



# Rank and file employees and the discovery of misreporting: The role of stock options<sup>☆</sup>



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## ABSTRACT

We find that firms grant more rank and file stock options when involved in financial reporting violations, consistent with managements' incentives to discourage employee whistle-blowing. Violating firms grant more rank and file options during periods of misreporting relative to control firms and to their own option grants in non-violation years. Moreover, misreporting firms that grant more rank and file options during violation years are more likely to avoid whistle-blowing allegations. Although the Dodd-Frank Act (2010) offers financial rewards to encourage whistle-blowing, our findings suggest that firms discourage whistle-blowing by giving employees incentives to remain quiet about financial irregularities.

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"It takes a team to pull off a good corporate fraud." – Floyd Norris ([New York Times, 2007](#)).

## 1. Introduction

Although senior executives often spearhead corporate wrongdoing, accounting misrepresentation cannot be sustained without support from rank and file employees ([Association of Certified Fraud Examiners, 2014](#)). Even employees not directly involved with the wrongdoing may observe signs of misconduct and can decide whether to remain silent and allow the wrongdoing to continue or to blow the whistle and expose the misconduct. Little is known about the role of lower-level employees in corporate misconduct, even though such employees play an important role in the discovery of financial

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misrepresentation (Dyck et al., 2010).

In this paper, we address two research questions. First, are stock option grants to rank and file employees consistent with an effort to discourage employees from blowing the whistle? Second, among firms accused of misreporting, are larger stock option grants to rank and file employees associated with a reduced incidence of employee whistle-blowing?

Corporate leadership has several ways to more closely tie the compensation of rank and file employees to the perpetuation of misconduct. Stock options are a popular and effective mechanism to link compensation with firm performance, although cash bonuses, perquisite consumption, and early promotions are other tools at management's disposal. In this study, we focus on stock option grants because vesting schedules prevent employees from liquidating their entire portfolio of options before exposing the firm's misconduct, the expected gain from stock options is directly tied to the continuation of the misconduct, and rank and file stock option grants are empirically measureable for a relatively large sample of firms.

Our misreporting sample consists of firms subject to class action shareholder litigation obtained from Stanford Securities Class Action Clearinghouse for the period 1996–2011. Our final sample has 784 cases spanning 1243 violation years for 663 unique firms, and our control sample contains all other firms on ExecuComp without an alleged violation. Consistent with expectations, we find that misreporting firms grant stock options to rank and file employees averaging 2.49% of total shares outstanding during the period that begins with the violation period and ends with discovery of the misreporting, which is significantly higher than the 1.62% granted by control firms to their rank and file employees.

We also find that rank and file option grants are significantly larger in violation years (2.49%) relative to the years before (2.17%) and after (1.67%) the misreporting for the same firm, suggesting that endogeneity in the form of omitted firm characteristics is unlikely to explain our results. Further, the higher usage of rank and file options in violation years remains statistically significant in multivariate estimations that control for top-five executive compensation, industry, year, location, and firm characteristics that have been shown to impact rank and file option grants; after the inclusion of firm fixed effects that control for time invariant firm characteristics; when the misreporting firms are compared with a propensity score matched control sample; in a sample of firms subject to Securities and Exchange Commission (SEC) enforcement; and when frivolous lawsuits are removed (i.e., lawsuits that were dismissed or with non-negative returns in the five-day window surrounding the announcement of the lawsuit).

If greater financial incentives from stock options increase the likelihood that employees facilitate wrongdoing, we expect stock option grants to be negatively associated with the incidence of whistle-blowing. We use a LexisNexis search and find that 63 cases in our sample of class action litigation, or about 8.4%, experienced a whistle-blowing event after the start of the violation period. Misreporting firms that experienced (avoided) an employee whistle-blowing event granted stock options to rank and file employees averaging 1.37% (2.44%) of total shares outstanding during the violation period. The 78% higher usage of rank and file options in misreporting firms without whistle-blowing is both statistically and economically significant. These univariate results hold in a multivariate setting with controls for stock options and other compensation granted to the firm's top-five executives, other determinants of whistle-blowing allegations as documented by Bowen et al. (2010), and year and industry fixed effects. Furthermore, abnormal option grants, computed relative to average option grants for all firms in the same industry that year are negatively associated with employee whistle-blowing, providing further support for the hypothesis that rank and file stock options deter employees from blowing the whistle about financial misreporting.

Because our sample consists of only discovered misconduct, many firms that engaged in misconduct and did not get caught are not included in our sample. To assess whether this impacts our results, we develop a measure of the likelihood of misreporting that is independent of whether any misreporting at the firm is ultimately discovered. Based on prior work that short selling is associated with future wrongdoing, our measure is based on abnormal short selling activity.<sup>1</sup> We model short interest as a function of firm fundamentals associated with overvaluation, and we use the residuals from this model as a proxy for the short interest arising from undiscovered misreporting. Firms with abnormal short interest grant more rank and file stock options than firms with lower abnormal short interest, consistent with our hypothesis.

An alternative explanation for our results is that stock options increase alignment between employees and shareholders. If so, employees with stock options may be motivated to monitor and expose wrongdoing internally, obviating the need for external whistle-blowing and potentially accounting for the negative association between external whistle-blowing and rank and file stock option grants. We address this possibility by including in our empirical model several proxies for firm governance and using the data set on internal whistle-blowing provided by Dyck et al. (2010) to examine whether larger rank and file stock option grants are associated with an increased incidence of internal discovery of wrongdoing. The results suggest that this alternative explanation is unlikely to explain our findings.

Another explanation for our findings is that firms with a culture of hubris are more likely to both misreport and use stock-based compensation. We use chief executive officer (CEO) pay slice to proxy for organizational hubris and, after controlling for this variable, we continue to find results consistent with our hypotheses. Finally, we identify and exclude all cases of misreporting involving option backdating, and our results remain unchanged.

This study makes three contributions to the literature. First, our findings suggest that regulators' financial incentives to encourage whistle-blowing, as mandated by Section 922 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, are offset by employers' financial incentives to discourage whistle-blowing. This finding has important policy

<sup>1</sup> See Desai et al. (2006), Efendi et al. (2005), and Karpoff and Lou (2010).

implications, given media reports that the SEC is investigating other ways in which firms subvert whistle-blowing legislation, including confidentiality agreements in employment and severance contracts that prevent employees from contacting regulators or benefiting from government probes (Ensign, 2015).

Second, several recent papers link executive compensation and, in particular, the use of equity-based compensation with incentives to misreport.<sup>2</sup> We show that rank and file compensation is also important in the facilitation and discovery of misreporting, even after controlling for option grants to the top-five executives.

Third, the rationale for granting rank and file stock options is somewhat of a puzzle, and our study offers an additional explanation for their use. Prior work shows that rank and file stock option awards sort and retain employees, address local labor market competition (Oyer, 2004; Oyer and Schaefer, 2005; Bergman and Jenter, 2007; Kedia and Rajgopal, 2009), and align the incentives of employees and shareholders (Hochberg and Lindsey, 2010). Our findings suggest an additional, albeit perverse, rationale. On the margin, firms grant rank and file options to share inflated profits with employees to facilitate misreporting and to reduce the likelihood of employee whistle-blowing.

## 2. Hypotheses

Employees are often asked to help implement corporate misconduct. Individual motives for facilitating misreporting include a sense of loyalty to the firm and to coworkers and a desire to avoid being labeled a snitch. Whistle-blowing involves huge personal risks such as the temporary or permanent loss of employment, personal trauma, and social stigma. Motives for blowing the whistle include maintaining personal integrity, avoiding complicity in the wrongdoing, and the need to remove the public harm caused by the misconduct (Acre, 2010). Along with these moral and ethical concerns, financial considerations likely impact the whistle-blowing decision. We argue that, on the margin, employees are more likely to cooperate in wrongdoing if they gain financially from it.

This argument implies that the employee's compensation is contingent on the continuation of the wrongdoing, such that the employee perceives some financial cost to the revelation of the wrongdoing. Although incentives to support misconduct can come in many forms (e.g., larger salaries, bigger travel budgets, better health care benefits, other perquisite consumption, early promotions), we focus on rank and file stock option grants for four reasons.<sup>3</sup>

First, the financial gains associated with stock options are directly tied to the value of the firm's stock. Because whistle-blowing allegations, particularly those involving earnings management, are associated with negative announcement returns (Bowen et al., 2010), and because the revelation of wrongdoing often leads to litigation and regulatory actions that are associated with further declines in share price, the value of an employee's stock option portfolio is intrinsically tied to his or her decision to blow the whistle.

Second, in contrast to other forms of compensation, option grants vest over several years. Hence, any decision to blow the whistle impacts not only the value of a single year's option grants, but also the value of options granted in prior years. Third, senior executives have the discretion to award larger option grants to the employees who are either perpetrating the wrongdoing or in a position to discover it. Fourth, unlike many other forms of firm performance-based compensation, stock option grants are reported in a systematic manner for a large number of firms, facilitating an empirical examination of rank and file option grants through time and across firms.<sup>4</sup>

In short, firms that award large rank and file stock option grants provide their employees greater financial incentive to support financial misrepresentation, either by facilitating the wrongdoing or by encouraging silence. This leads to our first hypothesis.

**H1:** Firms that engage in questionable financial reporting practices grant more rank and file stock options during violation years, on average.

The financial incentives firms provide can be mitigated by regulatory efforts to encourage whistle-blowing. For example, Section 922 of the Dodd-Frank Act provides significant new monetary incentives for individuals to file whistle-blower reports to the SEC and stipulates retaliation protection for employees who blow the whistle. The monetary awards range from 10% to 30% of fines, penalties, or repayments of losses and are payable only to those who contribute original

<sup>2</sup> See Cheng and Warfield (2005), Burns and Kedia (2006), Erickson et al. (2006), Bergstresser and Philippon (2006), Efendi et al. (2007), Peng and Roell (2008), and Johnson et al. (2009).

<sup>3</sup> Firms can deter employee whistle-blowing in other ways. For instance, the SEC recently concluded its first whistle-blower protection case in which KBR Inc. required witnesses in certain internal interviews to sign confidentiality statements with language warning that they could face disciplinary action and even be fired if they discussed matters with outside parties without the prior approval of KBR's legal department (see [http://www.sec.gov/news/pressrelease/2015-54.html#\\_VSbeiPnF-0X](http://www.sec.gov/news/pressrelease/2015-54.html#_VSbeiPnF-0X)). These employment or severance contracts are not easily observable. Further, the SEC can more easily challenge their use. In contrast, compensation contracts are more easily observable, and the SEC has more difficulty arguing that the compensation was intended to discourage whistle-blowing.

<sup>4</sup> Restricted stock units (RSUs) represent another form of state-contingent compensation at management's disposal to discourage whistle-blowing. We hand-collected RSU data for about half of the firms in the litigation sample (randomly selected). We find that 57% of these firm-year observations have no RSU grants across the entire firm. The absence of RSU grants is particularly pronounced prior to the implementation of FAS 123R. In contrast, only 5% of these firm-year observations did not issue stock options, suggesting rank and file stock option grants represent a much stronger test of our hypothesis than do rank and file RSU grants.

information that leads to recoveries of monetary sanctions of \$1 million or more in criminal and civil proceedings.<sup>5</sup>

The financial incentives regulators offer could dwarf any financial incentives the firm can provide. However, financial bounties offered by the government are uncertain. That is, the whistle-blower is paid only if the SEC decides to investigate the case and is successful in extracting fines and penalties from the accused firm. Adding to this uncertainty, monetary sanctions imposed by the SEC are typically not large (Karpoff et al., 2008b). Further, the SEC's prior record in rewarding whistle-blowers is not generous. During its 20-year existence, the SEC's whistle-blower program related to insider trading has paid just over \$1 million to only six participants (Holzer and Johnson, 2010).<sup>6</sup> With respect to Dodd-Frank, as of August 2014, 16 whistle-blowing applications to the SEC have been rejected and nine case awards have been approved.<sup>7</sup> Hence, an employee has to contend with several probabilistic outcomes before collecting a bounty from the SEC.<sup>8</sup>

On the surface, the financial incentives provided to an employee from stock options are not large. In our sample, each year about 780 stock options with a Black-Scholes fair value of \$6,981 are granted to the average rank and file employee. However, for several reasons, this figure underestimates the financial incentives employees face when deciding whether to blow the whistle. First, the distribution of options can be concentrated among those few employees who are in a position to observe or help perpetuate the wrongdoing, allowing key employees to receive nontrivial financial incentives to be supportive. Unfortunately, lack of data on the distribution of rank and file option grants prevents an explicit test of this conjecture. Second, the financial incentives associated with stock options are related not just to that year's stock option grant but also to the entire portfolio of options held, and the impact of whistle-blowing on the value of the entire option portfolio is likely to be substantial. Further, stock options represent just one form of financial incentive employees receive.

In summary, an employee weighs both ethical and financial considerations when deciding whether to blow the whistle. We posit that, on the margin, firms can discourage would-be whistle-blowers by providing financial incentives through rank and file stock options. This leads to our second hypothesis.

**H2:** The probability of an employee blowing the whistle for questionable financial reporting practices is lower, on average, among firms that grant more rank and file stock options.<sup>9</sup>

Fig. 1 outlines a hypothetical timeline of events. Once management begins to misreport, the possibility of employee whistle-blowing emerges, and senior management has incentive to grant additional stock options to rank and file employees in an effort to encourage cooperation and silence among the employees who discover the misconduct. After the misreporting ends, the possibility of whistle-blowing continues until the misconduct is discovered. In our sample, the misreporting period (or class period) lasts an average of 418 days, and the lawsuit is filed an average of 116 days after the end of the class period.

Although we cannot observe the vesting date or the exercise date for rank and file options, the options granted during the misreporting period likely vest at some point after the filing of the lawsuit, suggesting that employees are not able to benefit from any options they receive during the misreporting period. However, misreporting often goes undetected and, in these situations, cooperating employees likely benefit from the decision to remain silent.<sup>10</sup> Therefore, granting additional stock options to rank and file employees during the misreporting period can be a viable strategy *ex ante*, even if the misreporting is ultimately discovered *ex post*.

<sup>5</sup> Section 301 of the Sarbanes-Oxley Act of 2002 (SOX) also created a whistle-blowing program by requiring audit committees to implement mechanisms for recording, tracking, and acting on information provided by employees confidentially and anonymously. However, the Dodd-Frank Act further elevated the importance of whistle-blowing programs by enabling employees, vendors, and customers, among others, to bypass companies' internal control systems and report accusations directly to the U.S. government.

<sup>6</sup> The Office of the Inspector General (Office of the Inspector General, Office of Audits, Securities and Exchange Commission, 2010) reviewing the program found that five applications for bounties in the period 1989–2009 had been denied and that, from 2005 to 2010, the SEC received approximately 30 other bounty applications but did not formally take action. Although the SEC filed or initiated a total of 204 insider trading cases in the period 2005–2008, the SEC approved only three payments under the bounty program.

<sup>7</sup> See [http://en.wikipedia.org/wiki/SEC\\_Office\\_of\\_the\\_Whistleblower](http://en.wikipedia.org/wiki/SEC_Office_of_the_Whistleblower).

<sup>8</sup> Dickins and Awner (2011) argue that Section 922 of the Dodd-Frank Act is unlikely to be effective at encouraging whistle-blowing. Based on an analysis of two analogous federal bounty programs, the Federal False Claims Act (FFCA) and the Informant Claims Program (ICP), they contend that although rewards under these programs are substantial, the general use of the programs is not high. Moreover, they anticipate a lack of adequate federal funding to pursue reported claims, making payouts highly uncertain. With that said, the SEC has announced nine awards to date, ranging from \$25,000 to \$30 million ([http://en.wikipedia.org/wiki/SEC\\_Office\\_of\\_the\\_Whistleblower](http://en.wikipedia.org/wiki/SEC_Office_of_the_Whistleblower)). We cannot observe the potential awards that were not granted because would-be whistle-blowers decided not to come forward.

<sup>9</sup> This hypothesis does not imply that rank and file stock options will eliminate whistle-blowing in all cases, even when stock option grants are large. Incentives provided by stock options are likely to be inadequate when the misrepresentation is egregious or when the employee's moral and ethical compass strongly points to reporting the violation.

<sup>10</sup> Chief financial officers interviewed by Dichev et al. (2013) claim that 20% of their peers have used U.S. Generally Accepted Accounting Principles (GAAP) to misrepresent their economic performance. In contrast, only 1–3% of firms are accused of misreporting in class action lawsuits or SEC enforcement actions, or both, suggesting that a substantial percentage of misreporting goes undetected.

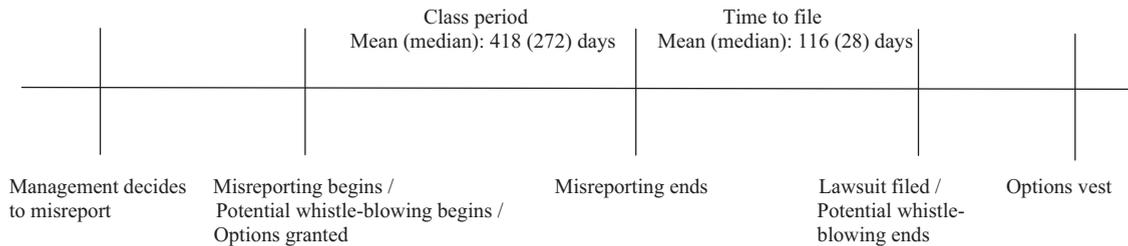


Fig. 1. Timeline of events.

### 3. Sample and measurement of rank and file stock option grants

#### 3.1. Sample of corporate misconduct

We use Stanford Securities Class Action Clearinghouse data to find class action lawsuits filed between 1996 and 2011, to identify firms alleged to have engaged in financial misreporting. We do not model a manager's decision to engage in financial misreporting and, for tractability, instead consider the decision to misreport as a starting point for our analysis.<sup>11</sup> We match firms to Compustat for firm-level data and to ExecuComp for compensation data. We also collect data on the lawsuit filing date and the violation or class period (the period over which the firm is alleged to have committed the violations).<sup>12</sup> The final sample consists of 784 class action litigation actions across 663 unique firms (Table 1).<sup>13</sup>

#### 3.2. Measuring rank and file stock option grants

We estimate the number of options granted to rank and file employees as the difference between the total number of options granted by the firm and the number of options granted to the firm's top executives. We use ExecuComp for top executive compensation and estimate total options granted by the firm from the options granted to the executive (NUMSECUR) and the executive's share of total option grants (PCTTOTOPT).<sup>14</sup> An estimate of the total options granted by the firm can be obtained from each top-five executive's share of total options granted. We discard estimates of total option grants that are not within 1% of each other, as such data are likely unreliable, and we use the average value from all remaining executives as the measure of total options granted by the firm. After 2006, ExecuComp no longer reports the percentage of total options granted to an executive. Therefore, starting in 2007, we use Compustat to determine the total number of options granted by the firm (OPTGR).<sup>15</sup>

We scale the number of rank and file option grants by total shares outstanding to get *RF\_OPTIONS*, the measure of rank and file options. Similarly, we scale option grants to top-five executives by the number of shares outstanding (*TOP5\_OPTIONS*).

## 4. Tests of Hypothesis 1: Rank and file option grants during periods of misreporting

#### 4.1. Univariate analysis

We test the first hypothesis and examine whether firms grant more rank and file stock options during periods of misreporting. Because violation firms have the greatest motivation to grant stock options to employees when their cooperation is needed and the threat of whistle-blowing is strongest, we examine option grants from the beginning of the violation

<sup>11</sup> A vast literature examines managers' decision to engage in misreporting (Fields et al., 2001; Graham et al., 2005; Dichev et al., 2013; Dechow et al., 2010). Reasons include the need for external financing on favorable terms, circumventing debt covenants, and analyst pressure. A related literature documents the role of compensation and managerial behavior in misreporting (Burns and Kedia, 2006; Armstrong et al., 2010; Armstrong et al., 2013; Bushee, 1998; Schrand and Zechman, 2012). We do not attempt to examine the motivations for wrongdoing. Instead, we take the firm's decision to misreport as given and examine whether, on the margin, stock price-based incentives deter employee whistle-blowing.

<sup>12</sup> The sample consists of class action lawsuits filed after 1996 with data availability on ExecuComp. As violation years fall prior to the filing of the lawsuit, they can occur before 1996. We include all violation years after 1992 for which we have compensation data. One of the limitations of using litigation or SEC enforcement data, shared by most studies in the area, is that we are restricted to a sample of discovered fraud.

<sup>13</sup> Of the 784 class action lawsuits, 359 include violation periods that were ultimately subject to a restatement. However, the remaining lawsuits may still represent legitimate financial misconduct as they involve allegations unrelated to potential GAAP-based violations.

<sup>14</sup> Incentives for silence can also arise from employee stock ownership plans (ESOPs). We do not examine these as Perun (2000) documents that in 1997 only 1% of all retirement plans were ESOPs and, of these, one-third were terminated in the grant year. Further, stock options plans have become a far more important channel for equity ownership over time.

<sup>15</sup> For the years 2003–2005, total options granted by firms are available through both ExecuComp and Compustat. We are able to calculate rank and file options grants using both methods for 2,646 firm-year observations during this period. For most firms, the two values are within 2% of each other. However, to ensure that this does not impact our results, we reestimated our regressions using only the ExecuComp measure of rank and file options and found qualitatively similar results.

**Table 1**

Sample description.

The lawsuit sample consists of all firms subject to shareholder class action litigation from 1996 to 2011 with data availability in Compustat and ExecuComp. We include in our analyses all violation years of these litigation cases dating back to 1992, as compensation data begin in 1992. For purposes of our analyses, the violation period covers the years the firm misreported (the class period) and all years until discovery (the filing date).

Sample characteristic	Lawsuits
Original events from 1996 to 2011	784
Unique firms from 1996 to 2011	663
Firm-years in violation period	1,243
Unique events with whistle-blowing overlap	63

**Table 2**

Rank and file option grants: litigation and control firms.

This table reports rank and file option grants for firms subject to class action litigation relative to control firms that have not had any misrepresentation event. Violation years are years the firm misreported through discovery. In Panel A, “Lawsuit firms–other years” represents all years of firms subject to litigation that are not violation years and “Control firms–all years” includes all years of control firms. We report the average annual value of *RF\_OPTIONS*, which is the number of options granted to rank and file employees scaled by total shares outstanding. Panel B examines rank and file option grants in the years before violation (*PRE*) and in the years after discovery (*POST*), relative to the option grants during the violation years through discovery. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively. Two-sided *p*-values are based on the *t*-statistic for differences in means and the Wilcoxon *Z*-statistic for differences in medians.

	Mean	Median	N
<b>Panel A: Full sample</b>			
Lawsuit firms–violation years (1)	2.49%	1.65%	1,243
Lawsuit firms–other years (2)	1.87%	1.20%	4,424
Control firms–all years (3)	1.62%	1.03%	10,070
Significance test–(1) versus (2)	< 0.001***	< 0.001***	
Significance test–(1) versus (3)	< 0.001***	< 0.001***	
<b>Panel B: Firms that misrepresented</b>			
Lawsuit firms– <i>PRE</i> violation years (1)	2.17%	1.55%	1,812
Lawsuit firms–violation years (2)	2.49%	1.65%	1,243
Lawsuit firms– <i>POST</i> violation years (3)	1.67%	0.95%	2,612
Significance test–(1) versus (2)	0.001***	0.071*	
Significance test–(2) versus (3)	< 0.001***	< 0.001***	

period until the public discovery of the wrongdoing. In our sample, an average of four months elapses between the end of the violation period and the filing of the lawsuit, and the lag is more than a year in some cases. During this period, even though the misrepresentation has ended, it has not been publicly exposed, and the threat of an employee blowing the whistle remains.

During the violation period and through the discovery of the wrongdoing, misreporting firms grant rank and file stock options averaging 2.49% of shares outstanding (Panel A, Table 2), which is significantly higher than the 1.62% granted to rank and file employees by control firms.<sup>16</sup> During the violation period, misreporting firms grant 1,282 stock options annually to the average rank and file employee. In contrast, control firms grant an annual average of only 736 stock options to rank and file employees.

These differences in rank and file option grants between misreporting firms in violation years and control firms may be due to differences in firm characteristics. We address this by restricting our sample to just the misreporting firms and assessing whether these firms grant more options in violation years than in non-violation years. We find that misreporting firms grant 1.87% of shares outstanding during non-violation periods, which is significantly lower than option grants of 2.49% of shares outstanding in the violation years. Further, during non-violation periods, misreporting firms grant 1,030 stock options to the average rank and file employee (a total of 3.1 million rank and file options), compared with 1,282 stock options (a total of 6.3 million rank and file options) during misreporting periods for the same firms.

However, the lower usage of rank and file option grants in non-violation years may be due to a predictable drop in option usage after the discovery of misrepresentation. Misreporting firms increase rank and file option grants from an average of 2.17% before the beginning of the violation (*PRE*) to an average of 2.49% during the violation period, followed by a decrease in rank and file option grants to 1.67% after the discovery of the violation (*POST*) (Table 2, Panel B). These differences in rank and file grants, within the sample of misreporting firms, are both statistically significant and suggest that the higher usage of rank and file stock options in the violation period is unlikely to be due to time invariant firm characteristics (whether

<sup>16</sup> The control sample consists of all firms with available ExecuComp data that have not been subject to litigation or SEC enforcement actions. This group potentially includes firms that have committed violations but have not yet been discovered. Inclusion of these firms in our control sample biases against finding results consistent with our hypothesis.

observable or unobservable), as any such firm characteristic should be present in the *PRE*, violation, and *POST* periods for misreporting firms.

#### 4.2. Multivariate model

To bolster the univariate inferences, we estimate the following cross-sectional model:

$$\begin{aligned}
 RF\_OPTIONS_{it} = & \beta_0 + \beta_1 VIOLATION_{it} + \beta_2 TOP5\_OPTIONS_{it} + \beta_3 TOP5\_OTHER_{it} \\
 & + \beta_4 MSA\_OPTIONS_{it} + \beta_5 CASH\_SHORT_{it-1} + \beta_6 INT\_BURDEN_{it-1} \\
 & + \beta_7 R\&D_{it-1} + \beta_8 BMR_{it-1} + \beta_9 LEVERAGE_{it} + \beta_{10} LOW\_TAX_{it-1} + \beta_{11} HIGH\_TAX_{it-1} \\
 & + \beta_{12} SALES_{it} + \beta_{13} EMP_{it} + \beta_{14} RET_{it-1} + \beta_{15} VOL_{it-1} + \beta_{16} LOSS_{it} \\
 & + \beta_{17} EXPENSING_{it} + \beta_{18} DISTRESS_{it} + MSA + Year + Industry + \varepsilon_{it}.
 \end{aligned} \tag{1}$$

The dependent variable, *RF\_OPTIONS*, is the number of rank and file options granted in the year scaled by the number of shares outstanding. Our main variable of interest is *VIOLATION*, an indicator variable equal to one for years in which the firm is alleged to have committed a violation and all years until discovery of the misconduct. We control for the use of option grants and overall compensation structure in the firm by including option grants (*TOP5\_OPTIONS*) and all other compensation (*TOP5\_OTHER*) given to the top-five executives of the firm.<sup>17</sup> Kedia and Rajgopal (2009) document that location is as important as industry membership in explaining rank and file option grants. Therefore, we include *MSA\_OPTIONS*, which is the average of *RF\_OPTIONS* for all other firms in the metropolitan statistical area (MSA) in which the firm is located.<sup>18</sup>

In addition, we control for several other factors associated with grants of rank and file options. Firms facing financial constraints are more likely to grant options (Core and Guay, 2001; Yermack, 1995). Consistent with Core and Guay (2001), we include two proxies to control for financial constraints. *CASH\_SHORT* is the three-year average of dividends plus cash flow from investing minus cash flow from operations, all scaled by total assets, and *INT\_BURDEN* is the three-year average of interest expense scaled by operating income before depreciation.

Firms with larger agency issues are likely to make greater use of stock options. These incentive alignment concerns are greater for firms with valuable growth opportunities. We include research and development (R&D) expense scaled by sales (*R&D*) and the book-to-market ratio (*BMR*) to capture growth opportunities (Bizjak et al., 1993; Smith and Watts, 1992). We also control for leverage (*LEVERAGE*) because John and John (1993) propose that firms with significant debt limit the use of options to reduce shareholder alignment.

We control for the marginal tax rate as a potential determinant of rank and file option grants (Yermack, 1995; Core and Guay, 2001) because the use of stock-based compensation is expected to be less costly for firms with low marginal tax rates. *LOW\_TAX* (*HIGH\_TAX*) is an indicator variable equal to one if the firm has negative (positive) taxable income and net operating loss carryforwards in each of the prior three years and is equal to zero otherwise.

We include *SALES*, the log of firm sales, and *EMP*, the log of number of employees, to control for firm size. To account for stock performance, we include *RET*, the firm's stock returns in the prior fiscal year, and *VOL*, the standard deviation of monthly stock returns in the prior fiscal year. Firms with operating losses are also more likely to grant options to avoid cash compensation that needs to be expensed through the income statement.<sup>19</sup> Therefore, we include *LOSS*, an indicator variable equal to one if the firm reported negative earnings for the year in question and zero otherwise. We also include *DISTRESS*, an industry-adjusted Altman Z-score in the year of the grant. We include *EXPENSING*, an indicator variable equal to one if the firm voluntarily expensed stock options using the fair value method, because some firms may have granted more stock options in an effort to improve reported profitability. Finally, we include *MSA*, year, and industry (Fama and French's 17 industry classification) fixed effects.

We report mean and median values of these variables in Table 3, separately for the litigation and control samples. The results of estimating Eq. (1) are reported in Table 4. The coefficient on *VIOLATION* in Column 1 of Table 4 is positive and significant at the 1% level. Consistent with Hypothesis 1, misreporting firms grant more rank and file options in violation years leading to discovery than do control firms. The decision to misreport is associated with an increase in rank and file stock option grants of 0.39% of shares outstanding. As the unconditional value of *RF\_OPTIONS* (across both litigation and control firms) is 1.76% of shares outstanding, this finding represents a 24% increase in rank and file option grants during violation years.

The coefficients for the other control variables are in line with expectations. The coefficient on *TOP5\_OPTIONS* is positive and significant, suggesting that firms granting rank and file options are also generous with top executive option grants. We find support for the importance of option usage in the firm's local MSA, leverage, marginal tax rates, stock return volatility, and operating losses. The coefficient on *CASH\_SHORT* is negative and significant, contrary to expectations.

To ensure that the larger grants of rank and file options in violation years are not due to unobservable firm

<sup>17</sup> We control for *TOP5\_OPTIONS* in an effort to isolate the effect of misreporting on rank and file option grants, independent of any association between misreporting and option grants to senior executives.

<sup>18</sup> We obtain zip codes for firm headquarters from Compustat and use them to assign firms to MSAs.

<sup>19</sup> Our sample consists of firm-year observations as early as 1992, when firms were not required to report stock option expense on the income statement.

**Table 3**

Descriptive statistics: litigation and control samples.

This table reports firm characteristics for the lawsuit sample and the control sample. The litigation sample consists of firms that were subject to class action litigation from 1996 to 2011 and with coverage in ExecuComp. The control sample contains all firms in ExecuComp that were not subject to misrepresentation from 1992 to 2010. All variables are defined in the Appendix A. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively. Two-sided *p*-values are based on the *t*-statistic for differences in means and the Wilcoxon Z-statistic for differences in medians.

Variable	Lawsuit (N=5,667)		Control (N=10,070)		T-test	Wilcoxon
	Mean	Median	Mean	Median		
RF_OPTIONS	0.0201	0.0130	0.0162	0.0103	< 0.001***	< 0.001***
TOP5_OPTIONS	0.0064	0.0032	0.0061	0.0035	0.103	0.014**
TOP5_OTHER	0.0072	0.0029	0.0079	0.0038	0.268	< 0.001***
MSA_OPTIONS	0.0179	0.0156	0.0172	0.0149	0.001***	0.001***
CASH_SHORT	-0.1621	-0.1638	-0.1824	-0.1767	< 0.001***	< 0.001***
INT_BURDEN	0.1934	0.0881	0.1681	0.0923	< 0.001***	0.783
R&D	0.2596	0.0104	0.1126	0.0000	0.005***	< 0.001***
BMR	0.5947	0.5739	0.6414	0.6308	< 0.001***	< 0.001***
LEVERAGE	0.8209	1.0000	0.8321	1.0000	0.074*	0.074*
LOW_TAX	0.0356	0.0000	0.0241	0.0000	< 0.001***	< 0.001***
HIGH_TAX	0.4161	0.0000	0.4867	0.0000	< 0.001***	< 0.001***
SALES	7.3450	7.2865	7.0025	6.9649	< 0.001***	< 0.001***
EMP	1.7804	1.7918	1.5275	1.5477	< 0.001***	< 0.001***
RET	1.3921	0.0265	0.4644	0.0365	0.228	0.146
VOL	0.1382	0.1178	0.1202	0.1030	< 0.001***	< 0.001***
LOSS	0.1361	0.0000	0.0937	0.0000	< 0.001***	< 0.001***
EXPENSING	0.0206	0.0000	0.0153	0.0000	0.020**	0.020**
DISTRESS	71.652	36.727	74.302	25.612	0.285	< 0.001***
G-INDEX	9.0499	9.0000	9.4076	9.0000	< 0.001***	< 0.001***
OUTSIDE%	0.8580	0.8889	0.8494	0.8750	0.004***	0.001***
BOARD_SIZE	8.0379	8.0000	7.6572	8.0000	< 0.001***	< 0.001***

**Table 4**

Rank and file option grants: litigation and control firms.

This table reports ordinary least squares regressions in which the dependent variable, *RF\_OPTIONS*, is the number of options granted to rank and file employees scaled by total shares outstanding. *VIOLATION* is an indicator variable equal to one for all years in the violation period and until discovery in a sample of firms subject to shareholder litigation. *PRE* (*POST*) is an indicator variable equal to one for all years before (after) the violation period (after discovery). The control sample contains all firms in ExecuComp that were not subject to misrepresentation from 1992 to 2010. All other variables are defined in the Appendix A. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively. *p*-values are two-sided. Standard errors are clustered by firm.

Variable	(1)		(2)		(3)		(4)		(5)	
		Lawsuit versus control		Lawsuit versus control		With firm fixed effects		Litigation only		With governance
PRE	-	-	-	0.0003	-	-	-	-	-	-
		-		0.644		-		-		-
VIOLATION	+	0.0039 < 0.001***		0.0042 < 0.001***		0.0017 0.043**		0.0032 < 0.001***		0.0023 0.006***
POST	-	-	-	0.0015	-	-	-	-	-	-
		-		0.027**		-		-		-
TOP5_OPTIONS	+	0.7716 < 0.001***		0.7709 < 0.001***		0.6560 < 0.001***		0.8318 < 0.001***		0.9503 < 0.001***
TOP5_OTHER	-	-0.0212 0.016**		-0.0212 0.017**		-0.0150 0.008***		-0.0298 0.005***		-0.1271 0.002***
MSA_OPTIONS	+	0.4329 < 0.001***		0.4323 < 0.001***		0.2317 < 0.001***		0.4765 < 0.001***		0.3331 < 0.001***
CASH_SHORT	+	-0.0094 < 0.001***		-0.0095 < 0.001***		-0.0059 0.015**		-0.0069 0.029**		-0.0105 < 0.001***

Table 4 (continued)

Variable		(1) Lawsuit versus control	(2) Lawsuit versus control	(3) With firm fixed effects	(4) Litigation only	(5) With governance
INT_BURDEN	+	0.0002 0.881	0.0001 0.911	0.0001 0.934	-0.0015 0.344	0.0001 0.955
R&D	+	-0.0000 0.8545	-0.0000 0.551	0.0001 0.079*	-0.0001 0.016**	0.0006 < 0.001***
BMR	-	-0.0004 0.744	-0.0004 0.742	0.0054 0.005***	-0.0002 0.875	0.0002 0.821
LEVERAGE	-	-0.0032 < 0.001***	-0.0031 < 0.001***	0.0008 0.566	-0.0058 < 0.001***	-0.0033 < 0.001***
LOW_TAX	+	0.0006 0.700	0.0005 0.724	-0.0002 0.921	0.0011 0.673	0.0028 0.194
HIGH_TAX	-	-0.0012 0.004***	-0.0012 0.006***	0.0002 0.678	-0.0007 0.359	-0.0014 0.001***
SALES	+	0.0011 < 0.001***	0.0010 0.001***	0.0009 0.233	0.0008 0.150	0.0013 < 0.001***
EMP	+	-0.0010 0.002***	-0.0009 0.002***	-0.0001 0.861	-0.0008 0.206	-0.0007 0.087*
RET	+	0.0000 0.077*	0.0000 0.089*	0.0000 0.0001***	0.0000 < 0.001***	-0.0003 0.103
VOL	+	0.0313 < 0.001***	0.0303 < 0.001***	0.0127 0.002***	0.0362 < 0.001***	0.0251 < 0.001***
LOSS	+	0.0073 < 0.001***	0.0072 < 0.001***	0.0038 0.001***	0.0061 < 0.001***	0.0079 < 0.001***
EXPENSING	-	-0.0015 0.081*	-0.0014 0.090*	0.0029 0.089*	-0.0025 0.112	-0.0019 0.034**
DISTRESS	+	-0.0000 0.320	-0.0000 0.363	0.0000 0.265	-0.0000 0.171	-0.0000 0.504
G-INDEX	?	- -	- -	- -	- -	-0.0004 < 0.001***
OUTSIDE%	?	- -	- -	- -	- -	0.0049 0.002***
BOARD_SIZE	?	- -	- -	- -	- -	-0.0001 0.609
Year fixed effects		Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>		30.7%	30.8%	44.3%	39.6%	38.2%
N		N <sub>lit</sub> =5,667, N <sub>non-lit</sub> =10,070; N <sub>vio</sub> =1,243, N <sub>non-vio</sub> =14,494	N <sub>lit</sub> =5,667, N <sub>non-lit</sub> =10,070; N <sub>vio</sub> =1,243, N <sub>non-vio</sub> =14,494	N <sub>lit</sub> =5,667, N <sub>non-lit</sub> =10,070; N <sub>vio</sub> =1,243, N <sub>non-vio</sub> =14,494	N <sub>lit</sub> =5,667, N <sub>non-lit</sub> =0; N <sub>vio</sub> =1,243, N <sub>non-vio</sub> =4,424	N <sub>lit</sub> =3,481, N <sub>non-lit</sub> =6,253; N <sub>vio</sub> =769, N <sub>non-vio</sub> =8,965

characteristics, we next include two indicator variables that take the value of one in the years prior to the violation (*PRE*) and after discovery (*POST*) for misrepresenting firms. As seen in Column 2, the coefficient on *VIOLATION* is 0.0042, and the coefficient on *PRE (POST)* is just 0.0003 (0.0015). These coefficients are significantly smaller than the coefficient on *VIOLATION* ( $p < 0.001$  and  $p = 0.001$ , respectively). These findings suggest that misrepresenting firms grant more rank and file stock options during periods of misreporting relative to the years before the violation and the years after discovery.

We also control for potential unobservable firm characteristics by estimating a firm fixed effects model. With firm fixed effects, the coefficient of *VIOLATION* captures rank and file option grants in violation years relative to the average annual option grant for the firm. As seen in Column 3, the coefficient of *VIOLATION* remains positive and significant. Lastly, in Column 4, we estimate the model using only the firm-year observations associated with misreporting firms. In this model, the coefficient of *VIOLATION* captures rank and file option grants in violation years compared with other years for the same firm. As seen in Column 4, the coefficient of *VIOLATION* continues to be positive and highly significant. These results suggest that omitted firm characteristics are unlikely to explain the findings.

Poorly governed firms may be more likely to use stock options to facilitate misreporting or to reduce the likelihood of external whistle-blowing. To control for this possibility, we include several proxies for firm governance: the G-Index (*G-INDEX*), board size (*BOARD\_SIZE*), and the percentage of independent directors on the board (*OUTSIDE*). Inclusion of governance variables reduces the sample by about 40%. Despite the loss of observations, we continue to find a significant positive coefficient on *VIOLATION* (Column 5).

In sum, consistent with [Hypothesis 1](#), our findings support the notion that misreporting firms grant more stock options to rank and file employees in violation years than control firms and in the periods either before the violation or after the discovery of misreporting. These results are robust to controls for firm characteristics, MSA, and industry and year effects potentially associated with rank and file option grants.

## 5. Tests of Hypothesis 2: Incidence of whistle-blowing

In this section, we test [Hypothesis 2](#) by examining whether larger grants of rank and file stock options during periods of misreporting are negatively associated with whistle-blowing activity. We use a LexisNexis search to construct our sample of whistle-blowing firms. We follow [Bowen et al. \(2010\)](#) and search every combination of the following sets of terms: (1) “whistle,” “whistle-blowing,” “whistleblower,” and “whistle-blower” and (2) “financial,” “accounting,” and “fraud.” We perform this search over the calendar years 1992 through 2010. We augment the sample with the employee-based whistle-blowing events identified by [Dyck et al. \(2010\)](#), yielding a total of 153 whistle-blowing events. As reported in [Table 5](#), 63 of the class action litigation cases, or about 8.2% of the sample, experienced a whistle-blowing event after the start of the

**Table 5**

Sample description and descriptive statistics for whistle-blowing.

This table displays mean and median values of rank and file option grants for the sample of firms subject to class action litigation, separately by whistle-blowing activity. The whistle-blowing indicator (*WB*) takes the value of one if the firm experienced an employee whistle-blowing event after the beginning of the violation period. *RF\_OPTIONS\_AVG* is the average value of rank and file option grants during the violation years leading to discovery, scaled by shares outstanding. *RF\_PORTFOLIO* is an estimate of the unvested rank and file options outstanding in the violation years leading to discovery, scaled by shares outstanding. *IND\_OPTIONS\_AVG* is the difference between rank and file option grants and average rank and file option grants within the firm's industry, averaged over the violation years leading to discovery. *ABN\_OPTIONS\_AVG* is the difference between rank and file option grants and the fitted value of expected rank and file option grants based on Eq. (1), averaged over the violation years leading to discovery. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively. Two-sided *p*-values are based on the *t*-statistic for differences in means and the Wilcoxon Z-statistic for differences in medians.

	Mean	Median	N
<b>Panel A: RF_OPTIONS_AVG</b>			
<i>WB</i> =1	1.37%	0.99%	63
<i>WB</i> =0	2.44%	1.53%	705
Significance test	0.005***	0.014**	
<b>Panel B: RF_PORTFOLIO</b>			
<i>WB</i> =1	3.47%	2.83%	63
<i>WB</i> =0	6.14%	4.11%	705
Significance test	0.001***	0.003***	
<b>Panel C: IND_OPTIONS_AVG</b>			
<i>WB</i> =1	−0.93%	−1.01%	63
<i>WB</i> =0	0.17%	−0.49%	705
Significance test	< 0.001***	< 0.001***	
<b>Panel D: ABN_OPTIONS_AVG</b>			
<i>WB</i> =1	0.02%	0.01%	46
<i>WB</i> =0	0.43%	−0.00%	459
Significance test	0.013**	0.702	

violation period.<sup>20</sup>

Our sample of employee whistle-blowers likely suffers from truncation bias. Firms that effectively avoid external whistle-blowing allegations by granting rank and file stock options are not included in our sample. In addition, our sample identifies cases in which an employee blows the whistle to external parties such as a regulator or the media, and it does not include internal whistle-blowing to the audit committee or to the board of directors, which is not observable to an outside researcher.

### 5.1. Univariate analysis

We create an indicator variable, *WB*, that takes the value of one if the misreporting firm was subject to an employee whistle-blowing allegation after the beginning of the violation period and zero otherwise. The variable of interest is rank and file option grants, *RF\_OPTIONS\_AVG*, which is the average value of *RF\_OPTIONS* over all fiscal years beginning with the start of the violation period and ending with the discovery of the wrongdoing (the date the lawsuit is filed). Each misreporting event corresponds to one observation in this analysis.

As reported in Panel A of Table 5, the 63 misreporting firms with a whistle-blowing event granted options to rank and file employees averaging 1.37% of shares outstanding. This is significantly lower than the 2.44% granted by firms that did not have an employee whistle-blower. The higher level of option grants in non-whistle-blowing firms is statistically significant at the 1% level and is also economically significant, reflecting a 78% increase in rank and file option grants relative to the whistle-blowing sample. Results are similar when considering median instead of mean values.

*RF\_OPTIONS\_AVG* captures the average annual grant of options to employees, but it does not consider unvested options granted in prior years that are held in the employees' portfolios. These unvested options are important because, if an employee blows the whistle, they lose value and may also be forfeited. Because ExecuComp does not report vesting schedules, we assume a four-year vesting with 25% of the option grants vesting every year and that all options are exercised immediately after vesting (Huddart and Lang, 2003). Our estimate of rank and file option portfolio, *RF\_PORTFOLIO*, is therefore estimated as follows:  $(1.00 * RF\_OPTIONS_t) + (0.75 * RF\_OPTIONS_{t-1}) + (0.50 * RF\_OPTIONS_{t-2}) + (0.25 * RF\_OPTIONS_{t-3})$ . We average *RF\_PORTFOLIO* over the years in the violation period and ending with discovery. As these assumptions are nontrivial and can introduce significant measurement error into our estimates, we report results using *RF\_PORTFOLIO* primarily for robustness.

As seen in Panel B of Table 5, employees of misreporting firms that experienced a whistle-blowing event held in their portfolio stock options averaging 3.47% of shares outstanding. This is significantly lower than the 6.14% held by employees of misreporting firms that did not experience an employee whistle-blowing event.

To minimize the role of other confounds, we measure abnormal or unexpected rank and file option grants in two ways. First, we capture abnormal rank and file option grants as the difference between a firm's rank and file option grants and the average rank and file options granted by all firms in the same industry in that year (*IND\_OPTIONS\_AVG*). Second, we capture expected rank and file option grants based on firm characteristics, location, and industry [see Eq. (1)] and estimate abnormal rank and file option grants (*ABN\_OPTIONS\_AVG*) as the residual from the estimating Eq. (1).<sup>21</sup>

In Panel C of Table 5, we find that misreporting firms that experience a whistle-blowing event exhibit average industry-adjusted option grants (*IND\_OPTIONS\_AVG*) that are significantly lower than their industry peers (mean = -0.93%, untabulated *p*-value < 0.001). Further, misreporting firms that avoid whistle-blowing allegations exhibit industry-adjusted rank and file option grants averaging 0.17%, which is significantly larger than the industry-adjusted option grants of firms that experience a whistle-blowing event (*p*-value < 0.001).

We find similar results using *ABN\_OPTIONS\_AVG* (Panel D of Table 5). Firms that avoid a whistle-blowing event issue abnormal option grants that are significantly larger than zero (mean = 0.43%, untabulated *p*-value < 0.001) and larger than among firms that experience a whistle-blowing event (*p*-value = 0.013). The medians are not significantly different between these two groups. In general, the results in Table 5 are consistent with Hypothesis 2 and with the notion that larger rank and file option grants during periods of misreporting decrease the likelihood of employee whistle-blowing allegations.

### 5.2. Multivariate model

Next, we estimate a model to predict the probability of a whistle-blowing event. We estimate the following regression:

<sup>20</sup> Section 806 of SOX also protects employees against discrimination when they blow the whistle on their employer. The employee who feels discriminated against may file, within 90 days of the alleged discrimination, a complaint with the Occupational Safety and Health Administration (OSHA). However, such whistle-blowing activity under SOX carries no opportunity for financial bounties. Bowen et al. (2010) evaluate the efficacy of whistle-blowing complaints filed with OSHA and conclude that these complaints are generally frivolous. Hence, we do not employ OSHA-related whistle-blowing events in our data analysis.

<sup>21</sup> We remove *VIOLATION* in the estimation of expected rank and file option grants to ensure that all determinants of rank and file option grants, other than the facilitation of the misrepresentation, are modeled. We therefore reestimate Eq. (1) without including *VIOLATION* and using all other determinants of rank and file option grants. We use the average residual over the violation years leading to discovery as a measure of abnormal option grants.

$$\begin{aligned}
WB_{it} = & \beta_0 + \beta_1 RF\_OPTIONS\_AVG_{it} + \beta_2 TOP5\_OPTIONS\_AVG_{it} \\
& + \beta_3 TOP5\_OTHER\_AVG_{it} + \beta_4 SALES\_GROWTH_{it-1} + \beta_5 DOWNSIZING_{it-1} \\
& + \beta_6 QUITAM_{it-1} + \beta_7 SIZE_{it-1} + \beta_8 REPUTATION_{it-1} + \beta_9 PAST\_PERF_{it-1} \\
& + \beta_{10} ICW_{it-1} + \beta_{11} AGE_{it-1} + \beta_{12} R\&D_{it-1} + \beta_{13} DURATION_{it-1} + Year + Industry + \varepsilon_{it}.
\end{aligned} \tag{2}$$

Our main variable of interest is *RF\_OPTIONS\_AVG*. We control for the compensation structure of top executives in the firm by including option grants (*TOP5\_OPTIONS\_AVG*) and other non-option compensation (*TOP5\_OTHER\_AVG*) given to the top-five executives of the firm. These variables account for firm characteristics that may be associated with option usage and other compensation. Like *RF\_OPTIONS\_AVG*, these variables are averaged over the years in the violation period through discovery.

We include a host of other control variables consistent with Bowen et al. (2010). We briefly motivate and describe each control variable here and provide detailed data descriptions in the Appendix A. External whistle-blowing is more likely in growth firms that outlive their nascent control systems (Baucus and Near, 1991). We use sales growth (*SALES\_GROWTH*) over the three years prior to the violation period as a proxy for growth. Employees are also more likely to blow the whistle if they have recently been laid off or if they feel insecure about their job because of layoffs at the firm (Luthans and Sommer, 1999). We use the change in the number of employees over the three years prior to the violation period to proxy for downsizing (*DOWNSIZING*). Monetary rewards from whistle-blowing, such as in qui tam cases, lead more employees to uncover cases of misreporting. Because 85% of qui tam cases deal with the health care or defense industry, our proxy for qui tam (*QUITAM*) is an indicator variable equal to one if the firm is in the health care industry or if the firm is on the federal government's "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards" list in any of the three years prior to the violation period.

Large firms (*SIZE*) and those with better reputations (*REPUTATION*) are more likely to be subject to whistle-blowing because the media considers such allegations more newsworthy. We proxy for firm size with revenues and for firm reputation with an indicator variable that is set to one if the firm is listed on either *Fortune*'s "Most Admired Companies" list or "Best Companies to Work For" list in any of the five years prior to the violation period. We also control for past performance by including stock returns (*PAST\_PERF*) in the year prior to the violation period.

Employees are more likely to blow the whistle when the firm has poor internal controls. We capture the firm's internal control environment (*ICW*) based on the fitted value from a model of the determinants of internal control weaknesses, as outlined by Doyle et al. (2007). We also control for firm age (*AGE*) because older firms tend to be more geographically diverse, making internal communication more difficult.

Highly qualified employees earning high wages might be less likely to blow the whistle as they value their jobs and have stronger career concerns. To control for this human capital effect on whistle-blowing, we include R&D expenditures scaled by sales (*R&D*), as R&D-intensive firms tend to have more skilled employees. Lastly, we control for the length (*DURATION*) of the violation to control for the severity of the misreporting. We also include year and industry fixed effects. Univariate statistics on all variables included in this model are reported in Table 6.

As reported in Column 1 of Table 7, the coefficient on *RF\_OPTIONS\_AVG* is negative and significant. Consistent with Hypothesis 2, rank and file stock option grants are associated with a lower incidence of employee whistle-blowing. This effect is also economically significant. A one standard deviation increase in rank and file options (from its mean) decreases the probability of whistle-blowing by 18%.<sup>22</sup> Using *RF\_PORTFOLIO\_AVG* in Column 2 reveals a similar and highly significant result.

The coefficient on *QUITAM* is positive and significant, implying that firms covered under qui tam provisions are more likely to experience whistle-blowing, consistent with Dyck et al. (2010). As expected, older firms and more reputable firms are more likely to experience a whistle-blowing event. Employee whistle-blowing is more likely when the violation spans many years.

Employees at firms with strong corporate governance may report the misrepresentation internally rather than blow the whistle externally. To control for this effect of corporate governance, we add controls for external monitoring (*G-INDEX*, *OUTSIDE%*, and *BOARD\_SIZE*) in Column 3. We continue to find similar results.

Finally, we examine the effect of abnormal rank and file option grants on employee whistle-blowing. We find that industry-adjusted option grants are lower among firms that experience a whistle-blowing event (Column 4), and we find similar results using the measure based on the residuals from Eq. (1) (Column 5). These results reinforce our earlier findings that employee whistle-blowing is less likely among firms that give their rank and file employees incentives to remain quiet.

<sup>22</sup> The marginal effect of *RF\_OPTIONS*, not reported in the table, is  $-0.500$ . Because the standard deviation of *RF\_OPTIONS\_AVG* is 0.029, a one standard deviation increase in *RF\_OPTIONS\_AVG* implies a change of  $-0.015$  in the probability of whistle-blowing. As the unconditional probability of whistle-blowing is 8.2% (63/768), this implies an 18% decrease in the probability of whistle-blowing.

**Table 6**

Descriptive statistics litigation sample by whistle-blowing activity.

This table reports firm characteristics for the lawsuit sample conditioned on whistle-blowing activity. The lawsuit sample consists of firms that were subject to class action litigation from 1996 to 2011 and with coverage in ExecuComp. *WB* is an indicator that takes the value of one if the firm experienced an employee whistle-blowing event after the beginning of the violation period. Rank and file options (*RF\_OPTIONS*) and other compensation variables are averaged over the years in the violation period. All other variables are measured as of the year before the beginning of the violation period and are defined in the Appendix A. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively. Two-sided *p*-values are based on the *t*-statistic for differences in means and the Wilcoxon *Z*-statistic for differences in medians.

Variable	WB=1		WB=0		T-test	Wilcoxon
	Mean	Median	Mean	Median		
<i>RF_OPTIONS_AVG</i>	0.0137	0.0099	0.0244	0.0153	0.005***	0.014**
<i>RF_PORTFOLIO</i>	0.0347	0.0283	0.0614	0.0411	0.001***	0.003***
<i>IND_OPTIONS_AVG</i>	-0.0093	-0.0101	0.0017	-0.0049	< 0.001***	< 0.001***
<i>ABN_OPTIONS_AVG</i>	0.0002	0.0001	0.0043	-0.0000	0.013**	0.702
<i>TOP5_OPTIONS</i>	0.0033	0.0015	0.0067	0.0035	0.002***	< 0.001***
<i>TOP5_OTHER</i>	0.0034	0.0009	0.0113	0.0029	0.216	< .001***
<i>SALES_GROWTH</i>	0.3631	0.0965	0.3638	0.1775	0.996	0.005***
<i>DOWNSIZING</i>	0.1339	0.0603	0.2128	0.1015	0.155	0.029**
<i>QUITAM</i>	0.2063	0.0000	0.0723	0.0000	< 0.001***	< 0.001***
<i>SIZE</i>	7.0796	7.4264	7.2431	7.1084	0.927	0.845
<i>REPUTATION</i>	0.2540	0.0000	0.1121	0.0000	0.001***	0.001***
<i>PAST_PERF</i>	0.2985	0.0682	0.3407	0.1263	0.802	0.963
<i>ICW</i>	-8.8439	-8.3113	-8.4271	-8.0055	0.383	0.419
<i>AGE</i>	28.603	25.000	23.121	17.000	0.022**	0.003***
<i>R&amp;D</i>	0.2379	0.0000	0.2228	0.0000	0.947	0.423
<i>DURATION</i>	599.17	414.00	489.54	311.00	0.080*	0.094*
<i>G-INDEX</i>	9.9268	10.000	9.0461	9.0000	0.046**	0.087*
<i>OUTSIDE%</i>	0.8548	0.8750	0.8498	0.8750	0.860	0.934
<i>BOARD_SIZE</i>	8.0000	8.0000	7.6320	8.0000	0.547	0.608

## 6. Robustness tests

### 6.1. Propensity score matching

The firms in the misreporting sample differ from those in the control sample on many dimensions (Table 3). Although we control for these differences in our empirical tests, we also compare the firms in the misreporting sample with a propensity score matched control sample of firms. In the first stage, we model misreporting as a function of firm characteristics included in Eq. (1), with the exception of *RF\_OPTIONS*, because this is the dependent variable in our second-stage model. Based on the results of this first stage, we calculate propensity scores and identify one matched control observation, in the same industry and year, for each firm-year observation in the violation period in our misreporting sample. These treatment and propensity score matched control observations exhibit very similar propensity scores.<sup>23</sup> However, misreporting firms grant rank and file options equal to 2.49% of shares outstanding, relative to 2.19% for the propensity score matched control firms, and the difference is statistically significant (*p*-value=0.023, untabulated). We continue to find a significant association between *VIOLATION* and *RF\_OPTIONS* (*p*-value=0.045, untabulated) in multivariate estimation.

### 6.2. False positives in the litigation sample

One concern with using class action shareholder litigation to identify misreporting is the possibility that the Stanford Securities Class Action Clearinghouse includes some firms that were not misreporting but that were subject to litigation for some benign reason (e.g., negative unexpected outcomes). We employ three separate tests to mitigate this concern.

#### 6.2.1. SEC enforcement actions

Because the SEC has constrained resources, it is likely to pursue only those firms engaged in relatively egregious misreporting (Kedia and Rajgopal, 2011). Consequently, the sample of firms that the SEC targets is smaller than the litigation sample but less likely to include firms that did not misreport.<sup>24</sup> Hence, SEC enforcement actions are likely to involve fewer false positives.

We match the SEC enforcement sample with ExecuComp and obtain a usable data set that consists of 129 enforcement

<sup>23</sup> The mean for violation firms (0.100) is not significantly different from the mean for the propensity score matched control firms (0.097).

<sup>24</sup> Several prior studies use SEC enforcement to capture financial misrepresentation. See Dechow et al. (1996), Johnson et al. (2009), and Karpoff et al. (2008a, 2008b), among others. We are grateful to Jonathan Karpoff, Scott Lee, and Jerry Martin for sharing their data on SEC enforcements. Their sample of SEC enforcement actions contains firms for which the SEC initiated an enforcement action from March 1978 through December 2007, and we include all violations periods for these firms after 1992.

**Table 7**

Whistle-blowing and rank and file option grants.

This table reports logistic results for a sample of firms subject to class action litigation from 1996 to 2011. The dependent variable, *WB*, is equal to one for misreporting events associated with an employee whistle-blowing allegation after the beginning of the violation period. *RF\_OPTIONS\_AVG* is the average rank and file option grants in the violation years leading to discovery, scaled by shares outstanding. *RF\_PORTFOLIO* is an estimate of the average number of unvested rank and file options in the violation years leading to discovery, scaled by shares outstanding. *IND\_OPTIONS\_AVG* is the difference between rank and file option grants and average rank and file option grants within the firm's industry, averaged over the violation years leading to discovery. *ABN\_OPTIONS\_AVG* is the difference between rank and file option grants and the fitted value of expected rank and file option grants based on Eq. (1), averaged over the violation years leading to discovery. All other variables are defined in the Appendix A. Two sided *p*-values are based on standard errors clustered by year. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively.

Variable		Model 1	Model 2	Model 3	Model 4	Model 5
<i>RF_OPTIONS_AVG</i>	-	-35.641 < 0.001***	- -	-61.573 0.005***	- -	- -
<i>RF_PORTFOLIO</i>	-	- -	-17.111 < 0.001***	- -	- -	- -
<i>IND_OPTIONS_AVG</i>	-	- -	- -	- -	-37.792 < 0.001***	- -
<i>ABN_OPTIONS_AVG</i>	-	- -	- -	- -	- -	-18.465 0.044**
<i>TOP5_OPTIONS_AVG</i>	?	-43.733 0.126	-39.084 0.129	93.777 0.012**	-45.705 0.120	-94.684 0.054*
<i>TOP5_OTHER_AVG</i>	?	-18.191 0.411	-18.127 0.422	-124.678 0.091*	-18.320 0.410	-7.842 0.316
<i>SALES_GROWTH</i>	+	0.075 0.737	0.095 0.667	-1.227 0.397	0.071 0.750	0.245 0.375
<i>DOWNSIZING</i>	-	-0.560 0.434	-0.587 0.421	0.091 0.935	-0.542 0.448	-0.560 0.451
<i>QUITAM</i>	+	0.987 0.001***	0.937 0.002***	2.372 0.002***	0.966 0.001***	0.607 0.265
<i>SIZE</i>	+	0.035 0.773	0.030 0.805	0.176 0.667	0.028 0.820	0.188 0.271
<i>REPUTATION</i>	+	0.848 0.023**	0.827 0.027**	1.254 0.014**	0.878 0.020**	1.059 < 0.001***
<i>PAST_PERF</i>	+	0.023 0.796	0.024 0.780	-0.527 0.348	0.024 0.782	0.155 0.585
<i>ICW</i>	+	0.274 0.010***	0.265 0.014**	0.442 0.344	0.269 0.012**	0.356 0.080*
<i>AGE</i>	+	0.046 0.002***	0.044 0.005***	0.053 0.374	0.045 0.003***	0.052 0.078*
<i>R&amp;D</i>	+	0.015 0.760	0.014 0.786	-14.906 0.004***	0.015 0.758	-0.038 0.906
<i>DURATION</i>	+	0.001 0.003***	0.001 0.002***	0.002 0.002***	0.001 0.002***	0.000 0.265
<i>G-INDEX</i>	-	- -	- -	0.101 0.453	- -	- -

Table 7 (continued)

Variable		Model 1	Model 2	Model 3	Model 4	Model 5
<i>OUTSIDE%</i>	-	-	-	0.322 0.866	-	-
<i>BOARD_SIZE</i>	+	-	-	-0.002 0.990	-	-
Year fixed effects		Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes
Pseudo R <sup>2</sup>		21.9%	22.5%	42.9%	22.1%	18.8%
<i>N</i>		<i>N</i> <sub>WB</sub> =63, <i>N</i> <sub>NO-WB</sub> =705	<i>N</i> <sub>WB</sub> =63, <i>N</i> <sub>NO-WB</sub> =705	<i>N</i> <sub>WB</sub> =32, <i>N</i> <sub>NO-WB</sub> =295	<i>N</i> <sub>WB</sub> =63, <i>N</i> <sub>NO-WB</sub> =705	<i>N</i> <sub>WB</sub> =46, <i>N</i> <sub>NO-WB</sub> =459

Table 8

Rank and file option grants: SEC and control firms.

This table reports rank and file option grants for firms subject to Securities and Exchange Commission (SEC) enforcement from 1996 to 2007 relative to control firms that have not had any misrepresentation event. In Panel A, “SEC firms–other years” represents all years of firms subject to SEC enforcement, and “Control firms–all years” includes all years of control firms. We report the average annual value of *RF\_OPTIONS*, which is the number of options granted to rank and file employees scaled by total shares outstanding. Panel B examines rank and file option grants in the years before violation (*PRE*) and in the years after discovery (*POST*), relative to the option grants during the violation years through discovery. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively. Two-sided *p*-values are based on the *t*-statistic for differences in means and the Wilcoxon Z-statistic for differences in medians.

	Mean	Median	<i>N</i>
<b>Panel A: Full sample</b>			
SEC firms–violation years (1)	2.75%	1.86%	427
SEC firms–other years (2)	1.85%	1.10%	889
Control firms–all years (3)	1.61%	1.00%	12,094
Significance test–(1) versus (2)	< 0.001***	< 0.001***	
Significance test–(1) versus (3)	< 0.001***	< 0.001***	
<b>Panel B: Firms that misrepresented</b>			
SEC firms– <i>PRE</i> violation years (1)	2.43%	1.56%	362
SEC firms–violation years (2)	2.75%	1.86%	427
SEC firms– <i>POST</i> violation years (3)	1.46%	0.84%	527
Significance test–(1) versus (2)	0.301	0.012**	
Significance test (2) versus (3)	< 0.001***	< 0.001***	

actions for 126 unique firms that span 427 violation years. Similar to the litigation sample, we find that 13, or about 10%, of the SEC enforcement actions are associated with whistle-blowing activity.

We begin by comparing rank and file option grants between misreporting and non-misreporting firms (*Hypothesis 1*). As reported in Table 8, violation years are associated with rank and file option grants equal to 2.75% of shares outstanding, which is significantly higher than the 1.61% granted by control firms and the 1.85% granted by misreporting firms in non-violation years. Results are similar in multivariate estimations. As seen in Column 1 of Panel A of Table 9, the coefficient on *VIOLATION* is positive and significant. The coefficient on *VIOLATION* is not statistically different from that on *PRE*, although it is significantly larger than the coefficient on *POST*. Although these findings continue to hold with the inclusion of governance variables (Column 4), they are not robust to the inclusion of firm fixed effects (Column 3).

The results from testing *Hypothesis 2* are displayed in Panel B of Table 9. The coefficient on *RF\_OPTIONS\_AVG* is negative and significant. In summary, firms subject to SEC enforcement grant more rank and file options in violation years, and rank and file option grants in violation periods are negatively associated with whistle-blowing allegations.

### 6.2.2. Excluding dismissed lawsuits

We also address the issue of false positives in the litigation sample by identifying all lawsuits in our sample that were subsequently dismissed. While dismissed lawsuits are not necessarily indicative of cases without merit, the remaining lawsuits are more likely to represent cases of legitimate wrongdoing. We reestimate Eq. (1) after excluding these dismissed lawsuits and find similar results. In untabulated tests, we find that the coefficient on *VIOLATION* in Eq. (1) is positive and significant (0.0038, *p*-value < 0.001). We further find the rank and file option grants are larger during the violation period through discovery than either before the violation (coefficient=0.0007) or after discovery (coefficient=0.0015). When we

**Table 9**

Rank and file option grants: SEC sample.

Panel A reports partial results from an ordinary least squares regression in which the dependent variable, *RF\_OPTIONS*, is the number of options granted to rank and file employees scaled by total shares outstanding. *VIOLATION* is an indicator variable equal to one for all years in the violation period and until discovery in a sample of firms subject to Securities and Exchange Commission (SEC) enforcement from 1996 to 2007. *PRE* (*POST*) is an indicator variable equal to one for all years before (after) the violation period (after discovery). The control sample is all firms in ExecuComp that were not subject to misrepresentation. Standard errors are clustered by firm. Control variables included but not displayed. Panel B reports partial results from a logistic estimation in a sample of firms subject to SEC enforcement from 1996 to 2007. The dependent variable, *WB*, takes the value of one if the misreporting event was associated with employee whistle-blowing allegation after the beginning of the violation period. *RF\_OPTIONS\_AVG* is the average rank and file option grants in the violation years leading to discovery, scaled by shares outstanding. *RF\_PORTFOLIO* is an estimate of the average number of unvested rank and file options in the violation years leading to discovery, scaled by shares outstanding. For Panel A, *p*-values are two-sided; for Panel B, two sided *p*-values are based on standard errors clustered by year. For both Panels A and B, all other variables are defined in the Appendix A. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively.

<b>Panel A: Rank and file option grants—SEC and control firms</b>					
Variable		(1) SEC versus control	(2) SEC versus control	(3) With firm fixed effects	(4) With governance
<i>PRE</i>	–	–	0.0052 0.083*	–	–
<i>VIOLATION</i>	+	0.0052 0.004***	0.0053 0.003***	–0.0026 0.544	0.0051 0.009***
<i>POST</i>	–	–	–0.0004 0.666	–	–
<b>Controls</b>		Yes	Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>		24.6%	24.6%	36.1%	25.3%
<i>N</i>		<i>N</i> <sub>SEC</sub> = 1,316, <i>N</i> <sub>nonSEC</sub> = 12,094; <i>N</i> <sub>vio</sub> = 427, <i>N</i> <sub>non-vio</sub> = 12,983	<i>N</i> <sub>SEC</sub> = 1,316, <i>N</i> <sub>nonSEC</sub> = 12,094; <i>N</i> <sub>vio</sub> = 427, <i>N</i> <sub>non-vio</sub> = 12,983	<i>N</i> <sub>SEC</sub> = 1,316, <i>N</i> <sub>nonSEC</sub> = 12,094; <i>N</i> <sub>vio</sub> = 427, <i>N</i> <sub>non-vio</sub> = 12,983	<i>N</i> <sub>SEC</sub> = 660, <i>N</i> <sub>non-SEC</sub> = 6,253; <i>N</i> <sub>vio</sub> = 225, <i>N</i> <sub>non-vio</sub> = 6,688
<b>Panel B: Whistle-blowing and rank and file option grants—SEC sample</b>					
Variable		Model 1		Model 2	
<i>RF_OPTIONS_AVG</i>	–	–556.994 0.071*		–	
<i>RF_PORTFOLIO</i>	–	–		–40.643 0.001***	
<b>Controls</b>		Yes		Yes	
Year fixed effects		Yes		No	
Industry fixed effects		Yes		Yes	
Pseudo R <sup>2</sup>		67.5%		39.0%	
<i>N</i>		<i>N</i> <sub>WB</sub> = 13, <i>N</i> <sub>NO-WB</sub> = 114		<i>N</i> <sub>WB</sub> = 13, <i>N</i> <sub>NO-WB</sub> = 114	

reestimate Eq. (2) after excluding dismissed lawsuits, we find the coefficient on *RF\_OPTIONS\_AVG* continues to be negative and significant (–54.762, *p*-value = 0.004).

### 6.2.3. Excluding non-negative announcement CARs

Lastly, we attempt to identify and exclude false positives from our sample by measuring the five-day cumulative abnormal return (CAR) around the filing of the lawsuit. While most CARs are negative, a positive CAR suggests that investors believe the lawsuit is either a nuisance lawsuit or not indicative of major wrongdoing. Therefore, we reestimate our tests using only lawsuits with negative announcement CARs. We continue to find that rank and file option grants are significantly

higher during the violation period through discovery (untabulated coefficient=0.0055,  $p$ -value < 0.001). Further, rank and file option grants during violation years through discovery are larger than those granted before the violation (coefficient=0.0011) or after discovery (coefficient=0.0010). We also continue to find a negative association between rank and file option grants and whistle-blowing, consistent with our second hypothesis (untabulated coefficient of  $RF\_OPTIONS\_AVG$  is  $-45.644$ ,  $p$ -value < 0.001). These findings suggest the possible inclusion of false positives in our sample is not driving our results.

### 6.3. False negatives in the litigation sample

An issue with all proxies of misreporting is that they capture only discovered misreporting. Dichev et al. (2013) report that 60% of chief financial officers say managers misreport because they believe such misrepresentation will go undetected. Undetected misreporting, or false negatives, poses a problem that affects virtually all research on financial misconduct. We attempt to identify misreporting, irrespective of whether it was ultimately detected, and examine our central hypothesis that managers of these firms grant more rank and file options during periods of suspected misreporting.

Prior literature finds that short sellers successfully identify financial misrepresentation.<sup>25</sup> As informed investors, short sellers are likely to take short positions in stocks when they believe either that the stock is overvalued relative to the firm's fundamentals or that the firm is misrepresenting its financial statements or is otherwise engaged in wrongdoing. Because we would like to measure the portion of short interest that captures the likelihood of misrepresenting, we control for the portion of short interest that arises due to stock overvaluation. We follow Dechow et al. (2001) and Drake et al. (2011) and estimate the following regression using all firm-year observations with available data:

$$SHORT_{it} = \beta_0 + \beta_1 MVE_{it} + \beta_2 EP_{it} + \beta_3 BM_{it} + \beta_4 TURNOVER_{it} + \beta_5 MOM_{it} + \beta_6 CAPEX_{it} + \varepsilon_{it}, \quad (3)$$

where  $SHORT$  is the average number of common shares shorted during year  $t$  scaled by total common shares outstanding,  $MVE$  is the market value of equity at the end of year  $t$ ,  $EP$  is the earnings-to-price ratio at the end of year  $t$ ,  $BM$  is the book-to-market ratio at the end of year  $t$ ,  $TURNOVER$  is the exchange-specific, percentile rank of average daily volume turnover during year  $t$ ,  $MOM$  is the buy-and-hold raw stock return for year  $t$ , and  $CAPEX$  is capital expenditures for year  $t$ .

The independent variables capture the portion of short interest due to overvaluation, with the residual capturing short interest due to investors' beliefs about misreporting. We refer to this residual as abnormal short interest and use it as a proxy for the likelihood of misreporting.<sup>26</sup> Importantly, many of the firms with high abnormal short interest are not litigated, targeted by the SEC, or subject to a restatement. Consequently, although these firms are not classified as misreporting by traditional proxies used in research on financial misconduct, we identify them as firms with a relatively high likelihood of misreporting. We estimate Eq. (3) annually and report average annual coefficients in Table 10.

We next validate the use of abnormal short interest as a proxy for the likelihood of misreporting.<sup>27</sup> As outlined in Panel A of Table 11, 6.87% of firm-year observations in the highest quintile of abnormal short interest are associated with a violation, while only 3.59% of all other firm-year observations are associated with a violation. This result is confirmed in a multivariate version as well. We estimate a logistic regression in which the dependent variable is  $VIOLATION$  (an indicator variable set to one for firm-year observations in the violation period of a class action lawsuit and set to zero otherwise), and we regress this variable on our proxy of potential misreporting ( $HIGH\_ABN\_SHORT$ ).  $HIGH\_ABN\_SHORT$  is equal to one for firm-year observations in the highest quintile of abnormal short interest and equal to zero otherwise. We also include other known determinants of misreporting (executive compensation, book-to-market ratio, leverage, firm size, operating performance, volatility, etc.). As seen in Panel B of Table 11, we find a positive association between this proxy for misreporting ( $HIGH\_ABN\_SHORT$ ) and detected misreporting (coefficient=0.1884,  $p$ -value=0.049), confirming that this approach of identifying misreporting firms is useful.

Finally, in Table 12, we identify misreporting firms based on whether they have a high likelihood of misreporting as captured by  $HIGH\_ABN\_SHORT$  (i.e., abnormal short interest in the top quintile). We find that firms with a high likelihood of misreporting grant rank and file stock options averaging 1.50% of total shares outstanding, which is significantly greater than the 1.30% granted by firms with lower values of abnormal short interest (Panel A of Table 12). These results are confirmed in a regression framework (Panel B) that controls for other determinants of rank and file option grants.

In summary, although traditional databases used to identify misreporting fail to capture undetected violations, the above tests strongly suggest that our findings are not driven by this shortcoming and that, during periods of misreporting, firms grant additional rank and file stock options to their employees in an effort to encourage participation or silence, or both.<sup>28</sup>

<sup>25</sup> See Desai et al. (2006), Karpoff and Lou (2010), and Efendi et al. (2005), among others.

<sup>26</sup> Dechow et al. (2001) and Drake et al. (2011) also include other firm fundamentals that we do not in Eq. (3). However, while their purpose is to identify a broad set of fundamentals associated with short interest, our purpose is to identify and control for fundamental overvaluation and its effect on short interest. For example, Drake et al. (2011) find that total accruals are negatively associated with firm fundamentals, but we exclude total accruals from Eq. (3) because investors can use total accruals to identify misreporting (Sloan, 1996; Xie, 2001).

<sup>27</sup> For example, if we estimate abnormal short interest in year  $t$ , we evaluate whether year  $t$  is ultimately named as part of the violation period in a class action lawsuit. Alternatively, in untabulated analyses, we examine whether year  $t$  or year  $t+1$  and whether year  $t$ , year  $t+1$ , or year  $t+2$  is associated with the violation period in a subsequent lawsuit, and the results are similar.

<sup>28</sup> We considered examining Hypothesis 2 using the subsample of firms with abnormally high short interest. However, we find that less than 1% of

**Table 10**

Short interest prediction model.

This table reports average annual ordinary least squares regression coefficients in which the dependent variable, *SHORT*, is the average number of common shares shorted during the year scaled by total common shares outstanding. *MVE* is the market value of equity as of the end of the fiscal year. *EP* is the earnings-to-price ratio as of the end of the fiscal year. *BM* is the book-to-market ratio as of the end of the fiscal year. *TURNOVER* is the exchange-specific, percentile rank of average daily volume turnover during the fiscal year. *MOM* is the buy-and-hold raw stock return for the fiscal year. *CAPEX* is capital expenditures for the year. All continuous independent variables (i.e., excluding *TURNOVER*) are winsorized at the 1% and 99% levels. The analysis includes all firm-year observations with available data from 1997 through 2014. *p*-values are based on Fama and MacBeth *t*-statistics. \*, \*\*, and \*\*\* represent two-sided significance at the 10%, 5%, and 1% level, respectively, based on the average annual coefficient.

Variable		
Intercept	?	−0.007 < 0.001***
<i>MVE</i>	+	−0.000 0.965
<i>EP</i>	−	0.003 0.330
<i>BM</i>	−	−0.006 < 0.001***
<i>TURNOVER</i>	+	0.093 < 0.001***
<i>MOM</i>	−	−0.004 0.002***
<i>CAPEX</i>	−	−0.00 −0.002**
Adj. R <sup>2</sup>		24.0%
<i>N</i>		18 years, 61,372 firm-year observations

#### 6.4. Internal whistle-blowing as an alternative explanation

An alternate explanation for our findings is that employees with more stock options are better aligned with shareholders and are therefore more likely to report violations internally, obviating the need for external whistle-blowing. In such a scenario, large rank and file option grants would be positively associated with discovered misconduct (*Hypothesis 1*) and negatively associated with external whistle-blowing (*Hypothesis 2*). However, employees are unlikely to perceive internal reporting of wrongdoing as a viable strategy because many of these violations involve senior management. Nevertheless, firms with good governance and internal control mechanisms could provide a credible mechanism for employees to report wrongdoing internally. We take several steps to examine this possibility.

First, we include several controls for corporate governance in our models: the G-Index, the percentage of board members who are independent directors (*OUTSIDE%*), and board size (*BOARD\_SIZE*). Eq. (2) already controls for internal control weaknesses (*ICW*), which may also impact internal whistle-blowing. Including these governance characteristics substantially reduces the size of the sample, from 768 misrepresentation events to only 327. Despite the substantial reduction in the sample, we continue to find a significantly negative association between rank and file options and whistle-blowing (Column 3 in *Table 7*). None of the governance variables is statistically significant.

Second, we directly examine the assertion that rank and file stock option grants improve shareholder alignment and promote internal whistle-blowing. If this alternative explanation is valid, rank and file option grants should be larger among firms with internally detected violations. We use the *Dyck et al. (2010)* sample of misreporting firms (available at <http://www-2.rotman.utoronto.ca/dyck>) to further examine this possibility. Their sample details the various agents responsible for the detection of misreporting, including 51 internally detected violations. The mean (median) *RF\_OPTIONS\_AVG* for these 51 internally detected fraud events in the *Dyck et al. (2010)* sample is 2.49% (1.63%), which is statistically indistinguishable from the mean (median) *RF\_OPTIONS\_AVG* of 2.87% (1.81%) for the 70 frauds in their sample detected by external parties. The results are similar for

(footnote continued)

these firm-year observations experienced a whistle-blowing event, likely because this sample, by definition, consists of potential misreporting firms that avoided detection. As a result, this sample is not well suited for a test of *Hypothesis 2*.

**Table 11**

High abnormal short interest and future violations.

Panel A reports univariate differences in the likelihood of an alleged misreporting violation in the year we measure abnormal short interest. Abnormal short interest is the residual from the model outlined in Table 10. Panel B reports a logistic regression in which the dependent variable, *FUTURE\_VIOLATION*, is an indicator variable equal to one if the firm is accused of misreporting in the year abnormal short interest is measured. *HIGH\_ABN\_SHORT* is an indicator equal to one for firm-year observations in the top quintile of abnormal short interest each year. *HERF* is the Herfindahl–Hirschman Index for the firm's two-digit standard industrial classification (SIC) industry, computed as the sum of squares of the market shares (firm sales/industry sales) of the firms in the industry. *IND\_BMR* is the industry-adjusted book-to-market ratio, measured as the sum of all book values in the firm's two-digit SIC industry divided by the sum of all market values in the same two-digit SIC industry. All other variables are defined in the Appendix A. For Panel A, two-sided *p*-values are based on the Wilcoxon *Z*-statistic; for Panel B, *p*-values are two-sided. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively.

<b>Panel A: Univariate differences in violations</b>		
	Percent with future violation	N
<i>HIGH_ABN_SHORT</i> =1	6.87	11,795
<i>HIGH_ABN_SHORT</i> =0	3.59	47,146
Significance test	< 0.001 ***	
<b>Panel B: Logistic regression</b>		
<i>HIGH_ABN_SHORT</i>	+	0.1884 0.049**
<i>TOP5_OPTIONS</i>	+	13.127 0.057*
<i>TOP5_OTHER</i>	-	2.9124 0.070*
<i>BMR</i>	+	-0.3011 0.197
<i>LEVERAGE</i>	+	-0.1168 0.424
<i>ASSETS</i>	+	0.4462 < 0.001 ***
<i>ROA</i>	-	1.4212 0.005***
<i>VOL</i>	-	4.5750 < 0.001***
<i>RET</i>	+	-0.0026 0.305
<i>HERF</i>	-	13.915 0.176
<i>IND_BMR</i>	+	-1.2378 < 0.001***
Year fixed effects		Yes
Industry fixed effects		Yes
Pseudo <i>R</i> <sup>2</sup>		11.4%
N		<i>N</i> <sub>HIGH</sub> =4,339 <i>N</i> <sub>LOW</sub> =13,394

*RF\_PORTFOLIO\_AVG*; i.e., the mean (median) of *RF\_PORTFOLIO* for the 51 internally detected fraud events is 5.52% (4.21%), and it is 6.81% (4.52%) for the 70 frauds detected by outsiders. In summary, we find no evidence that rank and file option grants encourage internal detection of misreporting or that this is a plausible alternative explanation for our findings.

**Table 12**

High abnormal short interest and rank and file option grants.

Panel A reports rank and file option grants for firms with high abnormal short interest relative to firms without high abnormal short interest. Abnormal short interest is the residual from the model outlined in Table 10. Panel B reports ordinary least squares (OLS) regressions in which the dependent variable, *RF\_OPTIONS*, is the number of options granted to rank and file employees scaled by total shares outstanding. *HIGH\_ABN\_SHORT* is an indicator variable equal to one for all firm-year observations in the highest quintile of abnormal short interest and equal to zero otherwise. All other variables are defined in the Appendix A. For Panel A, two-sided *p*-values are based on the *t*-statistic for differences in means and the Wilcoxon Z-statistic for differences in medians; for Panel B, *p*-values are two-sided and standard errors are clustered by firm. \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1% level, respectively.

<b>Panel A: Univariate differences in rank and file option grants</b>			
	Mean	Median	<i>N</i>
<i>HIGH_ABN_SHORT</i> =1	1.50%	0.99%	2,742
<i>HIGH_ABN_SHORT</i> =0	1.30%	0.90%	8,613
Significance test	< 0.001***	< 0.001***	
<b>Panel B: OLS regression</b>			
Variable			
<i>HIGH_ABN_SHORT</i>	+		0.0013 0.016**
<i>TOP5_OPTIONS</i>	+		0.7528 < 0.001***
<i>TOP5_OTHER</i>	-		-0.0354 0.002***
<i>MSA_OPTIONS</i>	+		0.3652 < 0.001***
<i>CASH_SHORT</i>	+		-0.0057 0.183
<i>INT_BURDEN</i>	+		0.0002 0.884
<i>R&amp;D</i>	+		0.0004 0.475
<i>BMR</i>	-		0.0011 0.495
<i>LEVERAGE</i>	-		-0.0026 0.002***
<i>LOW_TAX</i>	+		0.0013 0.319
<i>HIGH_TAX</i>	-		-0.0009 0.040**
<i>SALES</i>	+		0.0007 0.020**
<i>EMP</i>	+		-0.0004 0.129
<i>RET</i>	+		0.0000 0.247
<i>VOL</i>	+		0.0167 < 0.001***
<i>LOSS</i>	+		0.0055 < 0.001***
<i>EXPENSING</i>	-		-0.0027 0.001***
<i>DISTRESS</i>	+		-0.0000 0.872

Table 12 (continued)

Panel B: OLS regression	
Variable	
Year fixed effects	Yes
Industry fixed effects	Yes
Adj. R <sup>2</sup>	19.0%
N	N <sub>high</sub> = 2,742 N <sub>low</sub> = 8,613

### 6.5. Organizational hubris as an alternative explanation

Firms with a culture of hubris are likely to rely more heavily on stock-based compensation and also are more likely to misreport. To provide some confidence that the association between rank and file option grants and misreporting that we document is not the effect of hubris, we attempt to control for organizational hubris in our regressions.

We proxy for organizational hubris using CEO pay slice, which is the percentage of top-five compensation that is captured by the CEO (Bebchuk et al., 2011). While CEO pay slice is an imperfect proxy for organizational hubris, we argue that firms characterized by this type of culture are more likely to be led by CEOs who capture a relatively large portion of executive pay. When we include CEO pay slice in our model, we continue to find a significant association between rank and file option grants and misreporting.

### 6.6. Option backdating as an alternative explanation

A remaining concern is that our results are due to violations related to option backdating. If an employee receives stock options and knows they are backdated, he or she may not come forward to report the violations because such a revelation would result in either the backdated options getting repriced with a higher exercise price or a substantial increase in the taxes the employee would owe upon exercise of the options (if the options are not repriced). Therefore, option backdating might lead to a negative relationship between rank and file option grants and employee whistle-blowing, but not for the reasons we propose. To address this concern, we identify and remove from our sample any firm that is subject to litigation related to option backdating, and we reestimate our model. Only 23 cases in our sample are related to option backdating, and removing these observations does not impact our findings (untabulated results).

## 7. Conclusions

We provide evidence consistent with the hypothesis that when firms are engaged in financial reporting violations, they give their employees performance-based incentives, such as stock options, to facilitate and remain silent about the violations. We also find that the probability that a violating firm avoids allegations of wrongdoing from employee whistle-blowers is increasing in the stock option grants to its rank and file employees.

We make several contributions to the literature. First, our findings might be of interest to regulators who design enforcement and whistle-blowing programs. Second, while several studies argue that stock options held by senior executives are associated with misreporting, we show that options given to lower-level employees also impact the likelihood that misreporting is revealed by employee whistle-blowers. Finally, we offer an additional explanation for the puzzling existence of broad-based rank and file option plans, namely, that some firms grant rank and file options in an effort to deter employee whistle-blowing about financial irregularities.

However, our evidence is circumstantial because we cannot observe the underlying motivation for employees' whistle-blowing decisions and are therefore unable to completely rule out alternative explanations for our findings. For instance, rank and file employees may be persuaded to support misreporting orchestrated by a charismatic leader who makes employees believe her strategy is in the best interests of the firm. Alternatively, the corporate culture at certain firms may be more conducive to whistle-blowing relative to other firms (Graham et al., 2016).

While our findings do not provide direct evidence on the effectiveness of Section 922 of the Dodd-Frank Act, they are particularly relevant and timely, given recent legislative efforts to provide financial incentives to encourage employees to blow the whistle on corporate misdeeds. The Dodd-Frank Act and other regulations encourage whistle-blowing by offering rewards of up to 30% of recovered damages and penalties, and our findings suggest firms can offer financial incentives to discourage whistle-blowing. Recent press reports discuss the SEC's attempts to clamp down on firms that discourage whistle-blowing by requiring employees to sign confidentiality agreements or to forego any benefits from government inquiries. Future research could evaluate whether compensation packages or employment and severance contracts were

significantly altered after the implementation of Section 922 of the Dodd-Frank Act.

## Appendix A. Variable definitions

*ABN\_OPTIONS\_AVG* is the difference between rank and file option grants and the fitted value of expected rank and file option grants based on Eq. (1), averaged over the violation years leading to discovery.

*AGE* is the number of years the firm has been on CRSP as of the start of the violation period.

*BM* is the book-to-market ratio, measured as the book value of common equity divided by the market value of equity as of the end of the year short interest is measured.

*BMR* is the (book value of assets)/(book value of liabilities+market value of equity) in the year before options are granted.

*BOARD\_SIZE* is the number of members on the board of directors, per the IRRC database.

*CAPEX* is capital expenditures plus R&D expenditures plus acquisitions minus sales of property, plant, and equipment for the year short interest is measured (Richardson, 2006).

*CASH\_SHORT* is the three-year average of [(common dividends+preferred dividends+cash flow from investing – cash flow from operations)/total assets]. We measure cash shortfall over the three years prior to the year in which options are awarded.

*DISTRESS* is the industry-adjusted Altman Z-score in the year options are granted, measured as the Altman Z-score for firm *i* minus the average Altman Z-score for all firms in the same industry that year. The Altman Z-score is calculated as  $[1.2 \times (\text{working capital}/\text{total assets})] + [1.4 \times (\text{retained earnings}/\text{total assets})] + [3.3 \times (\text{earnings before interest and taxes}/\text{total assets})] + [0.6 \times (\text{market value of equity}/\text{total liabilities})] + [1.00 \times (\text{sales revenue}/\text{total assets})]$ . For manufacturing industries, we calculate the Altman A-score as  $[6.56 \times (\text{net current assets}/\text{total assets})] + [3.26 \times (\text{retained earnings}/\text{total assets})] + [6.72 \times (\text{earnings before interest and taxes}/\text{total assets})] + [1.05 \times (\text{book value of equity}/\text{total liabilities})]$ .

*DOWNSIZING* is the average growth in the number of employees over the three years prior to the violation period. Because of limited data availability, we assume employee growth is zero when it is unavailable from Compustat.

*DURATION* is the length of the class period.

*EMP* is the logarithm of the number of employees in the year options are granted.

*EP* is the earnings-to-price ratio, measured as earnings (operating income after depreciation) for the year short interest is measured divided by the market value of equity as of the end of the year.

*EXPENSING* is an indicator variable equal to one if the firm voluntarily records stock option expense using the fair value method for financial reporting purposes and equal to zero otherwise. Voluntary expensing of stock options is obtained from the Bear Stearns report on accounting and taxation.

*G-INDEX* is the governance index developed by Gompers et al. (2003).

*HIGH\_TAX* is an indicator variable equal to one if the firm has positive taxable income and no net operating loss carryforwards in each of the three years prior to the year options are awarded and zero otherwise. Consistent with Hanlon et al. (2005), we estimate taxable income as  $[(\text{federal tax expense} + \text{foreign tax expense})/\text{top marginal corporate rate}] - \Delta\text{NOL carryforward}$ .

*ICW* is internal control weaknesses, which is the fitted value from the following model, as estimated by Doyle et al. (2007):  $ICW = \beta_0 + \beta_1 MVE + \beta_2 AGE + \beta_3 LOSSES + \beta_4 SEGMENTS + \beta_5 FOREIGN + \beta_6 EXTREME\_SG + \beta_7 RESTRUCTURE + \varepsilon$ , where *MVE* is the log of the firm's market value of equity, *AGE* is the log of the number of years the firm has Center for Research in Security Prices (CRSP) data, *LOSSES* is an indicator variable equal to one if earnings before extraordinary items in the two most recent years sum to less than zero and zero otherwise, *SEGMENTS* is the log of the number of operating and geographic segments reported by the Compustat Segments database, *FOREIGN* is an indicator variable equal to one if the firm has nonzero foreign translation and zero otherwise, *EXTREME\_SG* is an indicator variable equal to one if year-over-year industry-adjusted sales growth falls into the top quintile and zero otherwise, and *RESTRUCTURE* is the aggregate restructuring charge in the two most recent years, scaled by the firm's market capitalization. *ICW* is measured in the year before the violation period. We use coefficient values as reported in Doyle et al. (2007):  $\beta_1 = -0.80$ ,  $\beta_2 = -0.136$ ,  $\beta_3 = 0.438$ ,  $\beta_4 = 0.269$ ,  $\beta_5 = 0.311$ ,  $\beta_6 = 0.227$ , and  $\beta_7 = 1.184$ . Because of limited data availability, we set *SEGMENTS* equal to zero if the necessary data are not available.

*IND\_OPTIONS\_AVG* is the difference between a firm's rank and file option grants and average rank and file option grants within the firm's industry, averaged over the violation years leading to discovery.

*INT\_BURDEN* is the three-year average of interest expense scaled by operating income before depreciation. We measure interest burden over the three years prior to the year in which options are awarded. Negative values and values greater than one are set equal to one.

*LEVERAGE* is equal to one if the firm has long-term debt outstanding in the year options are granted and equal to zero otherwise.

*LOSS* is an indicator variable equal to one if the firm reports negative operating earnings in the year in which options are granted and equal to zero otherwise.

*LOW\_TAX* is an indicator variable equal to one if the firm has negative taxable income and net operating loss carryforwards in each of the three years prior to the year options are awarded and zero otherwise. Consistent with Hanlon et al.

(2005), we estimate taxable income as [(federal tax expense+foreign tax expense)/top marginal corporate rate] -  $\Delta$ NOL carryforward.

*MOM* is the buy-and-hold raw stock return for the year in which short interest is measured.

*MSA\_OPTIONS* is the average *RF\_OPTIONS* of all other firms in the metropolitan statistical area in which the firm's headquarters is located in the year options are granted.

*MVE* is the market value of equity as of the end of the year short interest is measured.

*OUTSIDE%* is the percentage of board members who are outsiders, per the Investor Responsibility Research Center (IRRC) database.

*PAST\_PERF* is the buy-and-hold returns for the 12 months prior to the violation period.

*POST* is an indicator variable equal to one for all years after discovery.

*PRE* is an indicator variable equal to one for all years before the violation period.

*QUITAM* is an indicator variable equal to one if the firm is in the health care industry (two-digit standard industrial classification code=80) or it appeared on the federal government's "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards" list in any of the three years prior to the violation period and equal to zero otherwise.

*R&D* is research and development expense as a percentage of sales. For *H1*, R&D is averaged over the three years before the year in which options are awarded. For *H2*, R&D is measured in the year before the violation period.

*REPUTATION* is an indicator variable equal to one if the firm has appeared on *Fortune's* "Best Companies to Work For" list or on *Fortune's* "Most Admired Companies" list in any of the five years prior to the violation period and equal to zero otherwise.

*RET* is the buy-and-hold returns for the 12 months prior to the fiscal year.

*RF\_OPTIONS* is the options granted to rank and file employees, as a percentage of total shares outstanding, as of year *t*. This variable is measured as the total number of options granted by the firm minus the number of options granted to the top-five executives. The total number of options granted by the firm is available on ExecuComp (using the executive's option grants and the executive's share of total option grants made by the firm) for years 1992 through 2006. For 2007–2009, we obtain the number of options granted by the firm from Compustat. We scale this variable by the number of shares outstanding.

*RF\_PORTFOLIO* is the average number of rank and file options (scaled by total shares outstanding) that are unvested. Unvested options are measured as  $(1.00 * RF\_OPTIONS_t) + (0.75 * RF\_OPTIONS_{t-1}) + (0.50 * RF\_OPTIONS_{t-2}) + (0.25 * RF\_OPTIONS_{t-3})$ .

*SALES* is the logarithm of sales revenue in the year options are granted.

*SALES\_GROWTH* is the average growth in sales over the three years prior to the violation period.

*SHORT* is the annual average number of shares sold short divided by the number of shares outstanding.

*SIZE* is the natural log of total sales revenue for the year before the violation period.

*TOP5\_OPTIONS* is the number of stock options granted to the top-five executives scaled by total shares outstanding in the year options are granted.

*TOP5\_OTHER* is all compensation, other than stock option grants, given to the top-five executives scaled by market value of equity in the year options are granted.

*TURNOVER* is the average daily volume turnover ratio for the year in which short interest is measured, measured as the exchange-specific, percentile rank of daily volume divided by shares outstanding.

*VIOLATION* is an indicator variable equal to one for all years in the violation period and until discovery in a sample of firms subject to shareholder litigation.

*VOL* is the standard deviation of monthly stock returns in the year before options are granted.

*WB* is an indicator that takes the value of one if the firm experienced an employee whistle-blowing event after the beginning of the violation period.

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