

The Impact of Whistleblowers on Financial Misrepresentation Enforcement Actions

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December 2014

We thank Dan Collins, Ed deHaan, Rebecca Files, Cristi Gleason, Max Hewitt, Jared Jennings, Steve Kaplan, Bill Kinney, Rick Mergenthaler, Tom Omer, Steven Savoy, Susan Scholz, Terry Shevlin, Ed Swanson, Brady Twedt, and participants at the 2014 Center for Business Ethics, Regulation, and Crime (C-BERC) Conference for helpful comments and suggestions. Special thanks to David Drukker at StataCorp for guidance on the use of treatment effects estimation.

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Abstract: Whistleblowers are ostensibly a valuable resource to regulators investigating securities violations, but whether whistleblowers have any measurable impact on the outcomes of enforcement actions is unclear. Using a dataset of employee whistleblowing allegations obtained from the U.S. government and the universe of enforcement actions for financial misrepresentation, we find whistleblower involvement accounts for between 21.0% and 27.5% of the \$79.46 billion in total penalties assessed and more than doubles prison sentences of targeted individuals. However, these benefits are not without a cost, as enforcement actions involving whistleblowers take 10.9% (about 10 months) longer to complete. Our findings are relevant to firms, policymakers, and regulators.

JEL classification: G38; K22; K42; M41; M48

Keywords: whistleblowers; enforcement actions; fraud; penalties; financial reporting; Securities and Exchange Commission

1. Introduction

Policymakers have implemented ambitious whistleblower programs to motivate individuals to come forward and reveal information about potential securities violations or financial misconduct. However, we have a limited understanding of the role whistleblowers play in the enforcement process. We investigate the effect of employee whistleblowers on the consequences of financial misrepresentation enforcement actions by the Securities and Exchange Commission (SEC) and Department of Justice (DOJ). Our intent is not to examine the efficacy of any particular whistleblowing program; instead, our objective is to provide empirical evidence on the effects whistleblowers have on penalties, prison sentences, and the duration of regulatory enforcement actions for financial misrepresentation.

Examining the impact of whistleblowers on securities enforcement is important because policymakers continue to enact legislation attempting to encourage whistleblower involvement and because regulators dedicate significant resources to promoting and rewarding whistleblowing activity [SEC 2014]. For example, Congress recently passed the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act) requiring the Commodity Futures Trading Commission (CFTC) and the SEC to establish whistleblower offices that provide a formal venue where whistleblowers can voice complaints and share evidence with regulators. Rewards for whistleblowers who come forward with original information about corporate misconduct can be large, ranging from 10% to 30% of monetary sanctions over \$1 million stemming from investigations facilitated by whistleblowers' information, documentation, or cooperation [CFTC 2013, SEC 2013b]. Determining the effect of whistleblowers on the outcomes of enforcement actions is important because it informs policymakers and increases our understanding of the enforcement process.

The effect of whistleblower involvement on securities enforcement outcomes is unclear for several reasons. First, regulators have limited resources to address whistleblower complaints [Kedia and Rajgopal 2011], so credible whistleblowers likely slip through the cracks.¹ Second, whistleblowing complaints are often frivolous [Miceli and Near 1992, Near and Miceli 1996, Bowen et al. 2010]; thus, even if regulators had the resources to pursue every whistleblower complaint, the benefits of doing so are uncertain, and regulators cannot fully distinguish credible from frivolous whistleblowers ex ante. Finally, regulators have historically conferred relatively few whistleblower awards, raising questions about the usefulness of whistleblowers in their enforcement efforts.² This study fills an important void in the literature by providing empirical evidence on the association between whistleblower involvement and securities enforcement outcomes.

Using the universe of SEC and DOJ enforcement actions for financial misrepresentation between 1978 and 2012 [Karpoff et al. 2008a, 2008b, 2014], we investigate whether whistleblower involvement is associated with more severe enforcement outcomes. Specifically, we examine the effects of whistleblower involvement on: (1) monetary penalties against targeted firms; (2) monetary penalties against culpable employees; and (3) the length of incarceration (prison sentences) imposed against employee respondents. In addition, we investigate the effect of whistleblowers on the duration of the violation, regulatory proceedings, and total enforcement periods. Notably, we examine the effects of whistleblowers conditional on the existence of a regulatory enforcement action. This distinction is important because our tests exploit variation in consequences to SEC or DOJ enforcement with and without whistleblower involvement; we do

¹ A whistleblower in the Bernie Madoff Ponzi scheme attempted to alert the SEC concerning the fraud multiple times over a nine-year period. He stated, “In May 2000, I turned over everything I knew to the SEC. Five times I reported my concerns, and no one would listen until it was far too late.” [Markopolos 2010, p. 3].

² The U.S. federal government has offered financial rewards to whistleblowers since 1863. Since the creation of the SEC Whistleblower Office in 2011, only 14 whistleblowers have received bounties under the program [Ensign 2014]. Many, including the Government Accountability Office, have criticized agencies for being slow and inefficient in addressing whistleblower concerns related to the OSHA whistleblower program [Scott 2010].

not measure the effects of whistleblower allegations for which there are no regulatory enforcement actions.

To identify whistleblower involvement in enforcement actions, we use two distinct data sources. First, we begin with a dataset of employee whistleblowing allegations we obtained from the U.S. government using a Freedom of Information Act (FOIA) request [Bowen et al. 2010, Wilde 2013]. The Sarbanes-Oxley Act of 2002 tasked the Occupational Safety and Health Administration (OSHA) with fielding employee complaints of discrimination for blowing the whistle on alleged financial misconduct. OSHA is required to communicate these allegations to the SEC [OSHA 2012], after which the SEC can choose to investigate the underlying allegations or refer the allegations to the DOJ. We obtain 934 allegations of financial misconduct in complaints filed with OSHA from 2002 to 2010, which is our primary source of whistleblower data. Because we cannot directly observe whether regulators actually used the information from each OSHA whistleblower, these whistleblower allegations reflect only potential whistleblower involvement in an enforcement action.

To supplement the OSHA whistleblower data, we search all enforcement-related documents from the legal proceedings for information revealing whether the enforcement action resulted from a *qui tam* lawsuit or contains direct evidence of whistleblower involvement.³ Enforcement actions involving a whistleblower may not specifically reference the whistleblower's involvement in the enforcement documents, either to protect the whistleblower's identity or because the information provided by the whistleblower was not deemed pertinent to the legal proceedings. Nevertheless, when a whistleblower's involvement is specifically

³ A *qui tam* lawsuit is a civil lawsuit whistleblowers bring under the False Claims Act to help the government stop fraud related to goods and services provided to the federal government.

referenced in the administrative and legal proceedings associated with financial misrepresentation, we identify this enforcement action as having whistleblower involvement.⁴

Of the 1,133 financial misrepresentation enforcement actions between 1978 and 2012, 145 are associated with at least one whistleblower complaint made after the beginning of the violation and before the end of the regulatory proceedings period. Using guidelines published by the SEC and DOJ [SEC 2006, USSC 2013], we identify a broad set of controls for other factors related to the magnitude of penalties and sanctions. Specifically, we control for the breadth, depth, scope, and egregiousness of the violation. We employ proxies such as abnormal stock returns on the date the financial misrepresentation became public, the length of the violation period, the number and type of violations involved, the number of C-level executive respondents named in the enforcement action, and indicator variables based on whether the firm was involved in foreign bribery, whether the firm misled the auditor, and whether the firm was credited with cooperating with regulators when penalties were determined. We also control for firm characteristics, such as size, growth, capital structure, and other monitoring and governance mechanisms that are potentially associated with both the existence of a whistleblower and enforcement outcomes.

We find that whistleblower involvement in an enforcement action is associated with a significant increase in penalties. After controlling for various factors that affect the amount of penalties assessed in an enforcement action, we find that whistleblower involvement increases firm penalties by an average of \$76.96 million. Furthermore, penalties assessed against employees average \$39.29 million more when a whistleblower is involved. Finally, when whistleblowers are involved with an enforcement action, employees at targeted firms receive

⁴ A common misconception about whistleblowers is that they play the primary role of discovering and exposing misconduct. However, by design, regulatory whistleblower programs suggest, and our evidence indicates, the benefits of whistleblower involvement often arise after a regulator has begun an investigation. The SEC defines whistleblowers eligible for bounty programs as individuals who provide original information about federal securities law violations that leads to a successful SEC action.

prison sentences that are, on average, 21.55 months longer than if no whistleblower had been involved. In total, we estimate whistleblowers enabled regulators to obtain judgments (firm plus employee penalties) of \$16.86 billion beyond what they would have obtained without whistleblower involvement. This increase in monetary penalties accounts for approximately 56% of the \$30.09 billion in penalties assessed against firms and employees with whistleblower involvement, and 21% of the \$79.46 billion in total penalties assessed in all enforcement actions from 1978 to 2012. Restricting the analyses to only the enforcement actions subject to the provisions of the Sarbanes-Oxley Act yields similar results. These findings indicate whistleblowers are a valuable source of information for regulators in the investigation and prosecution of firms and their managers.

We also examine whether whistleblower involvement affects the duration of enforcement actions. If information from whistleblowers provides a “road map” that facilitates the SEC’s or DOJ’s case, whistleblower involvement could expedite the resolution of enforcement actions. Alternatively, because whistleblowers provide regulators with additional information to investigate, their involvement could prolong the enforcement process. After controlling for factors associated with the outcomes of investigation and enforcement, we find that the total duration of the enforcement action increases approximately 10 months (10.9%) with whistleblower involvement. These results suggest the benefits whistleblowers provide come at the cost of prolonged enforcement efforts.

We address the issue of selection bias, a common problem in finance, economics, and accounting research, which arises when treated observations differ from non-treated observations for reasons other than the treatment effect. Measuring the effect of whistleblowers involves two potential econometric issues: (1) the endogeneity of whistleblower involvement, and (2) missing counterfactuals. We employ a treatment effects model using inverse-probability-weighted

regression adjustment (IPWRA) and focus our analysis on the average effect of whistleblowers on enforcement actions to mitigate both the endogeneity and missing counterfactual problems [Greene 2012, Frolich and Melly 2013]. The results of this analysis suggest whistleblower involvement in enforcement actions accounts for 27.5% of total penalties assessed in all enforcement actions from 1978-2012 and increases the length of prison sentences for culpable employees by more than 25 months, confirming the important role of whistleblowers in the enforcement process.

This study makes important contributions to the literature and to ongoing policy discussions about whistleblowing. As policymakers and regulators continue to endorse whistleblower programs, we empirically document costs and benefits of whistleblower involvement in financial misrepresentation enforcement actions. While prior research on whistleblowing examines the determinants, economic consequences, and reporting responses to employee whistleblowing, [Bowen et al. 2010, Call et al. 2014, Dyck et al. 2010, Wilde 2013], we provide quantifiable estimates of the impact of whistleblowers on the penalties assessed against firms and culpable employees, as well as on prison sentences of employees in financial misrepresentation enforcement actions. Further, although prior research emphasizes the role of external monitors on financial reporting activities [Becker et al. 1998, Karpoff and Lou 2010, Xie et al. 2003, Yu 2008], our evidence complements recent work that suggests employee whistleblowers play an integral role in monitoring firm behavior [Dyck et al. 2010]. Our findings are important to legislators considering the efficacy of current policies related to whistleblowing and the determination of budgets for whistleblower programs, to regulators who design enforcement programs, to SEC and DOJ prosecutors evaluating the merits of using information from whistleblowers in their investigations of malfeasance, and to firms in assessing the consequences of potential enforcement actions.

2. Background and Related Research

2.1. HISTORY OF EMPLOYEE WHISTLEBLOWER PROGRAMS

The U.S. government has a long history of sponsoring whistleblowing programs. In 1863, Congress passed the False Claims Act, which allows individuals who are not affiliated with the government to initiate actions against federal contractors who defraud the government. In promising cases, federal attorneys from the DOJ intervene on behalf of filers and bring the weight and influence of government resources to bear. Suits brought under this act are considered *qui tam* lawsuits, and their successful prosecution allows whistleblowers to receive between 10% and 30% of any award or settlement amount. In 1988, Congress passed the Insider Trading and Securities Fraud Enforcement Act authorizing the SEC to award a bounty of up to 10% of settled amounts to persons who provide information that leads to a civil penalty in insider trading litigation. The decision to pay the bounty was at the sole discretion of the SEC and was not subject to judicial review (SEC, 1989). The program was not particularly successful, as the SEC awarded less than \$1.2 million in total bounty payments to six claimants under the program [SEC 2010a].⁵

Three recent Congressional acts, the Sarbanes-Oxley Act of 2002, the Tax Relief and Health Care Act of 2006 (TRHCA), and the Dodd-Frank Act, have significantly reshaped the whistleblowing environment and suggest an increasing regulatory emphasis on whistleblowing activities. Section 806 of the Sarbanes-Oxley Act prohibits retaliation against employees of publicly traded companies or employees of nationally recognized statistical rating organizations who reveal “questionable accounting or auditing matters,” outlines specific protection for

⁵ An additional seven claimants were denied plus another 30 applied but were never reviewed due to no recovery of an insider trading civil penalty. Following publication of the Office of Inspector General report, a \$1 million bounty was paid (<http://www.sec.gov/litigation/litreleases/2010/lr21601.htm>). The bounty program was terminated with the passage of the Dodd-Frank Act.

whistleblowers (Title 18 U.S.C., §1514A and 29 CFR 1980), and delegates to OSHA the responsibility to handle cases of discrimination against employee whistleblowers.

TRHCA provides significant monetary incentives to prospective whistleblowers, calling for mandatory bounties of up to 30% of the total proceeds the Internal Revenue Service (IRS) collects from delinquent taxpayers, as long as the whistleblower identifies amounts (in taxes, penalties, and interest) exceeding two million dollars. It also requires the IRS to establish a Whistleblower Office and permits whistleblowers to take their awards to the Tax Court on appeal [IRS, 2012].

The Dodd-Frank Act provides additional protections for employee whistleblowers and stipulates significant monetary incentives to prospective whistleblowers who reveal financial improprieties. These incentives range from 10% to 30% of the monetary sanctions collected via criminal or civil proceedings, as long as monetary sanctions exceed \$1 million. Section 922 of the Dodd-Frank Act established the SEC Investor Protection Fund (Fund) to provide, among other things, funding for the Commission's whistleblower award program, including the payment of awards in related enforcement actions. As of September 30, 2010, the Fund was fully funded, with an ending balance of \$451.9 million [SEC 2010b]. Since the passage of the whistleblower provisions of Dodd-Frank Act, 14 whistleblowers have received bounties stemming from their involvement in SEC investigations [Ensign 2014].⁶ Although our purpose is not to examine the efficacy of any specific whistleblower program, our analysis of the impact of whistleblowers on financial misrepresentation enforcement actions is relevant to the literature and to policy discussions about the merits of promoting and rewarding whistleblowing activity.

⁶ To qualify for whistleblower remuneration, whistleblowers must provide original information regarding misconduct that leads to a successful administrative or federal court action.

2.2. RESEARCH ON WHISTLEBLOWING

Whistleblowers have received significant regulator and media attention in recent years, and archival research on whistleblowing in finance and accounting is expanding. Dyck et al. [2010] examine the effectiveness of various firm monitors in uncovering financial wrongdoing. In their sample of shareholder lawsuits related to accounting improprieties from 1996 to 2004, they find that employee whistleblowers uncover more cases of financial misconduct than any outside monitor. They estimate that employee access to insider information is associated with a 15% higher likelihood that corporate financial misconduct comes to light, which is consistent with other employees often being aware when management engages in financial misconduct.

Bowen et al. [2010] investigate the characteristics of firms subject to employee whistleblowing allegations and the economic consequences of such allegations. Consistent with employee whistleblowing allegations uncovering agency issues, they find that firms with media reports of whistleblowing allegations are associated with negative stock market reactions and an increased likelihood of experiencing shareholder lawsuits and accounting restatements. They also find that these firms exhibit relatively weaker future performance and are more likely to make subsequent governance changes. Call et al. [2014] examine the effect of rank-and-file stock option grants on the likelihood a firm experiences whistleblowing allegations. Consistent with the notion that publicized whistleblowing allegations are likely to result in market penalties that reduce the value of employee stock options and holdings, they find that misreporting firms granting relatively more rank-and-file stock options are less likely to be the subject of employee whistleblowing allegations.

Miller [2006] investigates the role of the press as a “watchdog” of firm behavior, and finds that while the business press helps uncover financial wrongdoing, the non-business press typically reports on financial misdeeds uncovered by other monitors. Finally, Wilde [2013]

examines the relation between employee whistleblowing allegations and subsequent tax and financial reporting behavior and finds that firms subject to whistleblowing allegations are less likely to subsequently misstate their financial statements and to report large uncertain tax positions. We extend this literature by examining the effect of whistleblowers on regulatory enforcement.

2.3. WHISTLEBLOWING INFORMATION AND REGULATORY ENFORCEMENT

Although external stakeholders such as auditors, analysts, and investors closely monitor firm behavior, prior research highlights the increasing complexity of corporations [Zingales 2004] and suggests external stakeholders often fail to identify financial misconduct with publicly available information [e.g., Hobson et al. 2012, PCAOB 2007]. In contrast, employees have superior access to inside information, and management is unlikely to be able to perpetrate financial misconduct without at least some employees becoming aware [Dyck et al. 2010]. Although employee whistleblowers have no authority to enforce appropriate reporting behavior, they can serve as effective monitors if they reveal inside information about misconduct that is useful to external parties such as regulators or auditors.

The SEC promotes its whistleblower program as one of “the most powerful weapons in [its]...enforcement arsenal,” and argues that it helps “identify possible fraud and other violations much earlier than might otherwise have been possible” [SEC 2013a]. If whistleblowers go undetected as they collect evidence of misconduct [Eaglesham and Siconolfi 2011], the information they provide is likely to be useful to a regulator’s case for an enforcement action. The SEC states “even if a whistleblower’s tip does not cause an investigation to be opened, it may still help lead to a successful enforcement action if the whistleblower provides additional information that substantially contributes to an ongoing or active investigation” [SEC 2013a].

Alternatively, whistleblowing allegations may have no meaningful impact on enforcement outcomes, on average, because whistleblowing complaints are often frivolous [Miceli and Near 1992, Near and Miceli 1996, Bowen et al. 2010]. Further, it is costly for regulators to determine ex ante which whistleblowing allegations have merit. In addition, even if a whistleblower provides important information that would help regulators detect financial misconduct, it is not clear that such information would result in more severe enforcement outcomes than would have occurred otherwise. Although the SEC's and DOJ's public statements encourage whistleblowers to come forward and suggest whistleblower cooperation is helpful to their investigations, these statements may simply reflect an attempt to encourage legitimate whistleblowers to come forward or an effort to discourage managers from committing fraud, rather than an assessment of the usefulness of whistleblowers, per se.

3. Sample Description

3.1. FINANCIAL MISREPRESENTATION ENFORCEMENT DATA

Our financial misrepresentation enforcement data is based on the database developed in Karpoff, Lee, and Martin [2008a, 2008b] and further explained in Karpoff, Koester, Lee, and Martin [2014]. It consists of the universe of 1,133 enforcement actions by the SEC and DOJ from 1978 through 2012 that include violations of the accounting provisions enacted under the 1977 Foreign Corrupt Practices Act (FCPA). All of the enforcement actions include charges of financial misrepresentation under one of three sections of the Securities Exchange Act of 1934 as amended by the FCPA: 15 USC §§ 78.m(b) and two rules under the Code of Federal Regulations 17 CFR 240.13b2-1 and 13b2-2. In combination, these regulations require every issuer of a security under Section 12 of the Exchange Act to (1) make and keep books, records, and accounts which accurately reflect the transactions of the issuer; and (2) devise and maintain a system of internal accounting controls. The regulations also mandate that no person shall

knowingly circumvent a system of internal accounting controls; knowingly falsify any book, record, or account required under these regulations; or directly or indirectly make a materially false or misleading statement to an accountant. The database contains all federal enforcement actions for books and records and internal controls violations and is constructed from information gathered in various regulatory and legal filings, administrative actions by the SEC, civil complaints filed by the SEC and DOJ, criminal indictments from the DOJ and state Attorney General offices, district court documents, and corporate filings in EDGAR.

The term “enforcement action” refers to information surrounding the entire series of events related to the firm whose financial statements are misrepresented and result in a regulatory enforcement action. Each enforcement action begins with a defined period over which the violation occurred (violation period) and culminates with one or more enforcement proceedings by regulators (regulatory proceedings period). Between these periods, the firm may publicly announce any number of events related to the enforcement action, including that the firm has become aware of the potential misconduct, initiated an internal investigation, restated one or more financial statements, received an informal inquiry or a formal order of investigation from the SEC, is the subject of a warrant, subpoena, or raid by the FBI/DOJ, is named in private class or derivative actions, or has received a Wells Notice.

Importantly, regulators do not provide information on the targets of their investigations, nor do they confirm the existence of any inquiry or investigation. The only indication of regulator involvement prior to the regulatory proceedings is a voluntary public announcement from the firm or related agents that are targets of the inquiry/investigation. As a result, we are unable to determine precisely when inquiries or investigations begin, and because investigations often continue after the first regulatory proceeding is filed, we are also unable to conclusively establish when each investigation is completed. Nevertheless, the mean (median) duration of the

enforcement action, from the beginning of the violation period to the end of regulatory proceedings, in the universe of 1,133 enforcement actions for financial misrepresentation is 100.93 (89.83) months, or between seven to eight years. The violation period occurs over the initial 36.1 (26.9) months and the regulatory proceedings occur over the final 33.3 (19.5) months.⁷

3.2. WHISTLEBLOWING DATA

Our whistleblowing data come from two sources. First, we obtained whistleblowing allegations submitted to OSHA through a FOIA request to OSHA's national office in Washington D.C. We requested information about the date the complaint was filed with OSHA and the name of the firm in question for every whistleblowing allegation ever filed with OSHA. Because OSHA handles other types of employee complaints (e.g., workplace safety), we specifically requested information *only* about whistleblowing allegations that fall under section 806 of the Sarbanes-Oxley Act. These cases represent employee complaints of workplace discrimination at publicly traded companies for having blown the whistle on alleged financial misconduct. In total, we received data on 934 unique whistleblowing complaints (relating to 619 firms) filed from October 2002 through December 2010. These allegations represent all whistleblowing allegations filed with OSHA except for any cases exempted or excluded (<http://www.foia.gov/faq.html>).

We supplement the OSHA whistleblower data by searching all enforcement-related documents from the legal proceedings for information revealing either that it resulted from a *qui tam* lawsuit where the government intervened on behalf of the *qui tam* relator (whistleblower) or

⁷ The regulatory proceedings include a mixture of administrative, civil injunctive, and criminal proceedings that implicate a variety of respondents responsible for the violation and may include the firm itself, its subsidiaries or parent, agent firms, employees, and/or individuals not directly employed by the firm. Each enforcement action includes other pertinent information on the results of the enforcement proceedings, including the respondents' names, positions, age, dates of employment with the firm, laws and rules violated, penalties assessed, and any resultant criminal sanctions.

direct evidence that a whistleblower provided information pertinent to the case.⁸ We identified 20 *qui tam* related enforcement actions and 15 additional enforcement actions with direct whistleblower evidence not included in the OSHA data.⁹

3.3. LINKING ENFORCEMENT DATA WITH OSHA WHISTLEBLOWING DATA

We consider an enforcement action from the financial misrepresentation database to have potential whistleblower involvement if an employee filed an allegation with OSHA on any date between the start of the violation period and the last regulatory proceeding associated with the enforcement action. This process potentially oversamples the whistleblower-related enforcement actions because it could associate a whistleblower complaint with an enforcement action when, in fact, the whistleblower complaint was not associated with the enforcement action or regulators decided the complaint was frivolous and of no use in an existing enforcement action. This would bias against our finding a significant effect of whistleblowers on enforcement outcomes, as it would make it more likely that our tests reveal no effect of whistleblower involvement.

A total of 110 enforcement actions are associated with these OSHA whistleblowing allegations. On average, whistleblowers file these allegations less than a year after the end of the violation period. Combined with the 20 *qui tam* whistleblowing cases and the 15 additional enforcement actions with direct evidence of whistleblower involvement, a total of 145 enforcement actions are associated with whistleblower involvement. These 145 enforcement

⁸ For example, on July 25, 2006, the SEC announced an enforcement action involving Endocare, Inc. The complaint filed with the U.S. District Court for the Central District of California specifically states the “acting controller (the ‘whistleblower’) raised serious questions about Endocare's accounting practices” and further explains that “Endocare announced in a Form 8-K and press release the termination of the whistleblower for conduct ‘materially injurious to the company.’” (<http://www.sec.gov/litigation/complaints/2006/comp19772.pdf>)

⁹ The *qui tam* whistleblower enforcement actions generally predate the OSHA whistleblower actions. There are several reasons why a whistleblower identified in the administrative or legal proceedings may not be identified by OSHA: (1) some of the enforcement actions pre-date OSHA’s responsibility for handling whistleblower complaints; (2) OSHA redacted actions that may be part of an ongoing investigation; (3) OSHA receives only cases of whistleblowers who allege retaliation or discrimination from their employers for blowing the whistle; and (4) some whistleblowers may have contacted the SEC or DOJ directly.

actions represent 12.8% of the 1,133 enforcement actions for financial misrepresentation that regulators have pursued from 1978 to 2013.

3.4. MODEL TO EXAMINE EFFECT OF WHISTLEBLOWERS ON ENFORCEMENT OUTCOMES

We examine the effect of whistleblowers on various enforcement outcomes using the following regression:

$$Y = \alpha + \beta WB + \gamma Controls + \varepsilon. \quad (1)$$

Where Y is one of several outcomes of an enforcement action that we examine, including firm penalties, employee penalties, length of prison sentences for guilty employees, and the duration of an enforcement action. WB is a dichotomous variable equal to one if a whistleblower was associated with the enforcement action and equal to zero otherwise. $Controls$ is a vector of control variables explained below.

Two challenges that arise when estimating outcomes of regulatory enforcement actions are the large number of zero-valued observations (e.g., enforcement actions without any resultant penalties or criminal prison sentences) and the severe positive skewness in the dependent variable (e.g., some extremely large penalties). Tobit or log-linear regressions using a log-transformed dependent variable (plus a constant) suffer from potentially severe bias [Santos Silva and Tenreyro 2006, 2011]; thus, to mitigate these issues, we use a Poisson pseudo-maximum likelihood (PPML) estimator [Gourieroux et al. 1984, Santos Silva and Tenreyro 2006, 2011, Wooldridge 2010, Karolyi and Taboada 2013]. The difference between PPML and Poisson estimators is that PPML does not assume equality in the first and second moments of the distribution. Prior research finds that PPML is a particularly effective modeling technique for data distributions characterized by a disproportionate number of zeroes and severe skewness [Santos Silva and Tenreyro 2011].

Because whistleblowers may be more likely to approach regulators when they have knowledge of egregious violations that are more likely to result in large penalties and sanctions, we control for factors the SEC and DOJ indicate they take into consideration when recommending penalties and sanctions. After controlling for these factors, an association between whistleblower involvement and outcomes of enforcement actions suggests whistleblowers have an incremental impact on enforcement outcomes.

The Statement of the Securities and Exchange Commission Concerning Financial Penalties and the DOJ's Federal Sentencing Guidelines Manual describe the factors the SEC and DOJ consider when submitting recommendations to the court in the sentencing hearing or in the penalty phase of the legal proceedings. In Table 1, we summarize these factors and provide specific references to the sections of the SEC's framework and the DOJ's Sentencing Guidelines that describe these factors. Below we briefly list these factors and describe our proxies, and we provide detailed definitions in Appendix A:

- i. *The presence or absence of a direct benefit to the corporation as a result of the violation* – We include an indicator variable equal to one if the violation includes self-dealing by the respondents (Self-dealing flag), and equal to zero otherwise. Self-dealing involves a direct benefit to the respondents in the form of higher stock prices, compensation for meeting internal or external expectations, or outright expropriation or theft.
- ii. *The degree to which the penalty will recompense or further harm injured shareholders* – We include the percentage of blockholder ownership (% Blockholder ownership) to control for amount of the firm that is closely held or held by sophisticated investors. By virtue of their large holdings, these owners can influence firm management and policy,

- often have seats on the board of directors, or have greater resources to pursue claims through private actions such that they require less protection than diverse shareholders.
- iii. *The extent of the injury to innocent parties* – We proxy for the extent to which innocent parties were injured using the abnormal initial market reaction at the announcement of the investigation (% Initial abnormal return) and the length of violation period in months (Violation period).
 - iv. *The need to deter the particular type of offense* – We include three indicator variables equal to one for the presence of certain types of offenses that are considered to be relatively more egregious or that involve activities regulators specifically target or are particularly concerned about, and equal to zero otherwise. The first indicates the enforcement action involves charges of bribing a foreign official under the FPCA (Bribery flag). The second indicates whether the violation includes offenses for which regulators commonly target, such as option backdating, insider trading, or an offense related to a stock offering, an IPO, a merger, or a reverse merger (Deterrence flag). The third indicates whether organized crime is related to the violation (Organized crime flag).
 - v. *Whether complicity in the violation is widespread throughout the corporation* – We control for the number of C-level respondents (# C-level respondents) and the number of violations (# Code violations) to capture the extent to which the violation is pervasive in the firm.
 - vi. *The level of intent on the part of the perpetrators* – We include an indicator variable equal to one if either fraud charges (Fraud flag) are included in the enforcement action or if the corporation misled its auditors (Misled auditor flag), and equal to zero otherwise.
 - vii. *The degree of difficulty in detecting the particular type of offense* – We include an indicator variable equal to one if the firm used a Big N auditor (Big N auditor), and equal

to zero otherwise. Big N auditors are associated with higher-quality audits that could detect and correct issues before they rise to the level of misrepresentation. Alternatively, if managers are able to deceive the high-quality auditors, the illicit activity is relatively more difficult to detect.

- viii. *Presence or lack of remedial steps by the corporation* – We include an indicator variable equal to one if the firm terminated a culpable CEO, Chairman of the Board, or President specifically for his or her involvement in the financial misrepresentation (Executive terminated flag), and equal to zero otherwise.
- ix. *Extent of cooperation with Commission and other law enforcement* – We include an indicator variable equal to one if regulators acknowledged the firm’s cooperation in enforcement proceedings and equal to zero otherwise (Cooperation flag). Files (2012) finds that firms that cooperate with the SEC during an enforcement action receive lower monetary penalties. We also include an indicator variable equal to one if regulators acknowledged they were deliberately misled and/or charges were included for lying to investigators (Impeded investigation flag), and equal to zero otherwise.
- x. *Effective compliance programs* – We control for the quality of firm governance and the likelihood of participating in good governance activities, such as strong and effective education and compliance programs, using the percentage of the firm’s directors that are independent (% Independent directors).
- xi. *Prior enforcement history* – We include an indicator variable equal to one if the firm has shown a history of repeat offenses and equal to zero otherwise (Recidivist flag).
- xii. *Legislative history or statutory authority* – We include an indicator variable equal to one if the violation began in the post Sarbanes-Oxley Act era (Post-SOX flag), and equal to zero otherwise.

We also control for other firm attributes, such as firm market capitalization, growth, capital structure, and distance from regulator, which are potentially associated with both whistleblowing activity and enforcement outcomes.¹⁰

4. Descriptive Statistics

In Table 2, Panel A, we report the number of whistleblower complaints received in the OSHA FOIA requests and the number of enforcement actions from 1978 to 2012 with whistleblower involvement. Whistleblowers are involved in 145 (12.8%) of the 1,133 enforcement actions during this period. In Panel B of Table 2, we report the frequency with which each respondent type is included in the 1,133 enforcement actions. Of these enforcement actions, 475 (41.9%) took place prior to the passage of the Sarbanes-Oxley Act, and 658 (58.1%) took place after. A company executive is named as a respondent in 953 (84.1%) of the enforcement actions. The CEO is named as a respondent in 689 (60.8%), other C-level executives in 200 (17.7%), and a non-executive employee in 299 (26.4%) enforcement actions. The firm is named as a respondent in 866 (78.2%) of the enforcement actions, and the firm is the sole respondent in 145 (12.8%) of the enforcement actions.

We present the distribution of financial misrepresentation enforcement actions by industry (using the Fama and French 12-industry classifications) in Table 2, Panel C. The most frequent industries with enforcement actions are Business Equipment (260 or 23.0%), Finance (158 or 14.0%), Wholesale, Retail, and Some Services (140 or 12.4%), Manufacturing (102 or 9.0%), and Healthcare, Medical Equipment and Drugs (92 or 8.1%). No other industry accounts for more than 68 (6.0%) enforcement actions.

We find some variation in the proportion of firms in different industries that are subject to whistleblower complaints. For example, whistleblower complaints comprise 11.24% of firms

¹⁰ SEC and DOJ guidelines provide no indication that industry membership influences enforcement outcomes. However, in unreported tests, we repeat the analyses using industry fixed effects defining industry as the Fama & French 12-industry classification and the results are qualitatively similar.

in the Utilities industry, but only 1.19% of firms in the Oil, Gas and Coal industry.

Whistleblower enforcement actions are distributed rather homogenously across these industries, ranging from 10.3% to 18.8% of the enforcement actions in each industry. The sole exception is the “Other” category, which accounts for only 6.3% of the enforcement actions with whistleblower involvement. In addition, we find that the proportion of whistleblower complaints that are ultimately associated with an enforcement action varies across industries. In several industries, more than 20% of whistleblower reports are associated with enforcement actions (e.g., Chemicals and Allied Products; Consumer Durables; Manufacturing; Business Equipment; and Oil, Gas, and Coal), whereas in other industries less than 10% of whistleblower reports are related to enforcement actions (i.e., Utilities, Finance, and Other).

In Table 3, we report descriptive statistics for the dependent and independent variables used in subsequent regression analyses. For continuous variables, we perform a *t*-test of means (assuming unequal variances where appropriate), and for dichotomous variables, we conduct a test of proportions. The results suggest whistleblower involvement is associated with significantly larger penalties and longer prison sentences. The mean (median) penalties assessed against firms in enforcement actions with whistleblower involvement are \$143.90 (\$5.20) million, which are significantly larger than the \$33.29 (\$0.11) million assessed against firms in enforcement actions without whistleblower involvement. For employees, the mean (median) penalties in enforcement actions with whistleblower involvement are \$63.64 (\$0.08) compared to \$26.72 (\$0.04) for those without, but these differences are not statistically significant. Mean prison sentences with whistleblower involvement are significantly longer at 39.43 months compared to 17.90 (the medians are both zero). We also find significant differences between the two groups in many of the independent and control variables used in the determination of

penalties by the SEC and DOJ, which supports the need to control for these variables in our regression models.

5. Regression Results

As noted above, a potential problem that arises when estimating outcomes of regulatory enforcement actions is the combination of a large number of zero-valued observations with a severe positive skew in the dependent variable (e.g., many observations with no penalties and a non-trivial number of extremely large penalties). We find this to be the case in the financial misrepresentation enforcement actions, as 325 (28.7%) have no penalties assessed against the firm while the largest 11 enforcement actions each exceed \$1 billion in penalties; 456 (40.2%) have no penalties assessed against employees while the largest five exceed \$1 billion; and 909 (80.2%) have no prison sentences assessed against employees while 31 exceed 20 years. These distributions suggest PPML is the best estimator for our regression analyses [Santos Silva and Tenreyro 2011]. We present the results of the PPML regressions in Table 4.

5.1. FIRM PENALTIES, EMPLOYEE PENALTIES, AND PRISON SENTENCES

We first examine the effect of whistleblowers on total penalties in millions of dollars levied against targeted firms (Firm Penalties). As presented in Table 4 Panel A, the presence of a whistleblower is statistically ($p = 0.022$) significant in explaining firm penalties. Consistent with our expectations based on regulator guidelines, firm penalties are positively associated with the length of the violation period (Violation period), the number of violations (# Code violations), the incidence of misleading the auditor (Misled auditor), the size of the firm (Market capitalization), and capital structure (Leverage ratio). We find that firm penalties are negatively associated with cooperation with regulators (Cooperation flag), proximity to regulators (Distance from regulator), and the existence of fraud charges (Fraud flag). With the exception of the negative coefficient on the fraud charges indicator (Fraud flag), these findings are consistent with

our expectations based on the government's criteria in determining penalties as outlined in Table 1.

In Table 4 Panel A, we also show the effect of whistleblower involvement on two additional enforcement outcomes: monetary penalties (in millions of dollars) and prison sentences (in months) levied against culpable employees. We find that monetary penalties for culpable employees significantly increase with whistleblower involvement ($p = 0.019$). In terms of control variables, we find a positive association between employee penalties and the length of the violation period (Violation period), the violation including self-enrichment (Self-dealing flag), the percentage of blockholder ownership at the firm (% Blockholder ownership), violations the SEC and DOJ are particularly motivated to deter (Deterrence flag), the number of C-suite executives named as respondents (#C-level respondents), executives misleading the auditor (Misled auditor), the size of the firm (Market capitalization), and capital structure (Leverage ratio). Employee penalties decrease if the violation is associated with foreign bribery under the FCPA (Bribery flag), when organized crime is involved (Organized crime flag), and with board independence (% Independent directors).

Employee prison sentences also increase when a whistleblower is involved ($p = 0.023$). In addition, prison sentences increase with longer violation periods (Violation period), when the violation includes self-enrichment (Self-dealing flag), with the number of C-suite executives named respondents (#C-level respondents), and with the number of code violations (# Code violations). Prison sentences decrease as the distance from the regulator to the firm's headquarters increase (Distance from regulator).

5.2. PRACTICAL SIGNIFICANCE OF WHISTLEBLOWERS

To assess the practical significance of whistleblowers on the outcomes of enforcement actions, in Table 4 Panel B we examine the differences in predicted outcomes between

whistleblower and non-whistleblower observations. Specifically, for each observation, we use the model described in Table 4 Panel A to estimate firm penalties, employee penalties, and prison sentences under two alternative scenarios. We first set the whistleblower flag equal to zero for all observations and hold all other covariates fixed to estimate predicted outcomes (Whistleblower = 0). We then set the whistleblower flag equal to one for all observations, again holding all other covariates fixed, and estimate another predicted outcome (Whistleblower = 1). The difference in these two predicted outcomes is an estimate of the effect of whistleblowers on outcomes of enforcement actions, after considering the effect of the other determinants of enforcement outcomes discussed previously.

Across all 1,133 observations, we find the difference in predicted firm penalties due to whistleblower involvement is \$43.22 million, increasing average firm penalties from \$37.59 million to \$80.81 million (a 115% increase). This 115% increase, known as the population attributable fraction (PAF), represents the proportion of firm penalties due to exposure to the whistleblower factor, and is significant at $p < 0.022$ [Newson 2013].

Partitioning these results between whistleblower enforcement actions and non-whistleblower enforcement actions provides a clearer picture of the impact of whistleblower involvement. For the 145 enforcement actions with whistleblower involvement, the difference in predicted firm penalties is \$76.96 million, suggesting whistleblower involvement increased average firm penalties from \$66.94 million to \$143.90 million. For the 988 enforcement actions without whistleblower involvement, the difference is \$38.26 million, suggesting an increase in average firm penalties from \$33.29 million to \$71.55 million if a whistleblower had been involved.

The average difference in predicted employee penalties across all 1,133 observations is \$28.85 million, an increase from \$17.66 million to \$46.51 million (163%). The average

difference for the 145 enforcement actions with whistleblower involvement suggests an increase in average employee penalties of \$39.29 million, from \$24.05 million to \$63.34 million, and the average difference for the 988 enforcement actions without whistleblower involvement suggests an increase of \$27.33 million, from \$16.72 million to \$44.05 million.

These results indicate that for the 145 enforcement actions with whistleblower involvement, the increase in average total penalties (firm plus employee) attributable to whistleblowers is \$116.25 million ($\$76.96 + \39.29). Multiplying this average difference by the 145 whistleblower observations in the sample yields an estimated \$16.86 billion increase in total penalties attributable to whistleblower involvement, which represents 56.0% of the total penalties assessed to these firms and their employees. Further, this suggests whistleblowers are responsible for 21.2% of the \$79.46 billion in total penalties assessed by the SEC and DOJ across all 1,133 enforcement actions from 1978 to 2012.

Lastly, the average difference in predicted prison sentences across all 1,133 observations is 21.59 months, an increase from 17.90 months to 39.49 months (121%). The difference in predicted prison sentences for the 145 enforcement actions with whistleblower involvement indicates an increase in the length of average prison sentences of 21.55 months, from 17.88 months to 39.43 months, and the average difference for the 988 enforcement actions without whistleblower involvement suggests an increase in average prison sentences of 21.60 months, from 17.90 months to 39.50 months.

5.3. POST-SARBANES-OXLEY ACT RESULTS

Because OSHA received responsibility for handling whistleblower complaints related to financial misrepresentation after the passage of the Sarbanes-Oxley Act, a majority of our whistleblowing events occur in the post-Sarbanes-Oxley period. We repeat the analyses from Table 4 using only the 658 enforcement actions whose violation period was subject to the

provisions of Sarbanes-Oxley. Table 5 reports the results of these tests, which generally are consistent with our findings for the full sample of enforcement actions but with additional significant coefficients on some of the factors affecting penalties.¹¹ In untabulated analyses, we find the marginal effect of a whistleblower increases average firm penalties by \$68.30 million (130%) from \$52.34 million to \$120.64 million, increases average employee penalties by \$32.71 million (132%) from \$24.71 million to \$57.42 million, and increases prison sentences 10.17 months (44%) from 23.05 months to 33.22 months in the post Sarbanes-Oxley period.

5.4. DURATION OF ENFORCEMENT

The results presented in Tables 4 and 5 suggest whistleblower involvement is associated with higher penalties and prison sentences. However, it is uncertain whether whistleblower involvement also expedites the enforcement process, yielding added benefits to regulators, or whether whistleblowers prolong the enforcement process, consuming additional time and resources due to the information they provide.

To investigate this issue, we look at three observable periods of an enforcement action to determine if whistleblowers are associated with a change in their duration: (1) the period over which the violation occurred; (2) the period over which legal and regulatory proceedings occurred; and (3) the total period related to the enforcement action from the beginning of the violation to the end of the regulatory proceedings.

A key period to study would be the period over which the SEC and DOJ perform their investigations leading to the regulatory proceedings; however, investigations are not publicly disclosed by the SEC and DOJ, and it is not possible to determine the actual date on which an investigation is either initiated or terminated. In only 278 (24.5%) of the 1,133 enforcement

¹¹ The lack of significance on the whistleblower flag for prison sentences may be partially due to ongoing enforcement actions with incomplete outcomes. For example, 36% of the enforcement actions in the post-Sarbanes-Oxley period with whistleblower involvement have sentencing hearings that are still pending against one or more respondents.

actions did the firm publicly acknowledge it had received a non-public inquiry by regulators regarding a potential violation, and anecdotal evidence from legal proceedings suggests regulators begin looking at a firm long before the firm acknowledges regulators' interest. Similarly, the initial filing of a complaint by regulators does not signal the end of an investigation as SEC enforcement releases often include the phrase "the Commission's investigation is continuing." Therefore, we use the total period measured from the beginning of the violation period to the filing of the last regulatory proceeding as a proxy for the length of the investigation period. We control for the same factors that regulators consider when assessing penalties (discussed in the previous tests), with the exception of the length of the violation period (see Appendix A).

In Table 6 Panel A, we present the mean and median lengths of the violation period, the regulatory proceedings period, and the total period for all 1,133 enforcement actions, and we test for differences between enforcement actions with and without whistleblower involvement. Because the regulatory proceedings are not completed in 184 of the enforcement actions, we use hazard or survival time models to account for the censoring of the incomplete actions to estimate the duration of the regulatory proceedings and total periods. We find both the mean and median duration of all three periods are significantly longer when a whistleblower is involved.

Table 6 Panel B presents regression results using the periods of duration described in Panel A as dependent variables. Due to the censoring problem described above, we use survival time in a log-logistic parameterization with robust standard errors to estimate the regulatory proceedings and total periods. While we find the estimated coefficient on the whistleblower flag is positive in all three models, whistleblower involvement is significantly associated with only longer total duration of the enforcement action, increasing the overall period of enforcement 10 months, from 92 months to 102 months (10.9%). Our collective findings are consistent with

whistleblower involvement providing incremental information and insights that allow regulators to more thoroughly investigate and prosecute misconduct, but at the cost of prolonging the total duration of the enforcement process. While more evidence is needed to fully understand the costs and benefits of whistleblower involvement, these findings suggest the benefits of whistleblowing documented previously do not come without a cost.

6. Likelihood of an Enforcement Action Given a Whistleblower Complaint

Our primary objective is to understand the relationship between whistleblower involvement and regulatory outcomes, conditional on the existence of an enforcement action; thus, our tests cannot speak to the effect of whistleblowing when there is no enforcement action. However, we present a contingency table in Table 7 that examines the likelihood of an enforcement action, conditional on a whistleblower filing a complaint. To perform this analysis, we assume the total number of firms appearing in Compustat from 1978-2012 (23,024) is a reasonable estimate of the total population of firms subject to the reporting requirements under Section 13(a) of the Exchange Act.¹² The 1,133 enforcement actions in our sample are associated with 1,092 unique firms (41 recidivist enforcement actions), leaving 21,932 unique firms without enforcement actions (23,024 - 1,092).

We identify a total of 969 whistleblower complaints (see Table 2) representing 654 unique firms. Of these firms, 134 are also subject to a subsequent enforcement action (145 enforcement actions associated with whistleblower involvement minus 11 recidivist enforcement actions). The remaining 520 firms subject to a whistleblowing allegation (654 - 134) are not subject to a subsequent enforcement action.

¹² The number of firms appearing in Compustat underestimates the total number of firms whose securities are registered pursuant to Section 12 of the Exchange Act, which is a condition of a financial misrepresentation enforcement action under Section 13(b). Using the percentage of firms in the enforcement sample that are *not* covered by Compustat as a proxy for this underestimation, we estimate approximately 3,003 additional firms are subject to SEC oversight. To be conservative, however, we assume the number of firms subject to SEC oversight is 23,024 (per Compustat), which in untabulated tests, understates the risk of an enforcement action conditional on a whistleblowing allegation.

The risk of an enforcement action is the proportion of enforcement firms divided by the total number of firms within each category of whistleblower involvement. As reported in Table 7, the unconditional risk of an enforcement action is 4.74%. Conditional on the existence of a whistleblowing complaint, the risk of an enforcement action increases to 20.49%, resulting in a risk ratio of 4.78 (i.e., the risk of an enforcement action is 4.78 times higher with a whistleblower complaint).

An alternative way of presenting risk differences is the odds ratio. This ratio is calculated as the proportion of firms subject to whistleblowing allegations that are also associated with an enforcement action ($134 / 520 = 25.8\%$), divided by the same ratio for firms not subject to whistleblowing allegations ($958 / 21,412 = 4.5\%$). This analysis suggests the odds of a firm facing an enforcement action are 5.76 times greater among firms with prior whistleblower complaints.

This analysis also indicates that whistleblower complaints are not without inherent costs. For 520 of the 654 firms (79.51%) with whistleblower complaints, there is no subsequent enforcement action, suggesting a large portion of whistleblower complaints either are frivolous, are not sufficiently informative to result in an enforcement action, or slip through the cracks. These costs likely offset some of the benefits gained through whistleblower involvement in enforcement actions.

7. Treatment Effects Analysis to Address Potential Endogeneity

The evidence in Table 4 indicates that whistleblower involvement in enforcement actions results in significantly higher firm and employee penalties and longer prison sentences for convicted employees. However, if whistleblower involvement in enforcement actions is not a random event or is subject to self-selection, these results may be affected by endogeneity. In this section, we employ treatment effects analysis, an econometric technique that mitigates the effects

of this potential endogeneity. Treatment effects attempts to alleviate selection bias as well as the missing counterfactual problem inherent in observational data (e.g., we cannot observe the outcome of each enforcement action both with and without whistleblower involvement) [Greene 2012]. Because we are primarily interested in the average treatment effects for the observations with whistleblower involvement and not for the observations without whistleblowers, treatment effects is better suited for handling these econometric issues than are other methods, such as traditional instrumental variable estimators and selection models [Frolich and Melly 2013].

Treatment effects measures the impact of a treatment (i.e., whistleblower involvement) on the outcomes of interest (i.e., penalties and prison sentences) when treatment status is not randomized. If an endogenous relationship exists, this implies the treatment status (whistleblowing) and the outcomes of interest (firm and employee penalties) may not be independent. Treatment effects utilizes covariates to make the treatment and the outcomes independent after conditioning on these covariates.

We employ inverse-probability-weighted regression adjustment (IPWRA) to estimate the average treatment effects on the enforcement actions with whistleblower involvement. The IPWRA estimator uses two models: one to predict treatment (i.e., whistleblower) status and another to predict outcomes (i.e., penalties). IPWRA estimates the treatment effects as follows: (1) estimates the parameters of the treatment model and computes inverse-probability weights; (2) uses the estimated inverse-probability weights to fit weighted regression models of the outcome for each treatment level and to obtain the treatment-specific predicted outcomes for each observation; and (3) computes the means of the treatment-specific predicted outcomes. The difference between the actual and predicted averages provides the estimate of the average treatment effect. We restrict the computations to the subset of 145 observations with whistleblower involvement and estimate the effect of whistleblower involvement for these firms.

In Appendix B, we use a logit treatment model to estimate the likelihood of whistleblower involvement. The dichotomous dependent variable takes the value of one if the enforcement action is associated with whistleblower involvement, and zero otherwise. The independent variables include characteristics of the violation, as well as ownership, governance, and firm characteristics, other external influences that may be associated with the incidence of whistleblowing, and industry fixed effects [Bowen et al. 2010]. We find the likelihood of whistleblower involvement in an enforcement action is positively associated with the percentage of public float of the firm's common stock, firm size (market capitalization), and an indicator variable for enforcements occurring after the Securities Enforcement Remedies and Penny Stock Reform Act (SERPSRA), which gave the SEC authority to enforce a wider range of violations, thereby providing whistleblowers with a venue for reporting additional violations. Whistleblower involvement is negatively associated with the firm's market-to-book ratio and the use of a Big N auditor. The area under the ROC curve for our treatment model is 0.8674, indicating good model fit.

The outcome model (also reported in Appendix B) uses the same Poisson-pseudo-maximum likelihood (PPML) estimation method used in Table 4, with the omission of the whistleblower indicator variable. For each enforcement outcome, we calculate two outcome regressions and the treatment effects are the difference in the results of the two outcomes.

Table 8 presents the estimates of the treatment effects for firm penalties (Panel A), employee penalties (Panel B), and employee prison sentences (Panel C). In Panel A, the 145 enforcement actions associated with whistleblower activity would have been subject to estimated firm penalties averaging \$49.25 million ($p < 0.001$) had there been no whistleblower involvement. Therefore, the average treatment effect of whistleblower involvement is \$94.65

million ($p = 0.078$), suggesting 65.8% of the \$143.90 million in average penalties for these observations is attributable to whistleblowers.

For the 145 observations with whistleblower involvement, the average employee penalty that would be observed without whistleblower involvement is \$7.27 million ($p = 0.008$). We find the average treatment effect for these observations is \$56.07 million ($p = 0.211$), suggesting 88.5% of the \$63.34 million in average employee penalties levied in these enforcement action is due to whistleblower involvement.¹³

These results indicate that for the 145 enforcement actions with whistleblower involvement, the increase in average total penalties (firm plus employee) attributable to whistleblowers is \$150.72 million ($\$94.65 + \56.07). Multiplying this average difference by the 145 whistleblower observations in the sample yields an estimated \$21.85 billion increase in total penalties attributable to whistleblower involvement, which represents 72.6% of the total penalties assessed to these firms and their employees, and 27.5% of the \$79.46 billion in total penalties assessed by the SEC and DOJ across all 1,133 enforcement actions from 1978 to 2012.

Finally, for the 145 observations with whistleblower involvement, the average prison sentence that would be observed without whistleblowers is 13.59 months ($p = 0.004$). The average treatment effect for these observations is 25.84 months ($p = 0.011$), suggesting 65.5% of the 39.43 months in average prison sentences is due to whistleblower involvement. We note that the treatment effects in all three analyses are larger than the proportion of penalties due to whistleblower involvement documented in Table 4 Panel B, suggesting any potential endogeneity likely *understates* the effect of whistleblowers on enforcement outcomes.

¹³ Although the average treatment effect of whistleblower involvement on employee penalties is not statistically significant ($p=0.211$), in untabulated analyses we employ treatment effects analysis to estimate the effect of whistleblower involvement on *total* firm penalties (firm plus employee penalties). In this analysis, we find whistleblowers are associated with an economically and statistically significant ($p=0.042$) increase in monetary sanctions.

8. Conclusion

Recent Congressional legislation has emphasized whistleblowing programs at regulatory agencies such as the SEC, CFTC, and the IRS. Although policymakers and regulators often tout the importance of whistleblowers, whether whistleblowers have a measurable impact on outcomes of enforcement actions remains unclear because some whistleblowing complaints are frivolous [Bowen et al. 2010] and resource constraints prevent regulators from identifying and pursuing all credible allegations. We empirically estimate the impact of whistleblowers on outcomes of enforcement actions for financial misrepresentation.

Using data obtained through a Freedom of Information Act filing to identify potential whistleblower involvement in regulatory enforcement actions for financial misrepresentation, we investigate whether whistleblower involvement is associated with increased monetary penalties against firms, and larger monetary sanctions and longer prison sentences against culpable employees. After controlling for the factors the SEC and DOJ indicate are important in determining penalties, we find that, on average, whistleblower involvement is associated with \$76.96 million in additional firm penalties than what would be observed with no whistleblower involvement. We also find that, on average, employees are fined \$39.29 million more and are sentenced to jail terms that are 21.55 months longer when whistleblowers were involved. In total, we estimate whistleblowers have enabled regulators to successfully obtain \$16.86 billion in additional judgments against firms and employees that would not have been obtained without whistleblower assistance. This increase in penalties accounts for approximately 56% of all penalties assessed in cases with whistleblower involvement, and 21% of the total \$79.46 billion penalties assessed by the SEC and DOJ from 1978 to 2012. When we use treatments effects to mitigate potential endogeneity concerns, we estimate that whistleblowers are responsible for

27.5% of all penalties assessed over the sample period and increase the length of prison sentences for culpable employees by more than 25 months.

Whistleblowers may also affect the regulatory enforcement process in other ways. Due to the inside information they bring to the attention of regulators, whistleblowers may increase the workload required by regulators to investigate the violation, resulting in longer regulatory proceedings than would have occurred without whistleblower involvement. We find that whistleblower involvement increases the duration of an enforcement action by 10 months, or about 10.9%. In additional analyses, we estimate that 85% of whistleblower complaints are either frivolous or not pursued by regulators, indicating there are additional costs of encouraging whistleblowers. However, given the magnitude of the increased penalties associated with whistleblower involvement that we document, these costs are unlikely to fully offset the benefit whistleblowers provide. Further, the benefits we document in this study ignore other potential benefits, such as the societal benefit of more effective enforcement and the potential for whistleblower involvement in regulatory enforcement to discourage subsequent violations.

In summary, this study establishes that whistleblowers are a valuable source of information for regulators in the investigation and prosecution of financial misconduct. These findings provide new empirical evidence on the impact of whistleblowers on regulatory enforcement of financial misrepresentation and inform policymakers on the ongoing debate about the efficacy of whistleblowing programs.

Appendix A. Variable Definitions

(○) Indicates a dependent variable and (●) an independent variable in the associated table regressions.

Table				Variable	Definition
3	4/5/C	6	B		
			●	% Average loss	The natural logarithm of the average loss to a randomly chosen share purchase during the violation period, which is then sold at the close of trade following the first public announcement of a potential violation. The average acquisition price is calculated by taking the volume-weighted average of the daily closing stock value over the entire violation period adjusted for any changes in shares outstanding.
●	●	●	●	Big N auditor flag	An indicator variable equal to one if the misreporting firm used a Big N auditor, and equal to zero otherwise.
●	●	●	●	% Blockholder ownership	The percentage of blockholder ownership, defined as owners with at least five percent of common shares outstanding from the last 10-K or DEF 14A prior to the first public announcement the firm may be (is) subject to a regulatory enforcement action.
			●	Board size	The number of members on the firm's board of directors in the last year of the violation period.
●	●	●	●	Bribery flag	An indicator variable equal to one if the enforcement actions includes charges under the Foreign Corrupt Practices Act for bribery of a foreign official and zero otherwise.
			●	Chm/CEO duality flag	An indicator variable equal to one if the chairman of the board of directors also held the title of Chief Executive Officer for the majority of the violation period.
●	●	●	●	# C-level respondents	The zero skewness natural logarithm of 1.629834 + the total number of C-level respondents (e.g. CEO, COO, CFO, CAO, CMO, and CIO) named in the enforcement action.
●	●	●	●	# Code violations	The zero skewness natural logarithm of 10.91596 + the total number of unique code sections and rules violated (charges) associated with the enforcement action.
●	●	●	●	Cooperation flag	An indicator variable equal to one if the firm received credit in the assessment of penalties for cooperation as stated in regulatory enforcement documents during the course of the investigation and equal to zero otherwise.
●	●	●	●	Deterrence flag	An indicator variable equal to one if the violation includes an offense for either option backdating, insider trading, or an offense related to an offering, IPO, merger, or reverse merger and equal to zero otherwise.
●	●	●	●	Distance from regulator	The natural logarithm of the distance in miles from the location of the firm's headquarters to the offices of the regulator assigned to the geographic area of the firm's headquarter location (closer of the SEC Regional Office or DOJ US District Attorney).
○	○			Employee penalties (\$MM)	The total civil and criminal penalties assessed against all employees consisting of disgorgement, prejudgment interest, civil fines, criminal restitution, and criminal fines in millions of dollars.
			●	# Employees	The natural logarithm of the number of employees at the firm in the last year of the violation period.
●	●	●	●	Executive terminated flag	An indicator variable equal to one if the firm terminated an executive respondent as a result of the violations and equal to zero otherwise.
			●	Financial distress flag	An indicator variable equal to one if the firm failed for reasons of bankruptcy, cessation, foreclosure, liquidation, revocation etc. before the end of the regulatory period.
			●	Firm age	The natural logarithm of the firm age in the year of the first regulatory enforcement proceeding.
○	○			Firm penalties (\$MM)	The total firm civil and criminal monetary penalties assessed against the firm, its parent and subsidiaries consisting of disgorgement, prejudgment interest, civil fines, criminal restitution, and criminal fines in millions of dollars.
			●	Founder firm flag	An indicator variable equal to one if the founder was an executive at the firm and zero otherwise.
●	●	●	●	Fraud flag	An indicator variable equal to one if fraud under 15 USC §§ 77q, 78j(b), or rules promulgated thereunder are included among the charges in the enforcement action.
●	●	●	●	Impeded investigation flag	An indicator variable equal to one if regulators acknowledged they were deliberately misled and/or charges were included for lying to investigators and equal to zero otherwise.

Appendix A. Variable Definitions (cont.)

Table				Variable	Definition
3	4/5/C	6	B		
●	●	●	●	% Independent directors	The percentage of the firm's directors that are independent from the last 10-K or DEF 14A prior to the first public announcement the firm may be (is) subject to a regulatory enforcement action.
●	●	●	●	% Initial abnormal return	The value-weight market-adjusted return measured at the close of trading on the initial public announcement date that the firm may be (is) subject to a regulatory enforcement action, winsorized at the 0.01 percentile.
		●		Insider trading flag	An indicator variable equal to one if the enforcement action included insider trading violations and zero otherwise.
●	●	●		Leverage ratio	The natural logarithm of total debt divided by total assets measured at the last fiscal year end prior to the first public announcement the firm may be (is) subject to a regulatory enforcement action.
●	●	●	●	Market-to-book ratio	The sum of market value of equity plus total assets minus total debt divided by total assets with market value determined below and total assets and total debt measured at the last fiscal year end prior to the first public announcement the firm may be (is) subject to a regulatory enforcement action.
●	●	●	●	Market capitalization	The natural logarithm of the market value of equity measured in millions of dollars prior to the first public announcement the firm may be (is) subject to a regulatory enforcement action.
●	●	●		Misled auditor flag	An indicator variable equal to one if the violation included violations of 17 CFR 240.13b2-2 that prohibits materially false or misleading statement to an accountant in connection with the preparation of financial statements and zero otherwise.
●	●	●		Organized crime flag	An indicator variable equal to one if violation or any of the respondents were associated with a known organized crime family and zero otherwise.
		●		Post-SERPSRA flag	An indicator variable equal to one if any portion of the violation occurred after the Securities Enforcement Remedies and Penny Stock Reform Act of 1990 was signed into law on October 15, 1990 and equal to zero otherwise.
●	●	●		Post-SOX flag	An indicator variable equal to one if any portion of the violation occurred after the Sarbanes-Oxley Act was signed into law on July 30, 2002 and equal to zero otherwise.
○	○			Prison sentences (mos.)	Total incarceration consisting of jail, prison, home detention, and halfway house in months imposed upon employee respondents named in the enforcement action.
		●		% Public float	The percentage of the firm's equity not held by insiders and is calculated as 1 – portion of insider ownership reported prior to the first public announcement the firm may be (is) subject to a regulatory enforcement action.
●	●	●	●	Recidivist flag	An indicator variable equal to one if the firm was previously the subject of a securities regulatory enforcement action and equal to zero otherwise.
		○		Reg. proceedings period	The time period over which the regulatory proceedings occurred in months.
		●		Reverse merger flag	An indicator variable equal to one if the firm became public through a reverse merger or was a development stage firm during the violation period.
●	●	●		Self-dealing flag	An indicator variable equal to one if the violation includes self-dealing such as embezzlement and theft by respondents and equal to zero otherwise.
		●		Top 3 exec respondent flag	An indicator variable equal to one if the chairman of the board, CEO, or president was named as a culpable respondent in the enforcement action and zero otherwise.
		○		Total period	The total time period in months from the beginning of the violation period to the end of the regulatory proceedings period.
●	●	●	●	Violation period	The natural logarithm of the total time the violation occurred in months as indicated in the regulatory enforcement proceedings.
		○		Violation period	The total time the violation occurred in months as indicated in the regulatory enforcement proceedings.
○	●	●	○	Whistleblower flag	An indicator variable equal to one if a whistleblower is associated with the enforcement action and equal to zero otherwise.

Appendix B. Treatment Effects and Auxiliary Parameter Estimates

This table reports the average treatment effects to examine the impact of whistleblowers on enforcement outcomes for the 145 enforcement actions with whistleblower involvement. We first summarize the treatment effects, followed by the results of the outcome model which uses a Poisson pseudo-maximum likelihood (PPML) estimation method with inverse-probability-weighted regression adjustment (IPWRA). The weights are determined from the result of the treatment model, which is reported at the bottom of this appendix. The 1,133 enforcement actions used in the estimation represent the universe of all regulatory enforcement actions initiated for financial misrepresentation from 1978 through 2012 under Section 13(b) and rules promulgated thereunder of the Securities and Exchange Commission Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977. Each cell presents the coefficient estimate and the associated p-value using robust standard errors. All variables are defined in Appendix A. The dependent variables are total firm penalties in millions of dollars, total employee penalties in millions of dollars, and total employee prison sentences in months. ***, ** and * represent significance at 0.01, 0.05, and 0.10 respectively.

	Firm Penalties		Employee Penalties		Prison Sentences	
Average treatment effect of treated (ATET)						
WBFlag = yes (1) vs no (0)	94.6538 (0.078)		56.0674 (0.211)		25.8420 (0.011)	
Potential outcome mean WBFlag = no (0)	49.2477 (0.001)		7.2707 (0.008)		13.5925 (0.004)	
Outcome Model (PPML)	WBFlag=0	WBFlag=1	WBFlag=0	WBFlag=1	WBFlag=0	WBFlag=1
Violation period	1.4205*** (0.000)	0.5462** (0.026)	1.2067*** (0.001)	2.0017* (0.051)	0.0812 (0.685)	1.0161** (0.050)
Self-dealing flag	0.5723 (0.445)	1.3057** (0.027)	0.8870 (0.208)	3.9484*** (0.000)	0.6647 (0.095)	0.7752 (0.270)
% Blockholder ownership	0.8948 (0.389)	-4.2541*** (0.000)	3.6370** (0.024)	-1.3542 (0.405)	0.3517 (0.508)	-5.7827** (0.003)
Initial abnormal return	-5.7609*** (0.000)	1.4893 (0.237)	-2.1131 (0.516)	-5.0494*** (0.001)	-1.2431 (0.178)	-2.8345*** (0.009)
Bribery flag	0.2917 (0.548)	0.7045 (0.283)	-0.3991 (0.712)	-0.3747 (0.759)	-0.0385 (0.956)	1.0786 (0.177)
Deterrence flag	0.4349 (0.434)	-0.1947 (0.730)	1.5018** (0.013)	1.8976 (0.106)	-0.6085* (0.088)	2.0123*** (0.008)
Organized crime flag	-3.3331* (0.069)	1.6645 (0.101)	-2.5092** (0.041)	-1.9657* (0.076)	-1.0796 (0.101)	0.9168 (0.363)
# C-level respondents	-0.9422 (0.220)	0.3927 (0.349)	0.5844 (0.689)	0.8610 (0.547)	0.9495* (0.081)	1.9501*** (0.001)
# Code violations	1.0485 (0.421)	3.5395*** (0.000)	-0.0898 (0.947)	2.1957 (0.476)	3.4139*** (0.000)	0.4333 (0.661)
Fraud flag	-0.0502 (0.957)	-0.3002 (0.591)	0.8631 (0.429)	0.0295 (0.986)	-0.2513 (0.779)	1.7406 (0.174)
Misled auditor flag	0.0024 (0.996)	1.0792* (0.079)	0.7421 (0.335)	1.1492 (0.105)	0.0788 (0.836)	-0.7303 (0.325)
Big N auditor flag	-0.2062 (0.743)	1.0682 (0.152)	-0.9069 (0.223)	-1.2007 (0.265)	-0.1558 (0.602)	-1.7706*** (0.001)
Executive terminated flag	0.9226 (0.190)	0.0046 (0.995)	2.1410** (0.036)	0.2960 (0.614)	0.0440 (0.931)	0.2353 (0.854)
Cooperation flag	-0.6942* (0.087)	0.7775* (0.100)	-0.1975 (0.666)	-0.8549 (0.210)	-0.5527* (0.083)	0.3961 (0.554)
Impeded investigation flag	-3.3623 (0.308)	-0.4880 (0.594)	-2.5423 (0.440)	1.2133 (0.265)	-0.9845 (0.130)	1.3142 (0.289)
% Independent directors	1.5152* (0.076)	-0.2495 (0.785)	-0.1829 (0.857)	-0.4572 (0.761)	-1.3471** (0.039)	-1.9304** (0.027)
Recidivist flag	0.1007 (0.837)	-0.2859 (0.596)	-0.3149 (0.547)	-1.0920 (0.339)	0.2830 (0.386)	0.7276 (0.520)
Post-SOX flag	0.5767 (0.392)	-0.3253 (0.790)	0.7733 (0.612)	-3.7328 (0.187)	-0.4085 (0.275)	-2.5165*** (0.000)

Market capitalization	0.2014 (0.122)	0.0696 (0.447)	0.1995 (0.282)	0.2933 (0.529)	0.0966 (0.232)	-0.2323 (0.231)
Market-to-book ratio	-0.3237* (0.073)	-0.2343* (0.077)	-0.1608 (0.363)	-0.6262*** (0.001)	-0.1049 (0.101)	-0.1202 (0.265)
Leverage ratio	0.9407** (0.011)	0.3282 (0.244)	0.5839** (0.040)	-0.1181 (0.770)	0.3473** (0.032)	0.1349 (0.651)
Distance to regulator	-0.0582 (0.554)	-0.1366 (0.208)	-0.1628* (0.059)	0.2068* (0.064)	-0.1262** (0.023)	0.1590 (0.182)
Constant	-7.5743** (0.044)	-9.5761*** (0.001)	-8.9661** (0.018)	-13.9023 (0.257)	-7.9896*** (0.000)	-0.6954 (0.852)
Treatment Model (logit)	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
<i>Violation Characteristics</i>						
Violation period	0.2027	(0.123)	0.2027	(0.123)	0.2027	(0.123)
% Average loss	-0.1658	(0.405)	-0.1658	(0.405)	-0.1658	(0.405)
% Initial abnormal return	1.2696	(0.125)	1.2696	(0.125)	1.2696	(0.125)
Bribery flag	0.3694	(0.258)	0.3694	(0.258)	0.3694	(0.258)
Insider trading flag	0.2165	(0.535)	0.2165	(0.535)	0.2165	(0.535)
Top 3 exec respondent flg	0.2779	(0.273)	0.2779	(0.273)	0.2779	(0.273)
Recidivist flag	0.3552	(0.187)	0.3552	(0.187)	0.3552	(0.187)
<i>Ownership Characteristics</i>						
% Public float	1.1696*	(0.088)	1.1696*	(0.088)	1.1696*	(0.088)
% Blockholder	0.0667	(0.915)	0.0667	(0.915)	0.0667	(0.915)
<i>ownership</i>						
<i>Governance</i>						
Board size	-0.0129	(0.686)	-0.0129	(0.686)	-0.0129	(0.686)
% Independent directors	0.5765	(0.365)	0.5765	(0.365)	0.5765	(0.365)
Chm/CEO duality flag	-0.4358	(0.116)	-0.4358	(0.116)	-0.4358	(0.116)
<i>Firm Characteristics</i>						
Founder firm flag	0.1880	(0.503)	0.1880	(0.503)	0.1880	(0.503)
Firm age	0.1341	(0.370)	0.1341	(0.370)	0.1341	(0.370)
# Employees	0.0674	(0.467)	0.0674	(0.467)	0.0674	(0.467)
Market capitalization	0.4438***	(0.000)	0.4438***	(0.000)	0.4438***	(0.000)
Market-to-book ratio	-0.1458*	(0.096)	-0.1458*	(0.096)	-0.1458*	(0.096)
Financial distress flag	0.2724	(0.328)	0.2724	(0.328)	0.2724	(0.328)
Reverse merger flag	0.4500	(0.390)	0.4500	(0.390)	0.4500	(0.390)
<i>External Influences</i>						
Big N auditor flag	-0.9339**	(0.030)	-0.9339**	(0.030)	-0.9339**	(0.030)
Post-SERPSRA flag	1.3196**	(0.028)	1.3196**	(0.028)	1.3196**	(0.028)
Distance from regulator	-0.0261	(0.564)	-0.0261	(0.564)	-0.0261	(0.564)
<i>Industry Fixed Effects</i>						
Consumer non-durables	(omitted)		(omitted)		(omitted)	
Consumer durables	-0.0176	(0.982)	-0.0176	(0.982)	-0.0176	(0.982)
Manufacturing	0.3432	(0.562)	0.3432	(0.562)	0.3432	(0.562)
Oil, gas & coal extraction	-1.1849	(0.101)	-1.1849	(0.101)	-1.1849	(0.101)
Chemicals & chem. prod.	0.3595	(0.714)	0.3595	(0.714)	0.3595	(0.714)
Business equipment	0.3037	(0.595)	0.3037	(0.595)	0.3037	(0.595)
Telephone & TV trans.	0.0134	(0.985)	0.0134	(0.985)	0.0134	(0.985)
Utilities	-0.5017	(0.554)	-0.5017	(0.554)	-0.5017	(0.554)
Wholesale & retail	0.2185	(0.710)	0.2185	(0.710)	0.2185	(0.710)
Healthcare & medicine	-0.0020	(0.998)	-0.0020	(0.998)	-0.0020	(0.998)
Finance	0.2106	(0.729)	0.2106	(0.729)	0.2106	(0.729)
Other	-0.4452	(0.485)	-0.4452	(0.485)	-0.4452	(0.485)
Constant	-7.800***	(0.000)	-7.800***	(0.000)	-7.800***	(0.000)
N		1,133		1,133		1,133
χ^2		165.53		165.53		165.53
p		(0.000)		(0.000)		(0.000)
Pseudo R-squared		0.3123		0.3123		0.3123
Area under ROC curve		0.8674		0.8674		0.8674

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Table 1. Criteria used in Determining Penalties and Related Proxy Variables

This table presents a summary of the SEC’s framework for the determination of corporate penalties released on January 4, 2006 (SEC 2006) and the relevant sections of the United States Sentencing Commission Guidelines Manual Chapter 8 - Sentencing of Organizations, Part C – Fines (USSC 2013) and the independent proxy variables used in regression analyses. A detailed description of each of the variables and their construction are presented in Appendix A.

Securities and Exchange Commission	Federal Sentencing Guidelines Manual	Proxy variables
The presence or absence of a direct benefit to the corporation as a result of the violation.	§8C2.4. (a)(2) The pecuniary gain to the organization from the offense.	Self-dealing flag
The degree to which the penalty will recompense or further harm injured shareholders.	§8C2.8. (a)(3) Any collateral consequences of conviction, including civil obligations arising from the organization's conduct. §8C2.9. Disgorgement. The court shall add to the fine any gain to the organization from the offense that has not and will not be paid as restitution or by way of other remedial measures.	% Blockholder ownership
The extent of the injury to innocent parties.	§8C2.4. (a)(2) The pecuniary loss from the offense caused by the organization. §8C2.8. (a)(4) Any non-pecuniary loss caused or threatened by the offense.	% Initial abnormal return Violation period
The need to deter the particular type of offense.	§8C2.8. (a)(1) The need for the sentence to reflect the seriousness of the offense, promote respect for the law, provide just punishment, afford adequate deterrence, and protect the public from further crimes of the organization.	Bribery flag Organized crime flag Deterrence flag <i>If any of the following occurred:</i> Option backdating related Insider trading related Offering/IPO related Merger related Reverse merger
Whether complicity in the violation is widespread throughout the corporation.	§8C2.5. (b) Involvement in or Tolerance of Criminal Activity. §8C2.8. (a)(2) The organization's role in the offense.	# C-level respondents # Code violations
The level of intent on the part of the perpetrators.	§8C2.3. Offense Level.	Fraud flag Misled auditor flag
The degree of difficulty in detecting the particular type of offense.		Big N auditor flag
Presence or lack of remedial steps by the corporation.		Exec respondent terminated flag
Extent of cooperation with Commission and other law enforcement.	§8C2.5. (g) Self-Reporting, Cooperation, and Acceptance of Responsibility. §8C2.5. (e) Obstruction of Justice.	Cooperation flag Impeded investigation flag
Effective compliance programs.	§8C2.8. (a)(11) Whether the organization failed to have, at the time of the instant offense, an effective compliance and ethics program.	% Independent directors
Prior enforcement history.	§8C2.5. (c) Prior History. §8C2.5. (d) Violation of an Order. §8C2.8. (a)(6) Any prior criminal record of an individual within high-level personnel of the organization or high-level personnel of a unit of the organization who participated in, condoned, or was willfully ignorant of the criminal conduct. §8C2.8. (a)(7) Any prior civil or criminal misconduct by the organization.	Recidivist flag
Legislative history and statutory authority.		Post-SOX flag
Firm-level controls		Market capitalization Market-to-book ratio Leverage ratio Distance from regulator Industry (Fama & French 12-industry)

Table 2. Description of Whistleblowing and Enforcement Action Samples

The 1,133 enforcement actions represents the universe of all regulatory enforcement actions initiated for financial misrepresentation from 1978 through 2012 under Section 13(b) and rules promulgated thereunder of the Securities and Exchange Commission Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977. Panel A summarizes the type of whistleblower actions by source. OSHA refers to the Occupational Safety and Health Administration and FOIA and Non-FOIA refer to the OSHA whistleblower actions received through a Freedom of Information Act filing and those directly referred to in administrative and legal proceedings as part of the enforcement action. Panel B presents the enforcement actions partitioned pre and post Sarbanes-Oxley Act and by whistleblower involvement by type of respondent named and the position or relation to the firm. Panel C presents the frequency counts and percentages of firms listed in Compustat over the relevant period, the number of OSHA whistleblower complaints received through the Freedom of Information Act filing and enforcement actions by industry using the Fama and French 12-industry classification.

Panel A. Source of Whistleblower Action

Type	N	%
OSHA FOIA whistleblower complaints received	934	
Total enforcement actions	1,133	100.0
No whistleblower	988	87.2
Whistleblower	145	12.8
OSHA FOIA	110	9.7
<i>Qui tam</i>	20	1.8
As noted in enforcement proceedings	15	1.3

Panel B. Whistleblower Actions by Respondent Type

Category	N	% Actions	Whistleblower		
			No	Yes	%
Total enforcement actions	1,133	100.00	988	145	12.80
Pre Sarbanes-Oxley Act	475	41.92	468	7	1.47
Post Sarbanes-Oxley Act	658	58.08	520	138	20.97
<i>Respondent type</i>					
Executive	953	84.11	858	95	9.97
CEO	689	60.81	631	58	8.42
Other C-level executive	200	17.65	177	23	11.50
Non-executive employee	299	26.39	265	34	11.37
Firm	886	78.20	21	124	14.00
Firm only	145	12.80	102	43	29.66

Table 2. Description of Whistleblowing and Enforcement Action Samples (cont.)

Panel C. Whistleblower Actions by Fama and French 12 Industry Classification

Industry	Compustat Firms	Whistleblower Complaints		Enforcement Actions					
		N	% Firms	All			With Whistleblower		
				N	% Firms	% Actions	N	% Actions	% Complaints
Consumer Non-Durables: food, tobacco, textiles, apparel, leather, toys	1,085	38	3.50	68	6.27	6.00	7	10.29	18.42
Consumer Durables: cars, TV's, furniture, household appliances	449	21	4.68	31	6.90	2.74	5	16.13	23.81
Manufacturing: machinery, trucks, planes, office furniture, paper, commercial printing	1,968	76	3.86	102	5.18	9.00	18	17.65	23.68
Oil, Gas, & Coal Extraction & Products	1,936	23	1.19	44	2.27	3.88	5	11.36	21.74
Chemicals & Allied Products	368	16	4.35	30	8.15	2.65	4	13.33	25.00
Business Equipment: computers, software & electronic equip	3,586	156	4.35	260	7.25	22.95	35	13.46	22.44
Telephone and Television Trans	688	45	6.54	32	4.65	2.82	6	18.75	13.33
Utilities	338	38	11.24	18	5.33	1.59	3	16.67	7.89
Wholesale, Retail & Some Services (Laundries, Repair Shops)	1,909	82	4.30	140	7.33	12.36	15	10.71	18.29
Healthcare, Medical Equip & Drugs	1,877	90	4.79	92	4.90	8.12	12	13.04	13.33
Finance	4,424	254	5.74	158	3.57	13.95	25	15.82	9.84
Other: mines, construction, building maintenance, trans, hotels, business services, entertainment	4,396	130	2.96	158	3.59	13.95	10	6.33	7.69
Total	23,024	969	4.06	1,133	4.92	100.00	145	12.80	14.96

Table 3. Descriptive Statistics

This table reports means and tests of means for the variables in our models partitioned by whether or not there is whistleblower involvement. The 1,133 enforcement actions represents the universe of all regulatory enforcement actions initiated for financial misrepresentation from 1978 through 2012 under Section 13(b) and rules promulgated thereunder of the Securities and Exchange Commission Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977. All variables are defined in Appendix A. Significance of a parametric t-test is indicated next to the difference in means (assuming unequal variances where appropriate. For dichotomous variables the proportions are presented along with the significance from a test of proportions. Variables indicated with § are presented in their non-transformed metric but are log transformed in the regression analyses. ***, ** and * represent significant differences at $p < 0.01$, $p < 0.05$, and $p < 0.10$ respectively.

	All	Whistleblower		Difference
		No	Yes	
N	1,133	988	145	
Dependent variables				
Firm penalties (\$MM)	47.44	33.29	143.90	-110.62**
Employee penalties (\$MM)	22.69	16.72	63.64	-46.62
Prison term (mos.)	20.66	17.90	39.43	-21.53**
Independent variables				
Violation period (mos.)§	36.12	33.55	53.64	-20.10***
Self-dealing flag	14.47%	15.89%	4.83%	11.06%***
% Blockholder ownership	42.68%	44.95%	27.21%	17.74%***
% Initial abnormal return	-11.97%	-12.68%	-7.18%	-5.50%***
Bribery flag	10.06%	7.09%	30.34%	-23.26%***
Deterrence flag	62.22%	62.75%	58.62%	4.13%
Organized crime flag	2.12%	2.33%	0.69%	1.64%
# C-level respondents§	1.54	1.57	1.35	0.22
# Code violations§	11.16	11.22	10.76	0.46
Fraud flag	75.02%	77.33%	59.31%	16.67***
Big N auditor flag	69.55%	66.80%	88.28%	-21.47%***
Misled auditor flag	50.40%	52.53%	35.86%	16.67%***
Executive terminated flag	53.13%	54.76%	42.07%	12.69%***
Cooperation flag	28.16%	24.60%	52.41%	-27.82%***
Impeded investigation flag	3.53%	3.14%	6.21%	-3.07%*
% Independent directors	46.04%	43.30%	64.72%	-21.42%***
Recidivist flag	19.15%	18.52%	23.45%	-4.93%
Post-SOX flag	58.08%	52.63%	95.17%	-42.45%***
Market capitalization (\$MM)§	6,304.68	2,321.43	33,445.69	-31,124.26***
Market-to-book ratio	3.65	3.94	1.68	2.26***
Leverage ratio§	1.42	1.54	0.66	0.88**
Distance to regulator§	340.13	294.74	649.35	-354.61***

Table 4. Enforcement Outcomes

Panel A presents a Poisson pseudo-maximum likelihood (PPML) regression results examining the association between employee whistleblowing allegations and enforcement outcomes. The 1,133 enforcement actions represents the universe of all regulatory enforcement actions initiated for financial misrepresentation from 1978 through 2012 under Section 13(b) and rules promulgated thereunder of the Securities and Exchange Commission Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977. We present coefficient estimates on top and associated p-values below using robust standard errors. All variables are defined in Appendix A. The dependent variables are total firm penalties in millions of dollars, total employee penalties in millions of dollars, and total employee prison sentences in months. Panel B presents differences in predicted outcomes based on scenario analysis. The PAF is the population attributable fraction or the proportion of the penalties (prison sentences) due to whistleblower involvement. ***, ** and * represent significance at 0.01, 0.05, and 0.10 respectively.

Panel A: Poisson pseudo-maximum likelihood (PPML) Regressions

	Firm Penalties	Employee Penalties	Prison Sentences
Whistleblower flag	0.7653** (0.022)	0.9685** (0.019)	0.7912** (0.023)
Violation period	1.3145*** (0.001)	1.4494*** (0.000)	0.2863** (0.011)
Self-dealing flag	0.2518 (0.602)	1.1166** (0.014)	0.8096*** (0.000)
% Blockholder ownership	0.5576 (0.683)	2.3734*** (0.002)	0.3358 (0.396)
% Initial abnormal return	-1.7103 (0.393)	-0.0081 (0.996)	-0.6376 (0.205)
Bribery flag	-0.2644 (0.591)	-1.8902*** (0.008)	0.1545 (0.794)
Deterrence flag	0.4372 (0.281)	1.6580** (0.027)	0.0373 (0.868)
Organized crime flag	-0.3924 (0.655)	-1.7487*** (0.000)	0.0144 (0.963)
# C-level respondents	0.3004 (0.708)	1.9158** (0.017)	0.8305*** (0.003)
# Code violations	2.9965*** (0.005)	2.0876 (0.135)	3.0879*** (0.000)
Fraud flag	-1.4568*** (0.004)	-0.1659 (0.843)	-0.0240 (0.966)
Misled auditor flag	1.6424*** (0.001)	1.8683*** (0.001)	0.2207 (0.352)
Big N auditor flag	0.2786 (0.728)	-0.5577 (0.216)	0.1064 (0.688)
Exec respondent terminated flag	0.4899 (0.242)	0.5941 (0.416)	0.0975 (0.729)
Cooperation flag	-0.7391* (0.084)	-0.5647 (0.188)	-0.3642 (0.200)
Impeded investigation flag	-1.8516 (0.178)	-2.8009 (0.187)	-0.7036 (0.147)

Table 4. Enforcement Outcomes (con't)

Panel A (con't): Poisson pseudo-maximum likelihood (PPML) Regressions

	Firm Penalties (\$ MM)	Employee Penalties (\$ MM)	Prison Sentences (Months)
% Independent directors	0.2225 (0.870)	-1.5672* (0.059)	-0.3932 (0.418)
Recidivist flag	0.3415 (0.484)	-0.2607 (0.558)	0.1823 (0.481)
Post-Sox flag	-0.3128 (0.662)	-0.7724 (0.192)	-0.1835 (0.513)
Market capitalization	0.3190** (0.016)	0.4382*** (0.002)	0.0645 (0.231)
Market-to-book ratio	-0.0944 (0.117)	-0.0827** (0.046)	-0.0008 (0.953)
Leverage ratio	1.2236*** (0.000)	0.9611*** (0.000)	0.0592 (0.661)
Distance from regulator	-0.1157* (0.091)	-0.1037 (0.104)	-0.0926** (0.038)
Constant	-13.2584*** (0.001)	-16.4055*** (0.000)	-9.3595*** (0.000)
N	1133	1133	1133
χ^2	510.39	444.90	562.48
p	(0.000)	(0.000)	(0.000)
Pseudo R ²	0.6153	0.7406	0.3934

Panel B: Scenario Analysis

Average Predictions	Firm Penalties (\$ MM)	Employee Penalties (\$ MM)	Prison Sentences (Months)
All Observations (N=1,133)			
Whistleblower = 0	37.59***	17.66***	17.90***
Whistleblower = 1	80.81***	46.51***	39.49***
PAF (percent change from 0 to 1)	1.15**	1.63**	1.21**
Whistleblower Observations (N=145)			
Whistleblower = 0	66.94***	24.05***	17.88***
Whistleblower = 1	143.90***	63.34***	39.43***
PAF (percent change from 1 to 0)	0.53**	0.62**	0.55**
Non-Whistleblower Observations (N=988)			
Whistleblower = 0	33.29***	16.72***	17.90***
Whistleblower = 1	71.55***	44.05***	39.50***
PAF (percent change from 0 to 1)	1.15**	1.63**	1.21**

Table 5. Post-Sarbanes-Oxley Act Enforcement Outcomes

This table reports Poisson pseudo-maximum likelihood (PPML) regression results examining the association between employee whistleblowing allegations and enforcement outcomes for enforcement actions where any part of the violation occurred after enactment of the Sarbanes-Oxley Act on July 30, 2002. The 658 enforcement actions represents the universe of all regulatory enforcement actions initiated for financial misrepresentation under Section 13(b) and rules promulgated thereunder of the Securities and Exchange Commission Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977. Each cell presents the coefficient estimate on top and associate p-value below using robust standard errors. All variables are defined in Appendix A. The dependent variables are total firm penalties in millions of dollars, total employee penalties in millions of dollars, and total employee prison sentences in months. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 respectively.

	Firm Penalties	Employee Penalties	Prison Sentences
Whistleblower flag	0.8350** (0.012)	0.8340** (0.018)	0.3657 (0.287)
Violation period	1.4178*** (0.000)	1.5108*** (0.000)	0.3159** (0.046)
Self-dealing flag	0.8376* (0.098)	1.5872** (0.021)	0.7975*** (0.004)
% Blockholder ownership	-0.9973 (0.319)	1.3496* (0.058)	0.3951 (0.426)
% Initial abnormal return	-2.9487** (0.029)	-1.5466 (0.357)	-1.0537* (0.095)
Bribery flag	-0.3567 (0.388)	-1.6395** (0.043)	-0.0441 (0.959)
Deterrence flag	-0.0065 (0.986)	0.9261 (0.175)	-0.1181 (0.654)
Organized crime flag	-0.2982 (0.657)	-1.8034*** (0.001)	-0.0452 (0.921)
# C-level respondents	-0.6828 (0.195)	0.4930 (0.500)	0.8834*** (0.010)
# Code violations	3.7133*** (0.000)	3.0758 (0.106)	3.2017*** (0.000)
Fraud flag	-1.3893** (0.015)	-0.3601 (0.793)	-0.7356 (0.309)
Misled auditor flag	1.5342*** (0.000)	1.3219*** (0.007)	0.4200 (0.221)

Table 5. Post-Sarbanes-Oxley Act Enforcement Outcomes (cont.)

Big N auditor flag	-0.7714*	-1.3529***	0.4200
	(0.075)	(0.005)	(0.221)
Exec respondent terminated flag	0.7601	1.1914	0.3577
	(0.121)	(0.205)	(0.240)
Cooperation flag	-0.8627**	-0.6150	-0.3356
	(0.038)	(0.162)	(0.306)
Impeded investigation flag	-0.4993	-0.6728	-0.4963
	(0.524)	(0.607)	(0.348)
% Independent directors	1.0210	-1.2712	-0.3603
	(0.301)	(0.237)	(0.502)
Recidivist flag	-0.1512	-1.0763**	0.3184
	(0.655)	(0.043)	(0.307)
Market capitalization	0.2888***	0.4140***	0.0200
	(0.002)	(0.008)	(0.758)
Market-to-book ratio	-0.0498	-0.0341*	-0.0079
	(0.138)	(0.068)	(0.700)
Leverage ratio	0.9109***	0.5281***	0.1888*
	(0.000)	(0.001)	(0.050)
Distance from regulator	-0.0715	-0.0486	-0.0455
	(0.252)	(0.403)	(0.384)
Constant	-14.3546***	-17.5444***	-9.6654***
	(0.004)	(0.000)	(0.000)
N	658	658	658
χ^2	615.44	568.79	491.43
p	(0.000)	(0.000)	(0.000)
Pseudo R ²	0.6575	0.7751	0.4375

Table 6. Duration of Violation, Regulatory Proceedings, and Total Periods

This table reports descriptive statistics and regression results for the duration of the violation and regulatory proceedings periods and the total duration of the enforcement action for the 1,133 enforcement actions that represents the universe of all regulatory enforcement actions initiated for financial misrepresentation from 1978 through 2012 under Section 13(b) and rules promulgated thereunder of the Securities and Exchange Commission Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977. Panel A presents the mean and median period in months partitioned by whistleblower involvement of (1) the period over which the violation occurred, (2) the regulatory proceedings period from the first filing of a regulatory proceeding to the final conclusive regulatory proceeding, and (3) the total period. Due to the censoring of 184 uncompleted regulatory actions, figures for the regulatory and total periods are calculated using survival time estimates. The means are presented in the first row and medians on the second. Significance of a parametric t-test is indicated next to the difference in means (assuming unequal variances where appropriate) and a Wilcoxon rank-sum test next to the difference in medians. Periods indicated with a § are estimated using survival times with significance of log-rank test of equality of survival functions next to difference in means and a Wilcoxon-Breslow-Gehan test next to difference in medians. Panel B presents a regression analysis of each of the periods described in Panel A. Model (1) is estimated using OLS and models (2) and (3) estimated using a log-logistic parameterization of survival time. Each cell in OLS regressions presents the coefficient estimate on top and associated p-value below using robust standard errors and for survival regressions each cell presents time ratios on top and associated p-value below using robust standard errors. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 respectively.

Panel A: Descriptive statistics

Period (months)		All	Whistleblower		Difference
			No	Yes	
	N	1,133	988	145	
Violation	mean	36.12	33.55	53.64	-20.10***
	median	26.94	24.02	48.00	-23.98***
Regulatory proceedings§	mean	33.33	31.88	43.82	-13.94***
	median	19.52	18.63	35.45	-16.82**
Total§	mean	100.93	95.98	137.15	-41.17***
	median	89.83	85.69	126.82	-41.13***

Table 6. Duration of Violation, Regulatory Proceedings, and Total Periods (cont.)

Panel B: Regression analyses

	Violation Period	Regulatory Proceedings Period	Total Period
Estimator:	OLS	Survival	Survival
Whistleblower flag	5.2918 (0.122)	1.5330 (0.136)	1.1074** (0.027)
Self-dealing flag	6.8971*** (0.002)	1.2924 (0.227)	1.1013** (0.019)
% Blockholder ownership	-3.0306 (0.376)	1.0203 (0.955)	1.0299 (0.599)
% Initial abnormal return	26.8351*** (0.000)	1.7790 (0.237)	1.2003** (0.015)
Bribery flag	21.7454*** (0.000)	3.5588*** (0.002)	1.4162*** (0.000)
Deterrence flag	1.6575 (0.415)	1.6580** (0.039)	1.0705** (0.038)
Organized crime flag	-8.9803** (0.040)	0.8958 (0.743)	1.1032 (0.118)
# C-level respondents	-5.8907** (0.041)	4.3161*** (0.000)	1.0729 (0.159)
# Code violations	28.8693*** (0.000)	125.7281*** (0.000)	2.0761*** (0.000)
Fraud flag	-5.8907** (0.041)	5.1369*** (0.000)	0.9793 (0.660)
Misled auditor flag	-0.6723 (0.693)	0.9644 (0.855)	0.9945 (0.855)
Big N auditor flag	-0.4030 (0.833)	0.5587** (0.013)	0.9665 (0.353)
Exec respondent terminated flag	4.7368** (0.013)	0.8657 (0.500)	1.0615* (0.085)
Cooperation flag	4.4099* (0.072)	0.7746 (0.229)	1.0091 (0.803)
Impeded investigation flag	-6.9213* (0.061)	1.5152 (0.180)	1.0700 (0.324)
% Independent directors	4.5018 (0.215)	1.1532 (0.693)	1.1200* (0.074)
Recidivist flag	2.4424 (0.254)	1.7920*** (0.003)	1.0999*** (0.005)
Post-SOX flag	0.0199 (0.991)	2.1643*** (0.000)	1.2283*** (0.000)
Market capitalization	1.6673*** (0.000)	1.0054 (0.902)	1.0277*** (0.000)

Table 6. Duration of Violation, Regulatory Proceedings, and Total Periods (cont.)

Market-to-book ratio	-0.0001*** (0.004)	1.0000 (0.961)	1.0000 (0.820)
Leverage ratio	0.0776 (0.915)	1.1938 (0.013)	1.0230 (0.119)
Distance from regulator	-0.5107 (0.259)	0.9429 (0.131)	0.9981 (0.767)
Constant	-53.5601*** (0.001)	0.0000*** (0.000)	5.9286*** (0.000)
Shape parameter		1.4736*** (0.000)	0.2323*** (0.000)
N	1,133	949	949
N censored		184	184
χ^2	11.99	1078.97	584.20
p	(0.000)	(0.000)	(0.000)
R ²	0.2148		

Table 7. Conditional Likelihood of an Enforcement Action Given the Filing of a Whistleblower Complaint

This table presents a contingency analysis of the likelihood of an enforcement action given a whistleblower complaint has been filed against the firm. The total number of firms appearing in Compustat from 1978-2012 is used as an estimate of the total population of firms (23,024). Included in the population of 1,133 enforcement actions are 1,092 unique firms. This leaves 21,932 firms without enforcement actions. Of the 145 enforcement actions with whistleblower involvement, there are 134 unique firms with enforcement actions. Of the 654 unique firms with whistleblower complaints, 520 (654 – 134) are not associated with an enforcement action. Risk is the proportion of enforcement firms with (without and total) whistleblowers divided by the total number of firms with (without and total) whistleblower complaints. The risk ratio is the relative risk of an enforcement action given a whistleblower complaint to the risk of an enforcement action without whistleblower involvement. The odds ratio is the ratio of enforcement-to-non-enforcement firms in whistleblower firms divided by the same ratio for non-whistleblower firms and represents the increased odds of facing an enforcement action given a whistleblower complaint was filed. The 95% Confidence intervals are calculated using the exact method.

		Whistleblower		Total
		Yes	No	
Enforcement	Yes	134	958	1,092
	No	520	21,412	21,932
	Total	654	22,370	23,024
	Risk	20.49%	4.28%	4.74%
		Estimate	95% Confidence interval	
	Risk ratio	4.7844	4.0640	5.6325
	Odds ratio	5.7596	4.7140	7.0372
	Pearson's χ^2	369.42	Pr > χ^2 = 0.000	

Table 8. Treatment Effects of Whistleblower Involvement

This table presents the average treatment effects on outcomes of enforcement actions with whistleblower involvement (N=145) using inverse-probability-weighted regression adjustment treatment effects. The 1,133 enforcement actions used in the estimation represent the universe of all regulatory enforcement actions initiated for financial misrepresentation from 1978 through 2012 under Section 13(b) and rules promulgated thereunder of the Securities and Exchange Commission Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977. The results and auxiliary equations are presented in Appendix B. The inverse probability weights are estimated from a logit treatment model to predict whistleblower involvement, and the outcome models are weighted Poisson pseudo-maximum likelihood (PPML) regression models using the same variables presented in Table 4 without the whistleblower flag. Each panel presents the average treatment effect of whistleblower involvement, the potential outcome mean if no whistleblower involvement, and the average penalty (prison sentences) for the 145 observations with whistleblower involvement. Panel A presents the results for firm penalties, Panel B presents the results for employee penalties, and Panel C presents the results for the length of employee prison sentences. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 respectively.

Panel A. Firm Penalties (n = 145)

	\$ Millions	Robust Std, Error	z	P > z	[95% Confidence Interval]	
Average treatment effect of whistleblower involvement	94.65	53.6335	1.76	0.078*	-10.4659	199.7763
Predicted outcome mean if no whistleblower involvement	49.25	15.1565	3.25	0.001***	19.5414	78.9540
Average firm penalty for whistleblowing observations	143.90					

Panel B. Employee Penalties (n = 145)

	\$ Millions	Robust Std, Error	z	P > z	[95% Confidence Interval]	
Average treatment effect of whistleblower involvement	56.07	44.8255	1.25	0.211	-31.7889	143.9236
Predicted outcome mean if no whistleblower involvement	7.27	2.7268	2.67	0.008***	1.9263	12.6151
Average employee penalty for whistleblowing observations	63.34					

Panel C. Employee Prison Sentences (n = 145)

	Months	Robust Std, Error	z	P > z	[95% Confidence Interval]	
Average treatment effect of whistleblower involvement	25.84	10.2196	2.53	0.011**	5.8119	45.8721
Predicted outcome mean if no whistleblower involvement	13.59	4.6770	2.91	0.004***	4.4257	22.7593
Average prison sentences for whistleblowing observations	39.43					