties of earnings management for large firms, leading to a higher level of earnings management under the uniform policy in the post-SOX period. This result is also consistent with findings in prior research (e.g., Cohen et al., 2008; Bertomeu et al., 2021) that the level of financial reporting quality improves after SOX. In short, our evidence indicates large firms contribute a large share of worse outcomes under the one-size-fits-all policy in the post-SOX period.

[Insert Table 6]

7.3. Relative importance of social and enforcement costs

In this section, we examine the relative importance of social and enforcement costs in determining the level of penalties and violations. The results from this exercise can shed light on the extent to which the regulator's preferences affect the penalty costs and accounting violations.

We start by increasing marginal enforcement costs by 10% of the baseline value. Results in row (3) Table 5 show that the change in the level of expected penalties is -0.0003, which is 8.6% of the expected penalties in the baseline scenario. Meanwhile, the level of earnings management increases by 0.0006, which is 0.7% of the level of earnings management in the baseline.[24] Conversely, for a 10% decrease in marginal enforcement costs, the level of expected penalties increases by 0.0002, which is 6.0 % of the expected penalties in the baseline scenario and the level of earnings management decreases by 0.0006, which is 0.8% of the level of earnings management in the baseline. These results suggest that earnings management is relatively inelastic to marginal

[24] The level of expected penalties in the baseline scenario is 0.0037 and 0.0166 in the pre- and post-SOX period, respectively. The level of earnings management in the baseline scenario is 0.0760 (0.0648) in the pre-SOX (post-SOX) period.

enforcement costs. Therefore, it challenges the efficacy of raising the SEC budget to reduce financial misconduct.

Next, we turn to marginal social costs of earnings management by increasing and decreasing them by 10% of the baseline value. The results in rows (5) and (6) show that penalties and earnings management are more sensitive to changes in social costs than to changes in enforcement costs. Specifically, there is an increase in the level of expected penalties by 0.0002, which is 6.7 % of the baseline scenario and a decrease in earnings management by 0.0008, which is 1.0% of the expected penalties in the baseline scenario for a 10% increase in marginal social costs in the pre-SOX period. Similarly, the magnitude of the decrease in the penalty (-0.0004) and the magnitude of the increase in earnings management (0.0009) are both greater when the social costs decrease by 10%, compared to a 10% increase in the enforcement costs.

Given the significant sensitivity of earnings management and penalties to marginal social costs of violations, it is conceivable that any miscalculation of the cost can have a significant economic consequence. Since social costs represent the SEC's perceived costs, attempts to comprehensively and accurately quantify such costs can improve the efficiency of public enforcement. One example is that the SEC may hire economists to conduct sophisticated and data-driven analyses to gain a better understanding of the costs and benefits of its regulatory decisions. In 2009, the SEC created the Division of Risk, Strategy, and Financial Innovation, which is comprised of 24 economists, that assist in the provision of economic analysis for SEC rules and enforcement. Another example is that the SEC may rely on academic research in its rulemaking process. Geoffroy and Lee (2021) show that the SEC's proposed regulations receive fewer negative comment letters when the SEC incorporates academic research in its proposed rules.

8. Conclusion

This study examines the objective function of the SEC in enforcing securities laws against firms' earnings management. Using SOX as a shock to the SEC's enforcement intensity, we employ structural estimations to recover the objective function of both firm managers and the SEC. In our model, we focus on three components of the SEC's perceived cost function: (1) social costs, (2) the SEC's enforcement costs, and (3) managers' expected benefits of earnings management. The counterfactual analyses deliver three novel insights. First, the heterogeneity in the SEC's preferences (marginal enforcement costs and marginal social costs) is the primary source for explaining the observed discretion in enforcement penalties. Second, imposing the one-size-fits-all policy in the penalty schedule generates less desirable outcomes, as evidenced by a tenfold increase in enforcement costs with little impact on earnings management. Third, financial misconduct is less sensitive to the changes in marginal enforcement costs, relative to the changes in marginal social costs.

Collectively, our study highlights that regulatory intervention of removing the SEC's discretion in enforcement can lead to undesirable outcomes, and thus, informs the policy debate of whether financial regulators should be granted discretion. Our findings also shed light on the efficacy of expanding the SEC's budget in financial fraud prevention. Finally, as our framework does not allow us to estimate the preferences of a social planner, we caution readers not to make inferences about social welfare based on our findings.

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Appendix A: Variable Definitions

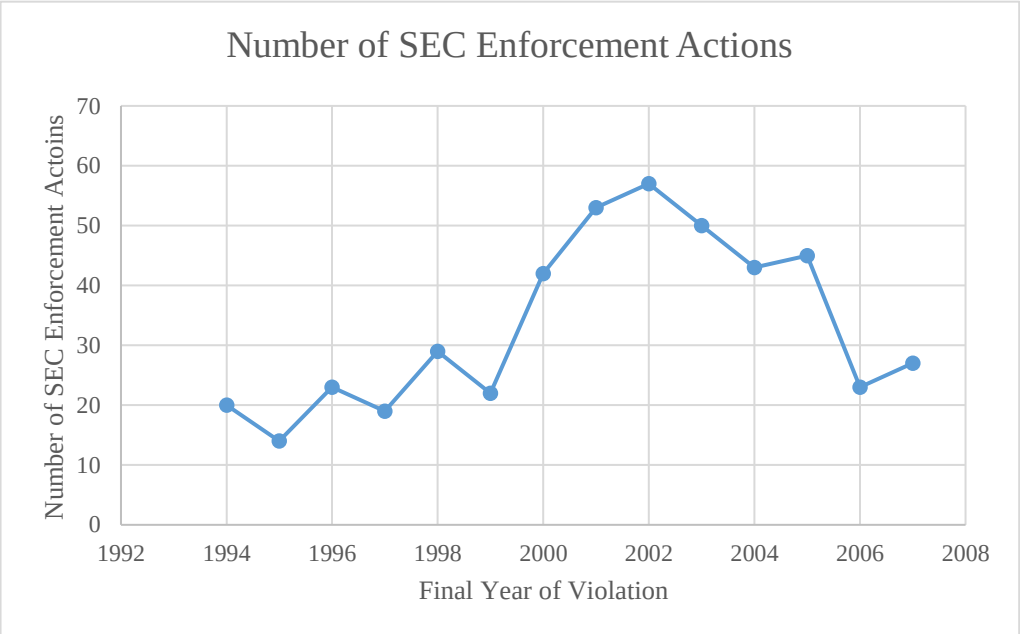
Variable	Definition
Firm Control Variables	
Lev	Long-term debt divided by total assets.
Loss	An indicator variable set to one if net income is less than zero.
MTB	Market value of equity divided by book value of equity.
ROA	Income before extraordinary items divided by total assets in the prior year.
Size	Natural log of market capitalization.
Industry Control Variables	
ClassAction	The number of class actions in each two-digit SIC-year divided by the total number of public firms in each two-digit SIC-year
Ind_MTB	Industry median of *MTB* based on 2-digit SIC
Ind_ROA	Industry median of *ROA* based on 2-digit SIC

Appendix B: Tobit Estimation of Penalty Schedule

	(1) Linear Terms		(2) Exponential Terms	
VARIABLES	*-AbRet*			
Lev	0.029		-0.034	
	[-0.074	0.14]	[-0.451	0.67]
MTB	-0.007		0.007	
	[-0.017	-0.001]	[-0.357	0.068]
Size	0.042		0.026	
	[0.018	0.122]	[-3.639	0.098]
ROA	0.291		-1.634	
	[-0.289	0.498]	[-4.005	0.757]
Loss	0.745		-20.766	
	[0.126	1.034]	[-24.98	-0.106]
Ind_MTB	0.017			
	[-0.019	0.056]		
Ind_ROA	0.515			
	[-0.548	1.242]		
ClassAction	1.123			
	[-0.359	2.441]		
PreSOX	-0.279			
	[-0.354	-0.229]		
Constant	-2.119		-0.709	
	[-2.641	-1.47]	[-5.432	1.482]
Log likelihood	-699.3			
Observations	20,987			

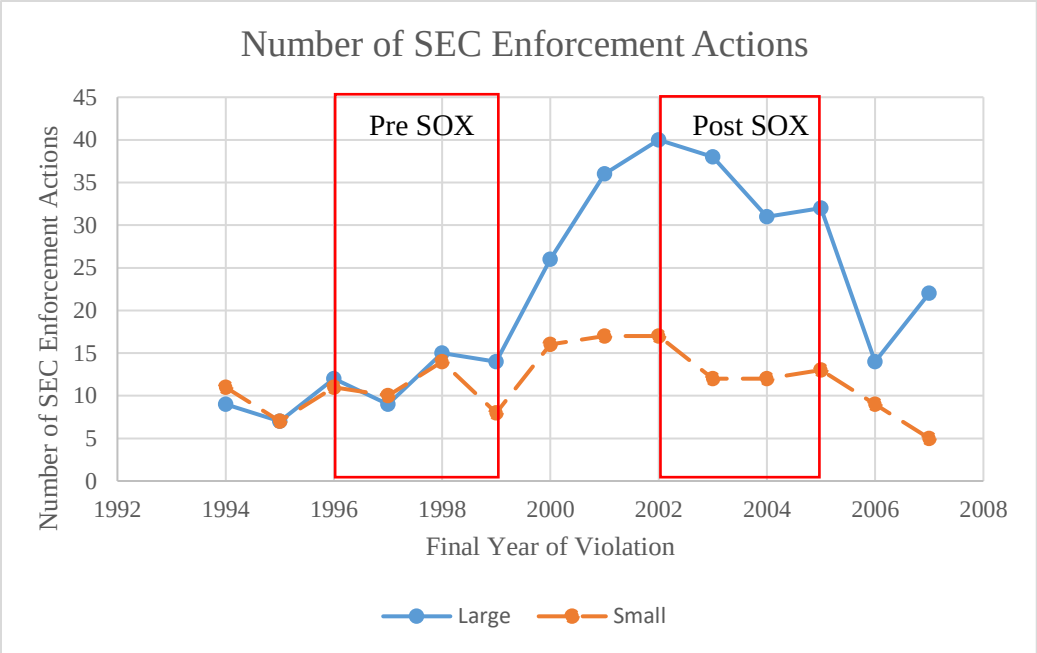
This table presents the Tobit estimation of equation (7). The regression is estimated for 20,987 firm-year observations before and after SOX. The dependent variable, *AbRet*, is multiplied by -1 to present penalties as a positive number. Bootstrap 90% confidence intervals are presented in brackets.

Figure 1: Number of SEC Enforcement Actions over Time



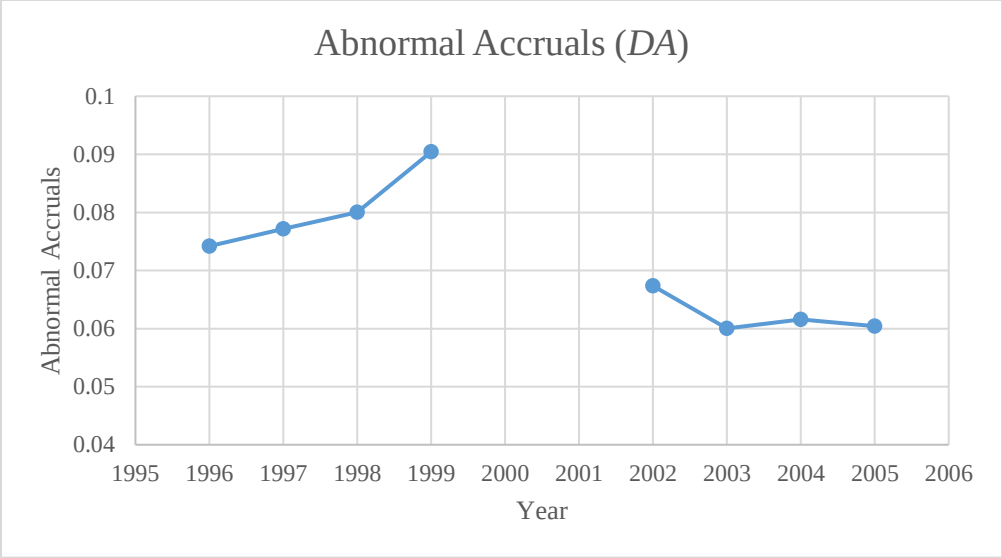
This figure shows the total number of SEC enforcement concerning 13(b) violations from 1994 to 2007, plotted based on the final year of violation. The pre-SOX period is 1996 to 1999, and the post-SOX period is 2002 to 2005.

Figure 2: Number of SEC Enforcement Actions over Time for Large and Small Firms



This figure shows the number of SEC enforcement concerning 13(b) violations for large and small firms from 1994 to 2007, plotted based on the final year of violation. Large firms are represented by the solid line, and small firms are represented by the dotted line. The pre-SOX period is 1996 to 1999, and the post-SOX period is 2002 to 2005.

Figure 3: Abnormal Accruals (*DA)*



This figure plots the time series of the average value of abnormal accruals (*DA*) for the pre-SOX period (1996-1999) and post-SOX period (2002-2005). *DA* is computed using the Jones (1994) model estimated for each two-digit SIC-year grouping.

Table 1. Descriptive Statistics

	Pre-SOX (1996-1999)				Post-SOX (2002-2005)			
Variables	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.
DA	11,719	0.081	0.049	0.100	9,268	0.063	0.043	0.074
Lev	11,719	0.315	0.250	0.325	9,268	0.262	0.227	0.255
MTB	11,719	3.874	2.565	4.991	9,268	3.128	2.300	3.849
TA	11,719	3,365	650	8,539	9,268	6,546	1,515	12,645
MktCap	11,719	3,385	666	8,376	9,268	5,583	1,480	10,674
Size	11,719	6.814	6.501	1.445	9,268	7.563	7.300	1.368
ROA	11,719	0.135	0.146	0.149	9,268	0.129	0.127	0.118
Loss	11,719	0.192	0.000	0.394	9,268	0.186	0.000	0.389
Ind_ROA	11,719	0.107	0.118	0.036	9,268	0.093	0.099	0.042
Ind_MTB	11,719	2.100	1.898	0.608	9,268	1.993	1.916	0.587
ClassAction	11,719	0.021	0.022	0.013	9,268	0.033	0.031	0.020
AbRet	23	-0.116	-0.059	0.156	122	-0.068	-0.017	0.117

This table provides descriptive statistics for variables used in the analyses for both the pre-SOX period and post-SOX period. *DA* represents the unsigned abnormal accruals computed using the Jones (1994) model presented in equation (5). *TA* is total assets, expressed in millions. *MktCap* is market capitalization expressed in millions. *AbRet* is the value-weighted market-adjusted return, computed based on 23 SEC enforcement actions in the pre-SOX period and 122 SEC enforcement actions in the post-SOX period. Firm and industry control variables are defined in Appendix A. All variables are winsorized at the 1% and 99% levels.

Table 2. Model Fit

Panel A: Model Fit for *DA* and Penalties

	Pre-SOX		Post-SOX	
	Data	Model	Data	Model
DA				
(0,0.01]	12.279%	12.580%	12.387%	14.610%
(0,0.02]	23.782%	23.660%	25.281%	27.130%
(0,0.03]	34.047%	33.250%	36.729%	37.680%
(0,0.04]	42.930%	41.540%	47.076%	46.610%
(0,0.05]	50.508%	48.720%	56.193%	54.150%
(0,0.06]	56.976%	54.970%	63.088%	60.550%
Penalties				
Average Penalties	0.023%	0.017%	0.089%	0.086%

This table presents the cumulative distributions of abnormal accruals (*DA*) and average penalties, as observed in the data and estimated by the fitted model. The data consists of firm-year observations in the pre-SOX period and the post-SOX period.

Panel B: Model Fit for Penalties with Respect to *DA*

		Pre-SOX		Post-SOX	
DA		Penalties			
		Data	Model	Data	Model
0.010	0.030]	0.001%	0.001%	0.010%	0.010%
(0.030	0.094]	0.003%	0.003%	0.020%	0.020%
(0.094	0.150]	0.007%	0.007%	0.040%	0.040%
(0.150	0.342]	0.021%	0.020%	0.110%	0.100%

This table presents the average penalties for each range of *DA*, as predicted by the first-stage estimates (i.e., data) and as predicted by the fitted model (i.e., model). The data consists of firm-year observations in the pre-SOX period and the post-SOX period. For each bin, we present the average penalties estimated using 1997 for the pre-SOX period and 2003 for the post-SOX period.

Table 3. Model Primitive Estimates: Summary Statistics

	Median	p25	p75
Firm Primitives			
Marginal benefits of earnings management			
Pre-SOX	0.007	0.003	0.019
	[0.000 0.144]	[0.000 0.027]	[0.000 0.756]
Post-SOX	0.017	0.007	0.043
	[0.000 0.399]	[0.000 0.071]	[0.000 2.062]
Regulator Primitives			
Marginal enforcement costs (ψ)			
Pre-SOX	0.554	0.435	0.622
	[0.051 1.011]	[0.045 0.867]	[0.060 1.167]
Post-SOX	0.324	0.257	0.375
	[0.046 0.558]	[0.041 0.472]	[0.054 0.608]
Difference before and after SOX	-0.230	-0.178	-0.247
	[-0.488 -0.005]	[-0.364 -0.005]	[-0.593 -0.006]
Marginal social cost (γ)			
Pre-SOX	0.003	0.001	0.005
	[0.000 0.009]	[0.000 0.005]	[0.000 0.012]
Post-SOX	0.010	0.006	0.016
	[0.000 0.022]	[0.000 0.012]	[0.000 0.032]
Difference before and after SOX	0.007	0.004	0.011
	[0.000 0.014]	[0.000 0.010]	[0.000 0.020]

This table provides the summary statistics of marginal benefits of earnings management estimated at the median value of earnings management, marginal enforcement costs (ψ), and marginal social costs (γ) for both the pre-SOX and post-SOX periods. Bootstrap 90% confidence intervals are presented in brackets.

Table 4. Explaining Benefits of Earnings Management and SEC Preferences
Panel A: Pre-SOX

VARIABLES	(1) log(ψ)	(2) log(γ)	(3) log(*Benefit*)
Lev	0.000	0.355***	2.077***
	(0.017)	(12.263)	(72.650)
	[-0.256 0.383]	[-0.427 1.306]	[1.313 8.833]
MTB	0.001	-0.010	0.191***
	(0.557)	(-1.124)	(29.485)
	[-0.018 0.042]	[-0.453 0.084]	[-0.181 1.322]
Size	0.036***	0.307***	-0.549***
	(20.896)	(73.963)	(-62.700)
	[-0.272 0.134]	[-3.326 0.439]	[-4.131 -0.341]
ROA	-0.820***	-2.835***	-1.205***
	(-13.424)	(-7.207)	(-5.317)
	[-1.271 0.446]	[-4.624 1.486]	[-4.049 5.968]
Loss	-2.388***	-20.980***	-19.473***
	(-188.273)	(-378.527)	(-395.376)
	[-3.176 0.100]	[-24.890 1.459]	[-25.527 2.781]
Ind_MTB	-0.085***	-0.032	0.809***
	(-10.708)	(-1.249)	(32.925)
	[-0.130 0.029]	[-0.186 0.241]	[-0.327 1.086]
Ind_ROA	0.007	1.038***	-12.944***
	(0.072)	(3.654)	(-53.691)
	[-1.862 1.666]	[-4.564 6.065]	[-40.255 -8.650]
ClassAction	-1.866***	6.344***	13.379***
	(-7.050)	(7.628)	(20.006)
	[-3.250 -0.489]	[-2.525 14.096]	[-37.610 18.809]
Constant	-0.456***	-7.530***	-2.246***
	(-18.577)	(-114.735)	(-24.706)
	[-3.746 1.116]	[-13.645 -3.035]	[-8.950 12.632]
R-squared	0.976	0.996	0.996

This panel presents the OLS regressions of the logarithm of marginal benefits of earnings management estimated at the median value of earnings management (*Benefit*), marginal enforcement costs (ψ), and marginal social costs (γ) on firm and industry attributes in the pre-SOX period. The regressions are estimated for each of the 3,039 firms active in 1997. *t*-statistics based on robust standard errors are reported in parentheses. Bootstrap 90% confidence intervals are presented in brackets. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, on a two-tailed basis using robust standard errors.

Panel B: Post-SOX

VARIABLES	(1) log(ψ)	(2) log(γ)	(3) log(*Benefit*)
Lev	-0.054***	0.252***	1.909***
	(-4.127)	(10.120)	(70.771)
	[-0.248 0.167]	[-0.440 1.109]	[1.253 3.869]
MTB	-0.003**	-0.009	0.183***
	(-1.974)	(-1.031)	(28.382)
	[-0.019 0.025]	[-0.439 0.072]	[-0.177 0.494]
Size	0.066***	0.277***	-0.536***
	(40.205)	(84.971)	(-63.395)
	[-0.180 0.138]	[-3.383 0.388]	[-4.092 -0.338]
ROA	-0.757***	-2.628***	-1.155***
	(-14.299)	(-6.933)	(-5.211)
	[-1.066 0.131]	[-4.320 1.143]	[-3.665 3.059]
Loss	-1.948***	-20.696***	-19.269***
	(-169.132)	(-399.421)	(-409.409)
	[-2.329 0.025]	[-24.458 1.192]	[-23.915 2.527]
Ind_MTB	-0.095***	-0.028	0.788***
	(-12.478)	(-1.265)	(34.636)
	[-0.128 0.006]	[-0.164 0.188]	[0.519 1.044]
Ind_ROA	0.569***	1.193***	-12.169***
	(5.787)	(5.066)	(-56.503)
	[-0.235 1.774]	[-3.419 5.320]	[-21.608 -8.270]
ClassAction	-2.277***	5.007***	11.958***
	(-9.220)	(6.971)	(19.763)
	[-3.112 -0.755]	[-2.159 12.208]	[2.031 17.221]
Constant	-1.198***	-6.097***	-1.435***
	(-52.037)	(-114.319)	(-16.464)
	[-3.859 -0.046]	[-11.684 -1.943]	[-7.643 5.995]
Adjusted R-squared	0.976	0.996	0.996

This panel presents the OLS regressions of the logarithm of marginal benefits of earnings management estimated at the median value of earnings management (*Benefit*), marginal enforcement costs (ψ), and marginal social costs (γ) on firm and industry attributes in the post-SOX period. The regressions are estimated for each of the 3,039 firms active in 1997. *t* -statistics based on robust standard errors are reported in parentheses. Bootstrap 90% confidence intervals are presented in brackets. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, on a two-tailed basis using robust standard error

Table 5. Counterfactual Analyses

Panel A: Pre-SOX

	Earnings Management		Penalties (in percentage points)	
	Mean	Std Dev	Mean	Std Dev
(1) Median Regulator	-0.0167	-0.0017	-0.0008	-0.0017
	[-0.0176 0.0084]	[-0.0072 0.1088]	[-0.0019 -0.0000]	[-0.0041 -0.0000]
(2) Uniform penalty	0.0345	0.0614	0.0386	-0.0022
	[-0.0743 0.0916]	[-0.0284 0.1173]	[0.0029 7.4182]	[-0.0050 -0.0000]
(3) High enforcement costs	0.0006	0.0001	-0.0003	0.0002
	[-0.0003 0.0007]	[-0.0237 0.0002]	[-0.0007 0.0000]	[-0.0005 -0.0000]
(4) Low enforcement costs	-0.0006	0.0002	0.0002	0.0002
	[-0.0015 -0.0002]	[-0.0240 0.0000]	[-0.0000 0.0009]	[0.0000 0.0004]
(5) High social costs	-0.0008	0.0002	0.0002	0.0002
	[-0.0017 -0.0005]	[-0.0242 -0.0001]	[-0.0000 0.0010]	[0.0000 0.0005]
(6) Low social costs	0.0009	0.0003	-0.0004	0.0002
	[0.0001 0.0012]	[-0.0234 0.0003]	[-0.0008 0.0000]	[-0.0006 -0.0000]

This panel presents the results of six counterfactual scenarios based on the estimates from the pre-SOX period. The changes, compared to the baseline scenarios, for the mean and standard deviation of earnings management and penalties are reported. We measure changes in penalties in terms of percentage points of firm market value. In row (1), the SEC's marginal enforcement costs and marginal social costs are homogenized to the median values across each firm. In row (2), the SEC imposes the same penalty schedule across all firms. In row (3), marginal enforcement costs increase by 10%. In row (4), marginal enforcement costs decrease by 10%. In row (5), marginal social costs increase by 10%. In row (6), marginal social costs decrease by 10%. Bootstrap 90% confidence intervals are presented in brackets.

Panel B: Post-SOX

	Earnings Management		Penalties (in percentage points)	
	Mean	Std Dev	Mean	Std Dev
(1) Median Regulator	-0.0145	-0.0014	-0.0029	-0.0080
	[-0.0150 0.0033]	[-0.0059 0.0217]	[-0.0094 -0.0000]	[-0.0135 -0.0000]
(2) Uniform penalty	0.0621	0.0225	0.7500	-0.0107
	[-0.0625 0.0763]	[-0.0204 0.0277]	[0.0005 4.0640]	[-0.0171 -0.0000]
(3) High enforcement costs	0.0005	0.0001	-0.0013	0.0008
	[0.0002 0.0006]	[-0.0008 0.0001]	[-0.0025 -0.0000]	[-0.0014 -0.0000]
(4) Low enforcement costs	-0.0005	0.0001	0.0009	0.0009
	[-0.0006 -0.0002]	[-0.0010 0.0000]	[0.0000 0.0014]	[0.0000 0.0015]
(5) High social costs	-0.0007	0.0001	0.0012	0.0011
	[-0.0009 -0.0005]	[-0.0010 -0.0001]	[0.0000 0.0020]	[0.0000 0.0016]
(6) Low social costs	0.0008	0.0002	-0.0017	0.0011
	[0.0006 0.0010]	[-0.0007 0.0002]	[-0.0032 -0.0000]	[-0.0018 -0.0000]

This panel presents results of six counterfactual scenarios based on the estimates from the post-SOX period. The changes, compared to the baseline scenarios, for the mean and standard deviation of earnings management and penalties are reported. We measure changes in penalties in terms of percentage points of firm market value. In row (1), the SEC's marginal enforcement costs and marginal social costs are homogenized to the median values across each firm. In row (2), the SEC imposes the same penalty schedule across all firms. In row (3), marginal enforcement costs increase by 10%. In row (4), marginal enforcement costs decrease by 10%. In row (5), marginal social costs increase by 10%. In row (6), marginal social costs decrease by 10%. Bootstrap 90% confidence intervals are presented in brackets.

Table 6: Additional Analysis of One-Size-Fits-All Policy

Panel A: Pre-SOX

VARIABLES	(1) *Increase in Earnings Management*		(2) *Increase in Enforcement*	
Lev	0.290***		0.001	
	(15.595)		(0.993)	
	[-0.235	0.091]	[-0.147	0.080]
MTB	0.017***		0.000	
	(13.100)		(0.932)	
	[-0.022	0.012]	[-0.006	0.010]
Size	-0.088***		0.000	
	(-14.034)		(1.003)	
	[-0.122	0.197]	[-0.139	0.008]
ROA	0.591***		0.010	
	(11.137)		(1.004)	
	[-1.137	1.247]	[-0.063	0.806]
Loss	0.338***		0.003	
	(19.907)		(1.006)	
	[-0.903	1.008]	[-0.008	0.280]
Ind_MTB	0.150***		-0.002	
	(6.193)		(-1.005)	
	[-0.142	0.038]	[-0.078	0.040]
Ind_ROA	-2.033***		0.010	
	(-8.981)		(0.999)	
	[-1.055	2.077]	[-0.999	1.443]
ClassAction	5.042***		0.021	
	(7.882)		(0.996)	
	[-4.062	4.093]	[-1.941	0.481]
Constant	0.727***		0.998***	
	(8.807)		(530.794)	
	[-0.626	1.155]	[0.956	1.829]
Adjusted R-squared	0.351		0.008	

This panel presents results from estimating the dummy variable, indicating whether the expected level of earnings management (column (1)) or the level of enforcement (column (2)) would increase under the uniform penalty scenario, in the pre-SOX period, as compared to the baseline. The regressions are estimated for each of the 3,039 firms active in 1997. *t* -statistics based on robust standard errors are reported in parentheses. Bootstrap 90% confidence intervals are presented in brackets. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, on a two-tailed basis using robust standard errors.

Panel B: Post-SOX

VARIABLES	(1) *Increase in Earnings Management*	(2) *Increase in Enforcement*
Lev	-0.077***	-0.037***
	(-6.428)	(-3.516)
	[-0.172 0.055]	[-0.116 0.089]
MTB	-0.012***	-0.004***
	(-8.336)	(-3.354)
	[-0.022 0.002]	[-0.004 0.015]
Size	0.006***	0.001
	(4.032)	(1.034)
	[-0.007 0.037]	[-0.184 0.032]
ROA	0.143***	0.020*
	(3.556)	(1.861)
	[-0.368 0.270]	[-0.177 0.883]
Loss	-0.051***	0.021***
	(-4.582)	(3.838)
	[-0.979 0.011]	[-0.033 0.427]
Ind_MTB	-0.016***	-0.002
	(-2.647)	(-0.517)
	[-0.106 0.005]	[-0.074 0.025]
Ind_ROA	0.055	0.033
	(0.628)	(0.665)
	[-0.047 1.462]	[-1.369 0.555]
ClassAction	0.353*	-0.287
	(1.717)	(-1.519)
	[-0.242 1.748]	[-3.061 1.576]
Constant	1.023***	1.015***
	(55.159)	(81.272)
	[0.000 1.050]	[0.700 1.874]
Adjusted R-squared	0.293	0.080

This panel presents results from estimating the dummy variable, indicating whether the expected level of earnings management (column (1)) or the level of enforcement (column (2)) would increase under the uniform penalty scenario, in the post-SOX period, as compared to the baseline. The regressions are estimated for each of the 3,039 firms active in 1997. *t* -statistics based on robust standard errors are reported in parentheses. Bootstrap 90% confidence intervals are presented in brackets. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, on a two-tailed basis using robust standard errors.