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Abstract

Overconfident CEOs/senior executives tend to have excessively positive views of their own skills and their company's future performance. We hypothesize that overconfident managers are more likely to engage in reckless or intentional actions and/or disclosures that give rise to securities class actions (SCAs). Empirical evidence is supportive: overconfident CEOs/senior executives increase SCA-likelihood, though litigation risk is ameliorated through improved governance, for instance after the passage of SOX. Following a SCA, overconfident CEOs appear to moderate behavior and to reduce their litigation risk. We find that companies are less likely to hire an overconfident CEO after a SCA.

JEL Classification Codes: G34, G38, K22
Keywords: CEO Overconfidence, Team Overconfidence, Securities Class Actions, Governance

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Abstract

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1 Introduction

Securities class actions (SCAs) often have significant ramifications for firms and the CEOs involved. SCAs, under SEC Rule 10b-5, aim to compensate shareholders for economic losses caused by a firm's false statements. SCAs often harm companies' product market positions (Johnson et al., 2014; Karpoff et al., 2008) and their access to capital (Autore et al., 2014). Given the high stakes, a natural question is whether some types of CEOs are less adept than others in terms of averting SCAs. In particular, are there potentially observable CEO characteristics that would imply a greater willingness to inflate their firm's prospects, even if it involved a distortion of facts? A finding that certain types of CEOs are more prone to making erroneous statements and catalyzing a class action could be helpful in terms of selecting new CEOs. Similarly, litigation insurers might wish to identify which executives are riskier and warrant greater pricing scrutiny. We propose one such executive-characteristic: overconfidence, which could induce executives to recklessly over-state their prospects or to conceal negative information with a perceived belief that future performance would obviate the economic loss that might otherwise trigger a class action.

Our objective is to better understand the implicit trade-offs – and beliefs – of CEOs and other executives that could affect the likelihood of SCAs. We analyze the role played by managers' beliefs on litigation risk by focusing on overconfident executives. Our contention is that these executives, with their bullish views about their firm's future prospects, are more likely to engage in manipulative actions. We develop and test hypotheses on the relation between overconfident beliefs and the tendency to commit fraud of the type that leads to SCAs. We also investigate whether SCAs prompt changes in firm policies by either precipitating the CEO's departure from the company or by inducing the existing management to improve quality of disclosure. Evidence that SCAs promote disclosure speaks to the policy issue of whether such class actions are welfare enhancing.

Overconfident executives have, by definition, an overly positive view of their ability and of their companies' prospects. This would manifest in overconfident executives' making exces-

sively optimistic public statements about the company, or failing to disclose negative information in a timely manner – believing that they might be able to rectify this period of poor performance. Indeed, this is the logic behind the commonly used media-based measures of overconfidence (see e.g., Hirshleifer et al., 2012). However, should those statements prove to be falsely optimistic, the company risks becoming subject to a 10b-5 securities class action (SCA) in which shareholders sue for loss or damage arising from reliance on such information when purchasing company's stock. Exacerbating the risk of a class action lawsuit is that excessive optimism with regard to future performance could leave executives with a nonchalant attitude about shading their financial statements.

We analyze whether, and in what circumstances, overconfident CEOs and non-CEO executives expose their companies to SCAs. For our analysis, we use a firm-year panel dataset from 1996-2012. We identify SCA-events using the Stanford Securities Class Action Clearinghouse (SCAC).[1] We use option-based measures of overconfidence, focusing on the Holder67 measure (as in Malmendier et al., 2011), which classifies managers as overconfident if they refrain from exercising deep in-the-money (specifically, 67% in-the-money) options. The underlying rationale is that an executive's human capital is often extremely under-diversified (exposed to firm-specific risk). A rational, risk-averse executive would choose not to hold deep in the money exercisable options: since he would be strictly better off by liquidating the options and using the funds to create a diversified portfolio with a similar or better risk-return profile, but less correlation with his firm-specific risk. We also use an alternative, "trading-based" measure of overconfidence (as in Kolasinski and Li, 2013), that classifies CEOs as being overconfident if they purchase stock in their own company and then lose money on the purchase. Additional robustness tests are conducted using a news-based measure of overconfidence.

We first hypothesize and show that overconfident CEOs and executives expose their companies to SCAs. We examine the role of CEO overconfidence within a regression framework

[1]In our baseline results, we focus on whether a SCA was filed against a company rather than whether it was ultimately successful. This is because there are many possible reasons for a suit to fail, including owing to the relative quality of the plaintiff's and the defendant's lawyers and the resource-imbalance between the parties in fighting the case. In robustness tests, we find qualitatively similar results when focusing on SCAs that were not dismissed.

similar to that in Kim and Skinner (2012). These regressions utilize industry and year fixed effects, and control for other factors that might influence litigation risk.[2] Nonetheless, we also check that the results hold when using firm fixed effects and different industry-definitions.[3] Our results indicate that overconfident CEOs' firms are about 33% more likely to be subject to a SCA than comparable other firms.[4] Further, the overconfidence of senior executives (excluding CEO) increases the likelihood of a SCA in addition to the effect of CEO overconfidence. This evidence is consistent with the idea that overconfident executives are also more likely to expose their firms to a SCA by, for instance, making overly positive predictions about the firm's prospects that are not supported by facts.

Next we analyze the effect of exogenously mandated changes in corporate governance practices in mitigating (or worsening) the impact of CEO overconfidence. We focus on the impact of one such exogenous shock to governance: passage of the Sarbanes-Oxley Act of 2002 (SOX) and contemporaneous changes to the NASDAQ/NYSE listing rules. We hypothesize and show that the improved monitoring following the passage of SOX moderates the impact of CEO overconfidence on SCAs. SOX requires firms to have a majority independent board, fully independent audit and nomination committees, and obliges the CEO to personally sign-off on the firm's accounts. These changes would be expected to both improve corporate governance standard and expose the CEO to a wider range of independent view-points (thereby helping to moderate overconfident CEOs' views).

To identify the effect of SOX, we distinguish between firms that were compliant with major requirements of SOX prior to the passage of SOX, and firms that were not (i.e., non-compliant firms). If additional scrutiny and independent view-points mandated by SOX help to reign in overconfident senior executives, the passage of SOX should primarily affect firms that were non-compliant at the time and have little/no effect on firms that were already compliant.

[2]We use both two digit Standard Industry Codes (SIC) and Hoberg-Phillips industry classification to control for industry fixed effects. Hoberg-Phillips industry classification results are stated in Online Appendix.

[3]Requiring firm fixed effects significantly reduces the sample-size as many firms are sued only once or are never sued. Consequently, the main reported regressions use industry and year effects.

[4]This result comes from the marginal effects associated with the coefficient on CEO Holder67 in Table 3 and average litigation risk of 4.5% for non-OC CEOs. The marginal effect associated with Holder67 in Table 3 is 1.54%, suggesting roughly about $1.54/4.5 \approx 33\%$ more risk for OC-managers relative to non-OC managers.

Our empirical findings strongly support our conjecture: In the pre-SOX period, CEO overconfidence has a substantial impact on litigation risk of SOX-non-compliant firms, but does not affect the litigation risk of SOX-compliant firms. Similarly, in the post-SOX period, non-compliant firms exhibit a significant drop in the effect of CEO overconfidence on firms' litigation risk, whereas there is little change for compliant firms.

We assess whether overconfident CEOs, and companies, modify their behavior in response to SCAs. We hypothesize and show that a SCA reduces the influence of CEO overconfidence on future litigation-risk. We also find that post-SCA, these CEOs exhibit fewer indications of being overconfident, relative to their pre-SCA behavior. This finding is consistent with the results in Bernile et al. (2014) that CEOs that experienced extreme shocks in their youth (in their case, natural disasters) were less prone to risk-taking behavior. Further analysis shows that a firm that has been subject to a SCA under its prior CEO is less likely to hire an overconfident executive for its next CEO. These results indicate the potential impact of SCAs (and the threat thereof) in terms of affecting firm and CEO behavior.

We take steps to mitigate econometric concerns that might otherwise influence a study of this type. These include (but are not limited to) the following. As stated, we examine the role of exogenous event like SOX in moderating the impact of CEO overconfidence. We also undertake measures to address sample selection issues, including propensity score matching techniques. Further, we ensure that the results are robust to alternative measures of managerial overconfidence, including news-based measures (per Hirshleifer et al., 2012) and trading-based measures (per Kolasinski and Li, 2013). The results are also robust to "adjusting" the overconfidence measure for the firm's stock-performance.

The results contribute to the literature in several ways. First, we expand upon the prior SCA-literature by highlighting the influence of executives' behavioral characteristics (such as CEO overconfidence) on the likelihood of a SCA. Second, we provide additional evidence on the effect of SOX and corporate governance on the impact of CEO overconfidence and the likelihood of SCAs. Third, our results suggest that shocks, such as SCAs, can induce CEO

behavioral change: CEOs exhibit fewer indications of overconfidence

The structure of this paper is as follows. Section 2 both discusses the prior literature and presents the hypotheses. Section 3 describes the data and presents summary statistics. Section 4 presents the multivariate regression analysis that examines the relationship between executive overconfidence and SCAs. Section 5 presents the robustness tests and addresses alternative explanations for the results and Section 6 concludes.

2 Hypotheses

A securities class action arises if the company, or an employee thereof, makes a materially falsely positive statement (or omits negative information) and shareholders subsequently suffer loss or damage by reason of relying on this misstatement. The shareholders typically do not need to prove that they relied on the misstatement (as the court assumes that they relied on the efficiency of the markets, which implicitly impounds all statements relating to the company).[5] Instead, it is generally sufficient for shareholders to prove that there is a false statement and that they purchased the shares after such a false statement. Thus, a 10b-5 SCA typically arises after one of the company's executives makes a positive statement that the company fails to actualize, or presents a positive prediction that fails to materialize. The plaintiff must also establish scienter, which is essentially that the defendant intentionally, or recklessly, misled the market.[6] The following sub-sections discuss the relationship between overconfidence and the likelihood of a SCA.

[5]This presumption of reliance originated in *Basic Inc. v. Levinson*. In June 2014, the United States Supreme Court upheld the validity of this presumption in *Halliburton Co. v. Erica P. John Fund, Inc.*

[6]For a discussion of scienter requirements see for example Bolger (1980). While the courts initially required the plaintiff to establish that the defendant intentionally mislead the market (i.e., by making a statement that she knew to be false), since *Ernst & Ernst v. Hochfelder* 425 U.S. 185 at 193 (1976), courts have accepted that it is sufficient to establish that the defendant acted recklessly (Bolger, 1980; Donelson and Prentice, 2012; Walker and Seymour, 1998). Further, Donelson and Prentice (2012) argue that PSLRA is premised on the sufficiency of establishing scienter by showing the defendant CEO was reckless.

2.1 Overconfidence and SCAs in general

We propose that overconfident executives are more likely to make such falsely positive statements. This is for at least four reasons. First, as indicated, overconfident CEOs tend to overestimate projects' returns and under-estimate projects' risks. Additionally, as stated above, if the CEO makes a falsely positive statement (i.e., when promoting the firm's projects) and is reckless as to whether that statement is correct, then the firm can be liable for a SCA. Since making imprudently overconfident statements increases the chance of the CEO being found to be reckless, we expect overconfident CEOs to increase the likelihood of a SCA. Indeed, a track-record of overconfident behavior would help to establish a case that the CEO's statements were not merely 'negligent' (which would be insufficient to establish scienter), but were reckless.[7] We expect the above logic to apply similarly to overconfident non-CEO executives.

Second, overconfident CEOs tend to over-invest (Malmendier and Tate, 2005, 2008). However, such investments often perform poorly (Kolasinski and Li, 2013; Malmendier and Tate, 2008), whereupon overconfident managers tend to adopt less conservative accounting practices, postpone loss recognition (Ahmed and Duellman, 2013), and engage in earnings smoothing (Bouwman, 2014) and financial misstatements (Schrand and Zechman, 2012). Further, Laux and Stocken (2012) present a theoretical model in which they argue that optimistic managers are more likely to (potentially inadvertently) misrepresent their investment prospects. Relatedly, McTier and Wald (2011) indicate that over-investment (albeit, not necessarily involving overconfident CEOs), tends to be associated with increased litigation-risk.

Third, overconfident CEOs tend to have miscalibrated perceptions of the risk and return associated with investments (Ben-David et al., 2013). Thus, overconfident CEOs are more likely to believe (incorrectly) that the company will perform well enough that they will not be caught if they make financial misstatements, or even if they are caught, the firm's stock price will not decline such that shareholders suffer a loss and instigate a Rule 10b-5 suit. Such beliefs

[7] Courts have acknowledged that it is difficult to establish direct proof that the CEO intended to mislead or was reckless (*Clarke v. United States*, 132 F.2d 538, 540-41 (9th Cir. 1943)). Instead, the court will often determine scienter as "a matter of inference from circumstantial evidence" (*Herman & MacLean v. Huddleston*, 459 U.S. 375, 390 n.30 (1983).).

appear to prompt overconfident CEOs to produce less conservative accounting statements (Ahmed and Duellman, 2013). Overconfident CEOs also appear to fail to learn from their failure to meet such optimistic forecasts (Chen et al., Forthcoming). Thus, the overconfident CEOs' highly optimistic beliefs could result in recklessly optimistic representations as to the firm's future prospects.

Finally, overconfident CEOs are more likely to omit negative information than are non-overconfident CEOs. A SCA can arise following the firm's failure to disclose negative information. An overconfident CEO, almost by definition, is more confident about her ability to rectify such negative outcomes. Thus, they would be slower to recognize negative information, giving rise to a SCA. The foregoing reasons suggest that overconfident CEOs are more likely to make recklessly, or intentionally, falsely positive statements. Such actions, would then expose the firm to a SCA. We expect a similar effect for non-CEO senior executives.

Hypothesis 1. *Companies with overconfident CEOs are more likely to be subject to a securities class action.*

Hypothesis 2. *Companies with overconfident senior, non-CEO, executives are more likely to be subject to a securities class action.*

2.2 Governance

Improvements in internal governance should reduce the likelihood that an overconfident CEO's company is sued. Monitoring by independent directors can mitigate the likelihood of securities fraud in general (Choi et al., 2013; Khanna et al., 2013). Higher quality boards are also associated with improved disclosure-quality (Reeb and Zhao, 2013). Our conjecture is that the impact of a CEO's behavioral biases could be attenuated by improving independent oversight and exposing the CEO to a more diverse set of view-points. The Sarbanes-Oxley Act of 2002 (SOX) was enacted in response to corporate scandals that connoted both unethical behavior and CEO hubris. The passage of SOX along with contemporaneous changes to

the NASDAQ/NYSE listing rules, represents an exogenous shock to internal corporate governance that imposed requirements such as a majority-independent board and a completely independent audit committee.

There are at least three key aspects of SOX that would be expected to mitigate the impact of CEO overconfidence on SCA-likelihood. First, SOX compels an overconfident CEO to consider alternative, independent view-points when making decisions, thereby moderating her tendency to make reckless statements and investments. Second, SOX increases oversight, creating more checks and balances over financial statements. For instance, Duarte et al. (2014) argue that SOX reduces managerial discretion, implying that SOX could reduce an overconfident CEO's discretion to act on their biases when making investments. This increase in oversight could, in and of itself, lead to a reduction in misreporting.[8] Finally, SOX forces CEOs to sign-off on financial reports, presumably forcing CEOs to reflect more upon the company's true financial state. Thus, while there is some evidence that SOX does not per se reduce litigation likelihood (see e.g., Malm and Mobbs, 2014), we expect that it could do so in particular companies, such as those with overconfident CEOs, that could benefit from additional independent oversight and monitoring.

While SOX's provisions applied to all firms, several firms were already compliant with the major requirements of SOX prior to its passage, while others were not ('non-compliant' firms). The effect of SOX in reducing the likelihood of overconfident CEOs' companies being sued would, therefore, be evident primarily for firms that were not previously compliant.[9] A finding that SOX impacts firms that were non-compliant – and not the compliant firms – would indicate that it was SOX related requirements that moderated the effects of CEO overconfidence on the likelihood of securities class actions.[10] We can state the following

[8] Dimmock and Gerken (2014) suggest that improvements in SEC oversight significantly reduced misreporting in the hedge fund sector.

[9] When looking at compliance, we also consider whether the firm complied with both SOX and the NYSE/NASDAQ listing rules, as these were implemented near-simultaneously. We classify a firm as compliant if, in 2000, fewer than 50% of its board members were executives and there were no executives on the audit committee or in the nominating committee.

[10] Although it is worth noting here that some aspects of SOX, such as auditors' enhanced responsibilities, CEO certification of financial reports, corporate and criminal fraud accountability and white collar crime penalty enhancement affected all (or virtually all) firms. We are not aware of any firms that had explicitly

hypothesis:

Hypothesis 3. *The passage of SOX reduces the likelihood that an overconfident CEO's firm is subject to a SCA, particularly for firms were not SOX-compliant prior to its passage.*

2.3 Likelihood of SCA success

It is possible that lawsuits that are brought against firms with overconfident CEOs are of a somewhat different quality than those against other firms. For instance, if SCAs are more likely because of a general tendency on the part of an overconfident CEO to paint a more positive picture, rather than actual fraudulent behavior, we would expect many of these lawsuits to be frivolous. If so, this would presumably result in the likelihood of successful SCA litigation being proportionately lower for overconfident CEOs. On the other hand, as we hypothesize, if overconfident CEOs are more likely to face SCAs because of a greater tendency to commit securities fraud (advertently or inadvertently), then we would expect there to be no substantial difference between the likelihood of a successful SCA when a firm is headed by overconfident CEO, relative to when it is headed by non-overconfident CEO. Thus, we state the following hypothesis:

Hypothesis 4. *Likelihood of success of a SCA lawsuit will be independent of CEO's overconfidence.*

2.4 Post-SCA learning

We anticipate that a SCA will attenuate the impact of CEO overconfidence on future litigation risk. As we have hypothesized above, overconfident CEOs are more prone to either failing to disclose negative news or to making falsely optimistic statements. We believe that occurrence of a SCA – an impactful shock – would help to highlight the importance of adequate and

adopted such provisions prior to SOX and some as noted are changes in legal guidelines. These "unobservable" common factors would tend to weigh *against* us finding significant differences between compliant and non-compliant firms.

accurate disclosure. Facing a lawsuit could plausibly cause an overconfident CEO to also change behavior, even to question the validity of her overconfident beliefs. Consequently, we expect that the occurrence of a SCA would reduce the impact of CEO overconfidence on future litigation risk. Therefore, we make the following prediction:

Hypothesis 5. *A SCA reduces the impact of CEO overconfidence on future litigation-risk.*

A related prediction pertains to companies' hiring practices. A SCA can worsen a company's product market position and future access to capital. Thus, we expect a litigated firm would seek to avoid hiring a litigation-prone CEO after it has experienced the effects of a SCA. We expect, therefore, that a firm that faced SCAs might be inclined to select a more cautions, less overconfident individual for its next CEO. This suggests the following hypothesis:

Hypothesis 6. *A company is less likely to hire an overconfident CEO if it was subject to a SCA under its prior CEO.*

3 Data

We create a firm-year panel data-set to examine the likelihood that a firm is subject to a securities class action in a given year. We start with the set of all companies in the CRSP/Compustat universe. We then match this data with executive-level data from Execucomp, which we use to identify if the CEO is overconfident. Data on whether a firm is subject to a SCA is obtained from the Stanford Securities Class Action Clearing House (SCAC). We use CRSP/Compustat data to compute various control variables that prior literature has used when examining litigation-likelihood (see e.g., Kim and Skinner, 2012). Relatively few of the firms in our sample are sued more than once. The exact number of repeat-defendants varies across model specifications (i.e., with the control variables that we require), being between 174 and 194 observations out of a sample of over 22,000 firm-year observations involving 1,375 law suits over the 1996 to 2012 period.[11] The results are robust to eliminating such repeat SCA-targets

[11] These SCAs, and the conduct relating thereto, pre-date the *Concepcion* decision, which upheld the ability of companies to opt out of class actions through arbitration waivers, and the corporate trend thereto (see e.g.,

from the sample.[12] In the reported models, we follow Kim and Skinner (2012), and use firm and two-digit industry fixed effects. However, we check that the results are robust to using firm fixed effects and alternative industry definitions including Hoberg-Phillips industry classifications.

We use option-based and trading-based measures of overconfidence. In robustness tests, we also check that the results are robust to news-based measures of overconfidence. The idea behind option-based measures of overconfidence is that a CEO's personal wealth is underdiversified, with her human capital being tied to the firm. Consequently, a rational CEO would exercise her options as and when they vest. An overconfident CEO would hold options, especially deep in the money options, for an extended period. We capture this by collecting data on the number and value of the CEO's vested options. We start by constructing the CONFIDENCE measure as "average-value-per-option/average-strike-price" (as per Campbell et al., 2011; Hirshleifer et al., 2012; Malmendier et al., 2011), where the average-value-per-option is the total value of the CEO's option-holdings (Execucomp: opt_unex_exer_val) scaled by the number of such options (Execucomp: opt_unex_exer_num). The average-strike-price is the firm's stock price at the end of the fiscal year (CRSP: prcc_f) less the value-per option.[13] We then construct two indicator variables: CONFIDENCE_TOPQ is an indicator that equals one if the CEO's CONFIDENCE variable is in the top quartile of all CEOs in that year. Holder67 is the Malmendier et al. (2011) Holder67 measure (computed using publicly available data), which is an indicator that equals one if the CONFIDENCE variable is at least 0.67 on two or more occasions (in which case the Holder67 indicator equals one from the first time that CONFIDENCE is at least 0.67).

We also ensure that the results are robust to using a Kolasinski and Li (2013) type measure of CEO overconfidence.[14] They characterize a CEO to be overconfident if she purchases stock

Fitzpatrick, 2015). Thus, this would not bias the results. However, the models do include year effects to control for time-related factors.

[12] We discuss these results in detail in the robustness section.

[13] This computation works on the idea that the value per option is roughly $S_t - X$, where S_t is the prevailing stock price at time t and X is the strike price. Thus, the average strike price is roughly $X = S_t - (S_t - X)$

[14] The correlation between the Holder67 measure and the trading-based measure is relatively low, at 0.002, which is statistically insignificant. This suggests that the measures capture somewhat different aspects of CEO

in her own firm and then loses money on the purchase. To construct the measure, we proceed by identifying all CEO stock-purchases in the Thomson Reuters insider trading filings. We determine if the CEO purchased stock in a particular year and calculate the return the CEO earned on the purchase over the following 180 days. We define the CEO as overconfident if he/she purchased shares and the market model buy-and-hold abnormal return was negative in the following 180 days, where the BHAR abnormal returns are calculated using a market model. We classify the CEO as non-overconfident if the BHAR was either positive or the CEO did not purchase shares. In the reported tests, we focus on the variable from two years prior to the litigation filing in order to ensure that the negative return is not merely a function of the market's reaction to the litigation. Additionally, we ensure the results are robust to creating a trading-based measure based on the CEO's trading activity in the financial year *after*, or only one year before, the date in which the SCA is filed.

In Figure 1, below, we depict the start of the class period, end of the class period and the time at which the lawsuit was filed. The average time between the end of the class period and the SCA filing is 98 days. The average class period lasts 652 days.

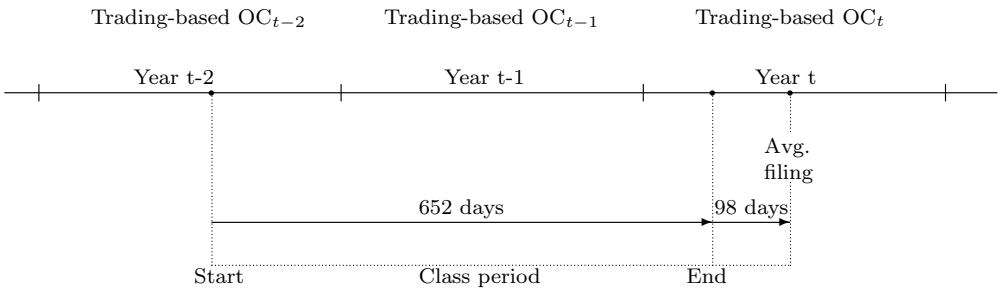

Figure-1: Timeline of SCA events and Trading-based Overconfidence measure

The sample composition by year is in Table 1. The table indicates that the sample size is relatively stable over time. Approximately half of the CEOs in the sample are overconfident (i.e., have Holder67 equal to one). This is similar to the proportion of overconfident CEOs in

behavior.

prior studies using this measure (see e.g., Malmendier and Tate, 2005, 2008; Malmendier et al., 2011). Around 65% of all law suits involve overconfident CEOs (i.e., if the company is sued, then it is around 1.8 times as likely that the CEO is overconfident than non-overconfident). The proportion of suits that involve overconfident CEOs fluctuates over time.

[Table 1 about here]

Summary statistics are reported in Table 2.[15] We report statistics for the full sample and for the sub-samples of companies run by overconfident and non-overconfident CEOs. The summary statistics are relatively standard and in line with expectations. There is a significant negative stock-price decline before the announcement of a SCA. The decline is more severe for companies run by overconfident CEOs. Overconfident CEOs' companies are also more likely to be sued and to suffer more negative long-run post-SCA returns. There are some differences between overconfident CEOs' firms and non-overconfident CEOs' firms. In robustness tests (described below) we take steps to address concerns about our results being driven by differences between overconfident CEOs' firms and non-overconfident CEOs' firms.

[Table 2 about here]

4 Analysis

This section presents the multivariate regression analysis. We begin by analyzing the relationship between CEO and non-CEO executive overconfidence and SCAs. Next, we explore how governance, entrenchment, and CEO compensation can affect the relationship between overconfidence and SCAs, with improved governance helping to mitigate the impact of CEO overconfidence. Finally, we explore whether overconfident CEOs are more likely to be disciplined (as proxied by them leaving the company) following a SCA.

[15] In the online appendix, we also report summary statistics some more variables that used but not central to our analysis; e.g., see Table OA1.

4.1 Executive overconfidence and the likelihood of a SCA

We begin by testing the hypothesis that overconfident CEOs' firms are more likely to be sued. We analyze the relation between CEO overconfidence and litigation likelihood in Table 3. The control variables are based on the models in Kim and Skinner (2012, Tables 7, 8).[16] All controls are one-period lagged.[17] The regression models in Table 3, and in subsequent tables, are logit regressions with year and SIC two-digit industry fixed effects (as per Kim and Skinner, 2012). The year fixed effects help to mitigate the impact of legal changes over time, such as PSLRA, that can influence SCA-likelihood (see e.g., Choi et al., 2009). The industry fixed effects help to address prior evidence that industry-conditions can influence fraud-propensity (Wang and Winton, 2014; Wang et al., 2010). If we use year and firm fixed effects, we obtain qualitatively similar results to those in Table 3. This suggests that our results are not merely capturing a time-invariant "firm" effect, and that changing the level of CEO-overconfidence at a given firm can affect SCA-likelihood.[18]

The important finding in Table 3 is that CEO overconfidence is significantly and positively related to the likelihood of the company being sued, supporting Hypothesis 1. This result is economically significant. Using the marginal effect of 1.54% associated with CEO Holder67 in Column 1 of Table 3 and 4.5% average litigation risk for non-OC led firms stated in Table 2, we find that overconfident managers are 33% more likely to be sued than are otherwise similar non-overconfident CEOs. We obtain similar results when focusing on the trading-based (as in Kolasinski and Li, 2013) measure of overconfidence in Column 2 of Table 3.

The coefficients on the control variables are largely consistent with expectations and with prior literature (see e.g., Choi, 2006; Field et al., 2005; Kim and Skinner, 2012). Insider trading is not significantly related to SCA-likelihood. This is consistent with prior findings that there is little abnormal insider trading prior to SCAs (Niehaus and Roth, 1999). Institutional

[16] Alternatively we used Hoberg-Phillips industry classification and we obtain results that are almost exactly the same. We stated these results in the Online Appendix.

[17] The core results are robust to using twice-lagged controls.

[18] However, using the firm fixed effect instead of industry fixed effect causes our sample size to shrink to only 5,000 observations (from around 20,000) observations as many companies never experience a SCA, and many companies experience only one SCA. Hence, for most part of our analysis we rely on industry fixed effect.

ownership is positively related to SCA-likelihood. This likely reflects the role of institutional investors in monitoring firms (and disciplining firms for misconduct), especially in light of SCA-reforms that emphasize the presence of a lead plaintiff (i.e., an institutional investor) to pursue the case (Perino, 2012, 2014). It is also consistent with prior evidence that some institutional shareholders tend to face lower costs in pursuing litigation (Choi et al., 2011). Firms that raise equity are more likely to be sued. This is unsurprising given the prior evidence on litigation around equity issuance. Firms with lower and more volatile stock returns are more likely to be sued (as in Arena and Julio, 2015; Choi, 2006; Gande and Lewis, 2009; Jones and Weingram, 1996). This is consistent with the idea that a 10b-5 case will be successful only if the shareholders suffered a loss after they purchased the stock.

Corporate fundamentals are also related to litigation-likelihood. Larger firms are more likely to be sued, possibly because larger firms have more assets with which to meet any litigation payout. Similarly firms with higher ROA and sales growth are more likely to be sued, which is in line with prior evidence that large cash holdings can render firms vulnerable to litigation-like disputes with unions (Arena and Julio, 2015; Klasa et al., 2009). Conversely, higher levels of PP&E reduce SCA-likelihood (after controlling for the firm's asset-size). This could reflect the fact that PP&E cannot be easily converted into cash in order to meet a litigation-payout, making the company a less attractive target.

[Table 3 about here]

We next examine the relationship between non-CEO executive overconfidence and the likelihood of a SCA. We analyze the overconfidence of all executives for the firm in *Execucomp* database: senior executives and junior executives. In each case we construct our option-based, and trading-based, measures of overconfidence for the firm's executives in *Execucomp*. We have several findings: First, under both the option-based, and trading-based measures of overconfidence, executive overconfidence is significantly associated with litigation risk; i.e., the Holder67 measure is significant and positive, whereas the trading-based measure is statistically significant and negative. Second, this effect seems to concentrate in the senior executives

and the CEO: in regressions that include CEO (and/or senior executive) overconfidence, junior executive overconfidence is found to be statistically insignificant, indicating that junior executives' overconfidence is not the primary driver of litigation risk. Overall, the results on senior executives' behavioral attributes and litigation risk are supportive of Hypothesis 2.

[Table 4 about here]

4.2 Sarbanes-Oxley Act 2002, CEO overconfidence and the likelihood of a SCA

We test the hypothesis that SOX ameliorates the impact of managerial overconfidence on SCA-likelihood (Hypothesis 3). For these tests, we focus on the option-based measure of overconfidence. We do not use the trading-based measure because the small sample size hinders reliable estimation. Requiring board data on whether the firm was SOX-compliant and restricting the analysis to the years around SOX, reduces the sample size substantially. The sample is further restricted for the trading-based measure, resulting in relatively few cases in which we can identify compliance with SOX and have data on CEOs' trading activities with which to detect CEO overconfidence.

We start by interacting the option-based measure of overconfidence with a "Post SOX" indicator that equals one if the observation occurs in 2002 or later and equals zero otherwise. When examining SOX, we restrict the sample to be six years on either side of SOX (i.e., 1996-2008). We use a post-SOX indicator in addition to splitting the sample by whether the firm was previously compliant with SOX's governance provisions. This is because SOX could enhance governance even in compliant firms through (inter alia) requiring CEOs to personally sign-off on financial reports, by increasing audit-stringency, and by enhancing internal controls (see e.g., Arping and Sautner, 2013).[19] We define a company as compliant if, in 2000, it had a majority non-executive board and had no executives on its audit and nominating committees.

[19]For example, related work indicates that SEC oversight significantly improved hedge fund governance and reporting (Dimmock and Gerken, 2014).

The results are in Table 5. In Column 1, the interaction term of the post-SOX dummy with the overconfidence measures are negative and statistically significant. In Columns 2 and 3 of Table 5 we analyze the sub-samples of firms that were SOX-compliant and those that were not.[20] We find that the interaction term is negative and significant only for the non-compliant sub-sample. The difference between the coefficients on the interaction term between the compliant and non-compliant subsamples is statistically significant. For the non-compliant firms, the improvement in the impact of overconfidence is economically meaningful: prior to SOX, in non-compliant firms, overconfident CEOs increased litigation risk by 2.4 percentage points (from a sample average of around 6 percentage points). After SOX, the impact of overconfidence decreased by 2.1 percentage points, suggesting that overconfidence increased litigation risk by only 0.3 percentage points post-SOX. The results indicate that SOX mainly affected firms that were not previously compliant with its major provisions, consistent with Hypothesis 3.

While smaller firms were exempt from SOX, this is unlikely to bias our results since our sample comprises only Execucomp (i.e., S&P 1500).[21] Further, the SOX results are unlikely to merely reflect an increase in litigation following the dot-com crash: the reported models include industry and year fixed effects and we obtain qualitatively similar results (unreported) if we exclude "high tech" firms or IT firms, following the definition in Loughran and Ritter (2004).

[Table 5 about here]

4.3 Likelihood of successful SCAs

One concern is that an overconfident CEO, who makes many positive comments, is an easy target for a frivolous/non-meritorious SCA. We mitigate this concern by hand collecting data

[20] We focus on analyzing sub-samples, rather than triple interactions, due to the difficulties interpreting triple interactions in LOGIT models. The sub-sample analysis also allows the coefficients on the controls to vary across subsamples, helping to mitigate any confounding effect arising from differential impacts of controls.

[21] For example, the exemption from Section 404(b) applies only to companies with a market capitalization of under $75 million.

(from the Stanford Securities Class Action Clearinghouse) on whether the litigation is found in favor of the plaintiff or of the defendant (i.e., the company). For our test, we focus on the sample of firms that are already subject to SCAs. The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t and the SCA results in a successful litigation in the future and zero otherwise. The results are in Table 6. We find that the coefficient associated with CEO Holder67 is statistically insignificant, suggesting that there is no significant difference in the nature of the SCAs faced by overconfident CEOs, as indicated by the likelihood of eventual success.

[Table 6 about here]

Further, we ensure that our baseline results are robust to excluding any SCA that is unsuccessful (and treating such firms as if they never had a SCA). This robustness test is premised on the assumption that all failed SCAs are frivolous. As reported in Table 7 the core results hold even if we replace the "SCA" indicator with an indicator that equals one if the firm is exposed to an ultimately successful law suit and equals zero otherwise, i.e., if it is exposed to an successful suit or no suit.

[Table 7 about here]

4.4 Post-SCA learning by CEOs

We expect a securities class action will tend to reduce the impact of CEO overconfidence on future litigation-risk. We expect this because the occurrence of a SCA could persuade an overconfident CEO about the need to engage in adequate disclosure and to moderate her tendency to make excessively optimistic statements about future prospects. We test this by analyzing the likelihood that firms with overconfident CEOs face additional SCAs after their first SCA in our sample. This likelihood is compared to the likelihood of the firm being sued for the first time.

The results are in Table 8 and suggest that a SCA reduces the likelihood that an overconfident CEO is sued again. We analyze the impact of overconfidence on future litigation risk by looking at the impact of overconfidence on (a) the likelihood of a first SCA (Model 2 & 4), and (b) the likelihood of a second SCA given that the firm has already experienced one SCA in the past (Model 1 & 3). When looking at the trading-based measure we use a four-period lagged measure in order to have a measure that pre-dates the average prior suit.[22] We find that whereas overconfidence is significantly associated with litigation risk for firms that have never faced a SCA before, it is not significantly related to litigation risk for firms that have already been sued.[23] This implies that a SCA tends to reduce future litigation risk in firms led by overconfident CEOs. In unreported robustness tests we find that the results are qualitatively similar if we require the CEO to be with the firm for at least 2, 3, or 4 years after the first SCA – thereby mitigating concern that the only reason overconfident CEOs' appear less likely to face SCAs is because they are fired and drop out of the sample.

[Table 8 about here]

We explore the reasons for the result. One possibility is that a SCA, especially the first SCA, constitutes a significant shock, which causes the CEO to become more cautious and potentially less overconfident. Such a possibility is consistent with the finding in Bernile et al. (2014) that CEOs that experienced both extreme shocks (in their case, natural disasters) and the consequences thereof reduce their risk-taking behavior. This in turn, coheres with prior findings in the psychology literature that disasters can influence individual risk-taking behavior in investments.[24] We assess the impact of a firm being sued in year t or in year $t-1$ on a continuous analogue to Holder67. We define this continuous analogue as the average

[22] On average, a second class action, if it occurs, occurs 1.3 years after the first class action.

[23] We also note that several other corporate characteristics can change in the years after the SCA. However, in unreported results, we find that the coefficients on the overconfidence measures are qualitatively similar if we control for differences in the controls, rather than the level of the controls per se.

[24] For example, Cassar et al. (2011) and Cameron and Shah (2013) find that disaster survivors prefer less risky gambles. Similarly, Bucciol and Zarri (2013) indicate that disaster survivors prefer to invest in cash and less risky assets.

'in-the-moneyness' of the CEO's options. We construct this by using the continuous variable that Malmendier et al. (2011) discretize to obtain Holder67.[25]

The results for these regressions are in Table 9. Panel A focuses on the impact of a SCA per se. Panel B specifically analyzes the impact of the first SCA. In all cases, we include the controls in Table 3, industry effects, and year effects.[26] We also analyze sub-samples in which the firm earned a non-negative return in the years following the SCA. This is to mitigate any concern that relationship (or lack thereof) between SCAs and confidence is merely a mechanical consequence of a decline in stock price. The results in Panel A indicate that the occurrence of a SCA in year $t-1$ does not significantly erode the confidence measure at t, after controlling for other corporate characteristics. However, Panel B indicates that the first SCA does reduce the CEO's confidence level. These results are consistent with the idea that the first SCA may constitute a shock that reduces CEO overconfidence, leading to a reduction in SCA likelihood.

[Table 9 about here]

4.5 Post-SCA learning by companies in hiring practices

In a similar manner to CEOs becoming more disciplined following a SCA, companies might alter their hiring practices if a CEO was associated with a SCA. Specifically, we hypothesize that if a company was sued under its prior CEO then it will tend to select a new CEO who is less overconfident; and, thus, associated with lower litigation risk. We test this hypothesis by analyzing the overconfidence-level (represented by Holder67) of the new CEO. In these tests, we identify all situations where the company's CEO in year t differs from that in year $t-1$.

[25] We define CONFIDENCE as the average value per vested option scaled by the average strike price of the options. The average value per vested option is the total (estimated) value of all options (Execucomp: 'opt_unex_exer_est_val') scaled by the total number of such options (Execucomp: 'opt_unex_exer_num'). The average strike price works on the simplifying assumption that the options have call-like payoff-structures; and thus, the strike price (X) is $X = S - (S - X)$, where S is the prevailing stock price and we compute the value of the options ($S - X$) as the aforementioned average value per vested option that we use as the numerator.

[26] The reported models are OLS regressions. In robustness tests, we ensure the results are also robust to using quantile regressions, robust regressions, and Tobit models with a lower bound of zero, as appropriate.

We then identify whether the prior CEO was associated with a SCA during his/her time at the company. Next, we obtain the Holder67 measure for the new CEO. We compute this in both year t and in year $t+1$ in order to ensure that reporting errors around the turnover do not bias our results.

The results are in Table 10. The analysis is cross-sectional. The main finding is that if a prior CEO was associated with a SCA, then the company's newly hired CEO is less likely to be overconfident.[27] This applies when we use an indicator for whether the prior CEO faced SCA (Columns 1 and 3) or look at the total number of law suits leveled against the company during the prior CEO's time at the company. In unreported robustness tests we also find that the results hold if we require that the new CEO stays at the firm for at least five years (so the results are unlikely to merely reflect litigated firms having a "revolving door" of CEOs such that the new CEO, while overconfident, does not last long enough for the Holder67 measure to be meaningful). The results, overall, support Hypothesis 6 and are consistent with companies moderating their hiring practices to avoid overconfident CEOs.

[Table 10 about here]

5 Alternative explanations and robustness tests

5.1 Media-based measures of overconfidence

The main reported models use the option-based measure of overconfidence. However, prior literature does show that there is a relationship between compensation-structures and litigation-risk (see e.g., Peng and Röell, 2008). This raises the possibility that option-based measures of overconfidence merely reflect the impact of CEOs' compensation structure. We argue that this is unlikely to be the case because (1) the option-based measures of overconfidence are derived from the CEO's exercise (or lack thereof) of vested options, not merely from the receipt of

[27] To put the results in perspective, around 67% of the sample of CEOs are classified as overconfident, according to the Holder67 measure. However, only around 30% of CEOs hired after a class action are overconfident in our sample, suggesting a signficiant difference in confidence between old and newly hired CEOs.

options per se, and (2) we find that the impact of option-compensation on litigation-likelihood is separate and distinct from the impact of overconfidence.[28] Nonetheless, we check that the results are robust to alternative measures of overconfidence.

An alternative way of measuring overconfidence is through media-based measures (per Hirshleifer et al., 2012). We ensure the results are robust to a "net news" measure. We construct this measure by hand-collecting news-based data between 2000 and 2006 from Factiva. To do this, we search for newspaper reports that refer to the CEO as 'confident', 'optimistic', 'positive' (for confident news) as opposed to reports that refer to the CEO as 'not confident', 'not optimistic', 'not positive', or 'cautions' (for non-confident news). We then construct a 'net news' measure as the number of confident reports less the number of non-confident reports. We restrict attention to the set of firms that have at least one 'positive' news item in order to: (1) ensure that we are not biasing the sample by including thinly reported firms and/or firms for which we simply failed to obtain information, and (2) to get a concept of how the *degree* of overconfidence influences litigation risk.[29] We report the baseline models using the media-based measure in Table 11.[30] The results in Table 11 are qualitatively similar to the reported results: overconfident CEOs are more likely to be subject to a SCA than are other CEOs.

[Table 11 about here]

5.2 CEO Characteristics

A concern is that the Holder67 variable might be correlated with the option intensity of the CEO's compensation contract and/or its wealth-performance sensitivity, causing the results to

[28] Particularly, when analyzing SFAS 123R we find that a reduction in option-compensation (following the accounting-rule change) reduces the impact of overconfidence on litigation-likelihood, implying that it has a separate (albeit complementary) impact from overconfidence. These results are reported in the Online Appendix.

[29] The results are *stronger* in our favor if we recode such missing values as zero to 'deem' such CEOs to have low confidence.

[30] In unreported tests, we find that the results are qualitatively similar if we twice-lag the media-measure to further obviate any concern about feedback between the SCA and the single-lagged media-measure.

reflect spurious correlation between Holder67 and compensation. Ameliorating this concern, the foregoing results vis-à-vis the media-based measure of overconfidence and the Kolasinski and Li (2013) trading-based measure of overconfidence are not subject to this concern (as they are not derived from option-holdings). Nonetheless, we check that the results are robust to controlling for the 'option intensity' of the CEO's compensation contract and the 'wealth-performance sensitivity' of that contract. We define the contract's option intensity to be the proportion of total pay that comes from option grants.[31] We obtain the scaled wealth-performance sensitivity measure from Edmans et al. (2009).[32]

The models controlling for option intensity are in Panel A of Table 12 and those controlling for wealth-performance-sensitivity are in Panel B of Table 12. The Holder67 variable remains positive and significant in all models, suggesting that compensation characteristics do not drive the results.

[Table 12 about here]

5.3 Repeat lawsuit targets

The results are robust to addressing the issue of firms being sued repeatedly. In the 'raw' SCA data (i.e., set of SCAs for all firms before restricting the sample to the set of firms with relevant company-level variables), there are 2559 lawsuits against 2089 unique firms, of which 329 unique firms were sued more than once. In the data, 256 lawsuits (from 106 unique firms) overlapped in class periods. In percentage terms, 256/2559 = 10% of lawsuits overlap in class periods; 106/329=32.2% of firms with multiple lawsuits overlap in class periods; 106/2089 =5.07% of unique firms were litigated in overlapping class periods. In our sample (with non-missing control variables), removing firms that are sued more than once results in a loss of only between 174 to 194 observations (depending on the controls required) from an overall

[31] In Execucomp, we use `tdc1` as the total compensation variable. The value of the option grants is `option_awards_blk_value` after Black-Scholes values were used and `option_awards` before then.

[32] The relevant wealth-performance sensitivity data is available from Alex Edmans's website: `http://faculty.london.edu/aedmans/data.html`, accessed on 31 December 2014.

sample of 1375 litigation-observations. The regression results are robust to omitting these observations. We report the regressions in Table 13. The main finding is that the results are qualitatively similar in these regressions: CEO overconfidence remains significantly and positively associated with the likelihood of a SCA.

[Table 13 about here]

5.4 Does the CEO-SCA relationship merely reflect earnings management?

We take steps to ensure that our results do not merely reflect the impact of CEO overconfidence on earnings management. Prior evidence suggests that overconfident CEOs' accounting statements are less conservative, including through postponing loss recognition (Ahmed and Duellman, 2013), and undertaking earnings smoothing (Bouwman, 2014). Thus, a concern is that the relationship between overconfidence and SCAs merely reflects the previously documented impact of overconfidence on accounting-practices. We mitigate this concern by ensuring that the results hold after controlling for absolute discretionary accruals.

We calculate discretionary accruals following the modified Jones (1991) model (as per Ayers et al., 2006). We do this as follows: We calculate the firm's *Total Accruals* as its earnings before extraordinary items (EBEI) less its cash flows from operations (Cash Flows, which we calculate as the firm's net cash flows from operating activities less its extraordinary items).[33] We scale *Total Accruals* by the firm's *Total Assets* in the prior year. For each year and two-digit SIC industry, we estimate the regression:

$$Total\ Accruals_{i,t} = \alpha + \beta^{(1)}\left(\Delta Sales_{i,t} - \Delta Receivables_{i,t}\right) + \beta^{(2)}\text{PP\&E}_{i,t} + \varepsilon_{i,t}$$

Where, *Total Accruals* is defined in the above step, $\Delta Sales$ is the difference in the firm's sales (Compustat: sale) in year t and year $t-1$, $\Delta Receivables$ is the change in accounts receivable

[33] In specific Compustat codes, we define *Total Accruals* as *ibc - (oancf - xidoc)*.

(Compustat: reccch), and PP&E is the firm's gross property plant and equipment. Because we estimate the regression separately for each two-digit industry and year, we do not include industry or year effects, and we require that there be at least 10 firms in the industry/year pair (per Ayers et al., 2006). We scale all variables by the firm's total assets in year $t-1$. We define the firm's discretionary accruals as the difference between it's *Total Accruals* and that predicted by above equation. Because earnings management can result in either positive or negative deviations from the 'predicted' accruals, we take the absolute discretionary accruals. We denote this as ABS Discretionary Accruals.

We report the results in Table 14. The core finding is that CEO Holder67 continues to increase litigation likelihood even after controlling for discretionary accruals. Further, the interaction of CEO Holder67 with the earnings management measure is statistically insignificant. This suggests that the impact of overconfidence does not depend significantly on, or merely reflect, a relationship between CEO overconfidence and earnings practices.

[Table 14 about here]

5.5 Systematic differences and panel models

We also ensure that the results are robust to modeling technique. One concern is that there might be systematic differences between companies that are subject to a SCA and those that are not. We mitigate this by using propensity score matching techniques. These results are provided in additional panel regressions in Online Appendix. We perform two sets of propensity score matches. The first set matches overconfident CEOs to non-overconfident CEOs. We match in two ways: First, we run a first stage model predicting the likelihood that a CEO is overconfident. Next, we construct a distribution of propensity scores for the set of overconfident firms. Then we identify the 10^{th} percentile cut-off. Finally, we estimate the regression omitting any non-overconfident CEO firm with propensity score that lies below this 10^{th} percentile cut-off. In the second method of matching, we undertake one-to-four nearest neighbor matching. Further, in our second set of matches, we match SCA firms to non-SCA

firms in a similar way. In all cases we find that overconfident managers' firms are more likely to face SCAs. We obtain similar results if we undertake one-to-one matching (instead of one-to-four matching) or if we use a different percentile cut-off instead of the 10^{th} percentile (e.g., the results are robust to using the 5^{th} and 15^{th} percentiles). We also find similar results in a regression that uses firm and year fixed effects.

5.6 Option-based overconfidence and firm performance

One concern is that option-based measures of overconfidence increase with the firm's performance; and thus, the Holder67 measure might merely proxy for other extraneous market movements. The media-based measure of overconfidence at least partially mitigates this concern. Nonetheless, we also address this concern by using a "residual" measure of CEO overconfidence. We define the "Residual CEO Holder67 (t-1)" variable as the residual from the regression CEO Holder67 (t-1) $= \alpha + \beta \times Return(t-1) + \varepsilon$, where *Return* is the firm's stock return. This Residual CEO Holder67 (t-1) would capture the portion of CEO overconfidence that does not merely reflect stock returns. These results are available in Online Appendix. The results are qualitatively similar to those previously reported.

5.7 Reverse causality: OC CEOs self-selecting into high SCA-risk companies

An alternative explanation for our baseline result, i.e., overconfidence is associated with increased litigation risk is that overconfident individuals optimistically believe they can manage a risky company and are relatively more willing to take such risks. In this case, the company's high litigation risk could conceivably cause it to select an overconfident CEO, rather than the overconfident CEO increasing litigation risk. Our foregoing results tend to suggest that such reverse causality concerns do not explain the results. The finding in Table 10 that companies prefer to avoid hiring such litigation-risk prone CEOs following a SCA suggests that reverse causality of that type is unlikely to drive our baseline results.

5.8 Endogeneity concern: CEOs make false statements to boost value of options

A possible concern is that the Holder67 is premised on the CEO holding options that are at least 67% in the money. However, if the CEO pumps up the stock price, then it would also increase the value of her option-holdings and could lead to those options becoming at least 67% in the money. Further, prior evidence suggests that CEOs might strategically time their trading, and, by parity of reasoning, option exercises (Billings and Cedergren, 2015). Thus, the conduct leading to the SCA might create the appearance of the CEO intentionally holding highly in the money options, when in fact it was an indirect consequence of misstatement.

We argue that endogeneity is unlikely to drive the results: (1) The options must be at least 67% in the money in at least two separate years, minimizing the chance of the CEO making false statements that merely indirectly inflate the value of the options. (2) The results are qualitatively similar if we use alternative measures of overconfidence, that are not subject to this criticism (see above and Table 11). (3) Prior literature shows that such risk-taking tendencies (as connoted by such measures as Holder67) tend to derive from genetic characteristics. For example, Cesarini et al. (2009) examine sets of twins and argue that genetics explains between 16% and 34% of an individual's overconfidence. Cronqvist and Siegel (2013) suggest that genetic differences can explain up to 45% of the variation in investment biases in individual investors. Similarly, Cronqvist et al. (2014) argue that genetic-characteristics also explain home ownership choice (which suggests that genetic-characteristics could also explain risk-taking in investment in general) and/or early life experiences (Bernile et al., 2014; Malmendier et al., 2011). Similarly, Malmendier et al. (2011) show that early-life experiences, such as growing up in the Great Depression, or having military experience, are associated with the degree of managerial overconfidence and influence corporate risk-taking tendencies. (4) It is often the case that "informed" traders *short* the company's stock (or manufacture a short position) prior to SCAs (Blau and Tew, 2014), which would imply that CEOs should endeavor to exercise any options prior to the SCA; i.e., the prospect of a SCA would not cause

the CEO to hold in the money options. (5) Such stock-price manipulation would be short term at best. If the CEO were to make false statements simply to increase the value of their options, then she would benefit only if she exercised the options before the market became aware of the true facts (whereupon the stock price would decline) and would risk violating insider-trading rules, which carry criminal, penalties.

Nonetheless, in unreported tests, we take additional steps to mitigate these endogeneity concerns. First, the results are qualitatively similar if we exclude any situation where the firm is subject to two SCAs. This excludes any situation where the CEO could have pumped up the stock price twice (rendering the CEO overconfident according to the Holder67 definition). Thus, it excludes certain situations where the CEO's conduct giving rise to the SCA also inflated the stock price and created the appearance of overconfidence.

Second, we obtain qualitatively similar results if we measure overconfidence based on the CEO's conduct *after* year t. In this case, it would be necessary for the options to be at least 67% in the money on two occasions after the SCA, meaning that the falsely positive misstatement cannot have driven the value of the options.

Third, in unreported tests, we obtain qualitatively similar results if we omit any situation where the CEO would have "inflated" the stock price in order to exercise her options. The underlying concern is that the CEO might "hype" the stock, which would give rise to the SCA and also tend to make options look more valuable – causing the CEO to appear to be overconfident. We address this by excluding from the sample any situation where the CEO exercises options in year t or $t-1$, when the SCA was in year t. The results for these tests are qualitatively similar to the reported results.

5.9 Does the SCA/overconfidence relationship just reflect volatility?

One concern is that the relationship between SCAs and overconfidence merely reflects volatility; i.e., OC CEOs take more risk. Riskier firms are more likely to face SCAs. Thus, the

relationship between overconfidence and SCAs might merely reflect volatility. The baseline models include volatility as a control variable. Nevertheless, to further explore this issue we perform regressions that interact CEO overconfidence with volatility: a statistically insignificant interaction term would indicate that the SCA/overconfidence relationship does not depend on volatility. We find that CEO overconfidence remains significantly positively associated with litigation risk. The interaction term is statistically insignificant. The results are qualitatively unchanged whether or not we undertake relevant corrections for standard errors on interaction effects in logit models (per Ai and Norton, 2003). These results are available in Online Appendix.

5.10 Does OC CEO merely represent aggressive "corporate" culture?

A concern is that aggressive corporations, which are more likely to be subject to a SCA due to the culture of risk-taking, seek overconfident CEOs, meaning that the overconfidence/SCA relationship merely reflects other corporate factors. We argue that this is unlikely to be a concern. First, we control for corporate characteristics, including corporate risk (as proxied by stock return volatility). Second, Table 4 partially ameliorates this concern: The overconfidence-level of junior executives captures the nature of the firm's corporate culture, if an aggressive firm tends to also hire more overconfident junior executives. However, the overconfidence of junior executives is not significantly related to SCA-likelihood after controlling for the overconfidence of senior executives (i.e., decision-makers). Thus, it is unlikely that CEO overconfidence merely captures another corporate trait. Third, as indicated above, the results are robust to including firm fixed effects, which control for unobserved time-invariant firm attributes, that would include a particularly aggressive and persistent corporate culture.

5.11 CEO inattention and the option-based measure of overconfidence

A possible concern with the option-based measures of overconfidence relates to CEO inattention. Specifically, if a CEO holds relatively few options, then she might hold well in the money options because the value of exercising them is low and the CEO might simply ignore them. We argue that this is unlikely to drive the results given that they are robust to using the media-based measure of overconfidence (see Table 11). Nonetheless, in unreported analysis we find that our main results hold if we exclude from the sample any CEO whose option-holdings (i.e., value of vested but unexercised options) are in the bottom quartile of the sample for that year.

5.12 Does CEO overconfidence capture poor corporate performance?

An issue with the models is to address whether CEO overconfidence *merely* reflects poor corporate performance. The baseline models address this in part by controlling for the prior year's stock return. Further, we analyze the interaction of CEO Holder67 and prior returns; either the return over year $t-1$ or an indicator for whether the return was negative. These results are available in Online Appendix. The main result is that while the interaction term is statistically insignificant, the CEO Holder67 term remains statistically significant. This further indicates that the relationship between SCAs and CEO overconfidence does not merely reflect prior poor performance.

5.13 Non-detection of "misconduct"

A factor that could affect results is the non-detection of managerial misconduct. Specifically, it is possible that a CEO may engage in actions that would satisfy the criteria for a SCA, but that shareholders (a) chose not to sue and/or (b) did not detect such actions. In our sample, both are unlikely: Our sample only contains S&P 1500 firms, which are large companies

with analyst coverage and media scrutiny (rendering detection likely). Further, such S&P 1500 companies ordinarily have sufficient financial resources to make a successful litigation financially beneficial to a plaintiff. Additionally, in the US, unlike in some other countries, forming a "class" to undertake a class action is comparatively straight-forward and litigation-funders would ensure that the indigence (or otherwise) of the plaintiffs would not lead to under-litigation in cases where there is a legitimate cause-of-action (as opposed to a frivolous case).

To illustrate this, around 4%-5% of our firm-year observations involve a SCA. By contrast, Chapple et al. (2014) find that there are 30 SCAs in Australia (on the ASX) against any Australian listed company between 1999-2010. Australia has similar laws covering continuous disclosure (and the theoretical ability to litigate) as does the US, containing an equivalent to Rule 10b-5. However, Australia has greater restrictions on forming a class and on using a litigation funder. The number of firms listed on the ASX in any given year varies. However, it exceeds 1500 in each year of the sample (suggesting 18,000 potential firm year observations over this time period), in which case under 0.1% of the firm-year observations would experience a SCA. Even if the focus is on the largest 500 companies listed on the ASX 500 (in order to ensure availability of all relevant controls), only 30/6000=0.5% of the sample would exhibit a SCA. Thus, whereas under-litigation of misconduct might be a concern in Australia, the US (for the above-mentioned reasons) is unlikely to be so affected.

5.14 CEO age

CEO age is arguably associated with corporate risk taking, with younger CEOs being associated with riskier corporate policies (see e.g., Kim, 2013; Serfling, 2014). In unreported tests, we also analyze whether the results are robust to controlling for CEO age, or indicators for whether the CEO is over 50, 60, or 65. CEO age is generally negatively related to litigation-likelihood.[34] Controlling for these measures of CEO age does not qualitatively change the

[34]However, the statistical significance of the coefficient is sensitive to the set of control variables used.

relationship between CEO overconfidence and litigation-likelihood (see e.g., Panel C of Table 12). We also undertake additional tests to analyze whether the impact of overconfidence varies across CEO age. These results are available in Online Appendix. We find that the interaction of CEO age with Holder67 is statistically insignificant. Additionally, if we split the sample into "young CEOs" (age in the bottom half of the sample) and "old CEOs" (age in the top half of the sample), we find that CEO overconfidence is positively and significantly related to litigation risk in both sub-samples.

5.15 Managerial entrenchment

Managerial entrenchment may influence litigation likelihood. On the one hand, entrenched managers are subject to less outside disciplinary action; and thus, are more free to engage in actions leading to a class action. On the other hand, entrenched managers may seek to "enjoy the quiet life," whereby they engage in relatively less risk-taking (Bertrand and Mullainathan, 2003), which, while potentially undermining shareholder wealth, would lower the risk of a class action. Whichever is the case, we check that the results are robust to controlling for the Gompers et al. (2003) index of 24 anti-takeover provisions (see e.g., Panel D of Table 12). In unreported results, we find that the coefficient on Holder67 is robust to controlling for the Bebchuk et al. (2009) index of six anti-takeover provisions, or indicators, for whether the company's index-value is above the sample median or is in the top quartile.

5.16 CEO gender and board gender diversity

We check that the results do not merely reflect a CEO-gender effect. Levi et al. (2014) argue that female CEOs are less overconfident than are male CEOs, leading to fewer takeover bids and more value-creation in those bids. However, Adams and Ragunathan (2013) argue that female directors are not per se associated with lower risk taking. Nonetheless, we check that our results are robust to controlling for CEO gender and interacting an indicator for whether the CEO is female with the overconfidence measure. The results are unreported for

brevity. Only 1.7% of the observations in our sample feature a female CEO. The impact of CEO overconfidence on litigation-risk varies slightly across CEO gender: overconfident female CEOs are less likely to face SCAs than are overconfident male CEOs. This is potentially consistent with Levi et al. (2014). However, the result is only weakly significant and there are relatively few female CEOs in the sample, making it difficult to draw strong conclusions from the results. Similarly, we find that board gender diversity is not statistically significantly related to litigation likelihood.

6 Conclusion

This paper analyzes the impact of CEO overconfidence on the likelihood of a securities class action. By definition, overconfident CEOs tend to overestimate the potential payoffs of projects and underestimate their risks. This could result in overconfident CEOs' statements being reckless and falsely positive, thereby exposing the company to a 10b-5 securities class action. We hypothesize and show that overconfident CEOs' firms are more likely to be sued via a SCA. Further, improved governance mitigates the impact of overconfidence on SCA-likelihood. Specifically, the impact of overconfidence on SCA-likelihood decreases following SOX and the changes to the NYSE/NASDAQ listing rules.

We find that SCAs appear to serve a learning function for overconfident CEOs, with a SCA reducing the impact of CEO overconfidence on future litigation risk. This suggests that SCAs persuade overconfident CEOs to attenuate their tendency to make overconfident and falsely positive statements, or to be cavalier about omitting material information (overconfident in their belief that the firm could rectify a negative outcome). This finding is consistent with the finding in Kolasinski and Li (2013), in the context of takeovers, that overconfident CEOs do learn from past actions. These results contribute to the policy debate about the welfare effects of SCAs, that some have criticized as being largely frivolous and wasteful.

The paper contributes to both the literature on CEO overconfidence and on securities regulation. We demonstrate another avenue through which CEO overconfidence can undermine

shareholder wealth (exposing the company to a SCA). This highlights the need for shareholders to be cautious when interpreting statements provided by overconfident CEOs. The paper also contributes to the regulation-literature by exploring an additional antecedent to financial-misstatements (CEOs' behavioral biases).

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Appendix: Variables

Variable	Definition
CEO HOLDER67	The CEO's HOLDER67 value computed in the same way as computed in Malmendier et al. (2011). This is an indicator that equals one from the first time that the CEO holds options that are (on average) at least 67% in the money if the CEO does so on at least two occaisions. We use Execucomp data to obtain a measure for how in the money the options are on average. We first create a measure of the extent to which the options are in-the-money, defined as *Average value per option/Number of options*, where the *Average value per option* is the estimated value of the vested optiosn scaled by the number of such options. We then scale this 'in-the-moneyness' variable by the average strike price for the options, which we proxy as $S-(S-X)$ = Stock price at the end of the fiscal year (in CRSP/Compustat: prcc_f) - the avera average value per option (computed as indicated previously).
TEAM HOLDER67	The average Holder67 measure for all executives at the firm in that year. We compute the Holder67 measure for non-CEO executives in the same way as we compute CEO HOLDER67.
OTHER EXEC HOLDER67	The average Holder67 measure for all non-CEO executives at the firm in that year. We compute the Holder67 measure for non-CEO executives in the same way as we compute CEO HOLDER67.
SENIOR HOLDER67	The average Holder67 measure for all senior executives at the firm in that year. We compute the Holder67 measure for non-CEO executives in the same way as we compute CEO HOLDER67. We define senior executives as any executive with the title (in Execucomp) of CEO, CFO, COO, President, Chairman/woman, and executives whose title includes the word 'chief'.
JUNIOR HOLDER67	The average Holder67 measure for all junior executives at the firm in that year. We compute the Holder67 measure for non-CEO executives in the same way as we compute CEO HOLDER67. We define junior executives as any non-senior executive.
CEO180TradingOC	The average 180-days trading window based OC measure for CEO in that year. This overconfidence measure is computed in the same way as computed in Kolasinski and Li (2013).
NYSE	An indicator that equals one if the firm trades on the New York Stock Exchange.
LNASSET	The natural log of the firm's book assets (Compustat: at).
ROA	The firm's return on assets, defined as its net income scaled by its assets.
SALES GROWTH	The sales growth in year $t-1$ is the sales in year $t-1$ less the sales in year $t-2$ all scaled by the assets at the beginning of year $t-1$.
R&D	The R&D expense (Compustat: xrd) scaled by the beginning-of-year assets.
PP&E	The firms property, plant and equipment scaled by its assets.
MB	The firm's market value of equity at the end of the fiscal year (Compustat: prcc_f $\times$ csho) scaled by its book value of equity.
RETURN	The firm's market adjusted stock return over the year (with stock return data from CRSP).
SKEW	The skewness of the firm's stock return over the year
RETURN STD DEV	The standard deviation of the daily stock return over the year.
TURNOVER	The trading volume for the year scaled by the number of shares outstanding at the beginning of the year.
INST	The percentage of shares that institutional investors hold. The institutional-holding data is from the Thomson 13F filings. If the firm does not appear in the filings, we deem it to have zero institutional holdings.
EQUITY PROCEEDS	The amount of capital that the firm raises via equity issuances in that year scaled by the firm's assets.
DEBT PROCEEDS	The amount of capital that the firm raises via debt in that year scaled by the firm's assets.
INSIDER TRADING	The insider trading figure for year $t-1$ is the average insider insider sales (net of purchases) for years $t-1$ and $t-2$ scaled by the firm's revenue.
INSIDER HOLDING	The average of all insider share holdings scaled by the total shares outstanding.
IND_WC	The industry average working capital accruals (current assets less current liabilities) scaled by the total assets.
IND_ALTMAN Z	The industry average Altman (1968) Z score.
SUED	An indicator that equals one if the firm was subject to a securities class action. The data is from the Stanford Securities Class Action Clearinghouse (SCAC).
POSTSOX	An indicator that equals one if the observation is after the Sarbanes-Oxley Act of 2002 (i.e. if the observation is in 2002 or later).
SHROWN	The CEO's percentage share ownership.

Tables

Table 1: Sample Distribution by Year

This table contains the sample composition by year. We define overconfident CEOs as those for which HOLDER67 equals one (HOLDER67 is defined in the variable appendix). We identify law suits using the Stanford Securities Class Action Clearinghouse (SCAC).

Year	#CEO	#Overconfident CEO	# Lawsuits filed	#Overconfident CEO involved in lawsuits	%Lawsuits involving overconfident CEOs
1996	1125	505	14	9	64.286
1997	1135	578	38	29	76.316
1998	1183	676	57	46	80.702
1999	1234	720	93	65	69.892
2000	1300	742	105	78	74.286
2001	1355	786	129	98	75.969
2002	1339	746	124	81	65.323
2003	1384	715	119	81	68.067
2004	1419	763	111	73	65.766
2005	1395	803	87	52	59.770
2006	1378	796	76	46	60.526
2007	1398	798	104	63	60.577
2008	1509	805	99	53	53.535
2009	1498	731	71	37	52.113
2010	1475	691	73	37	50.685
2011	1417	676	48	23	47.917
2012	1329	631	27	17	62.963
Total	22873	12162	1375	888	64.582

Table 2: Summary Statistics

This table contains the summary statistics. The variable definitions are in the variable Appendix.

	Full Sample			Over-confident CEOs			Non-Over-confident CEOs		
	Mean	Median	Std Dev	Mean	Median	Std Dev	Mean	Median	Std Dev
Panel A: Litigation variables									
SUED indicator	0.060	0.238	0.000	0.073	0.260	0.000	0.045	0.208	0.000
Sued firm long-run CAR(+10, +360)(%)	-28.431	221.691	-14.998	-37.041	161.524	-20.723	-18.722	273.812	-9.339
Sued firm pre-runup CAR(-360, 0)(%)	-34.980	256.839	-19.751	-35.854	188.056	-19.691	-33.996	316.958	-19.765
Panel B: Confidence Measures and CEO characteristics									
CEO Holder67 indicator	0.532	0.499	1.000						
TEAM Holder67 indicator	0.789	0.408	1.000						
SR Holder 67 indicator	0.786	0.411	1.000						
JR Holder 67 indicator	0.667	0.471	1.000						
CEO Stock Intensity	0.131	0.202	0.000	0.118	0.198	0.000	0.147	0.205	0.000
CEO Option Intensity	0.300	0.272	0.261	0.327	0.287	0.294	0.269	0.251	0.232
CEO Shares owned	0.018	0.038	0.003	0.022	0.041	0.005	0.013	0.034	0.002
CEO age (years)	60.770	8.706	61.000	61.396	8.427	61.000	60.056	8.958	60.000
CEO Turnover (in t+1 and t+2)	0.071	0.257	0.000	0.065	0.256	0.000	0.078	0.269	0.000
Internal CEO indicator	0.311	0.463	0.000	0.316	0.465	0.000	0.306	0.461	0.000
Female CEO indicator	0.019	0.138	0.000	0.012	0.110	0.000	0.028	0.164	0.000
Netnews	3.089	2.260	2.817	4.075	2.210	4.221	1.754	1.521	1.503
Panel C: Firm Variables									
Assets (mns)	8695.599	20992.480	1679.331	8088.222	19834.200	1560.185	9384.651	22214.420	1841.269
Insider Holding	0.016	0.053	0.002	0.018	0.054	0.003	0.014	0.051	0.001
Institutional ownership (INST)	0.552	0.560	0.640	0.569	0.529	0.671	0.532	0.594	0.608
Market-to-book (MB)	3.209	3.652	2.204	3.715	3.924	2.647	2.630	3.219	1.843
PP&E	0.262	0.230	0.192	0.245	0.228	0.173	0.281	0.232	0.219
Return(t-1)	-0.001	0.037	0.000	0.003	0.038	0.003	-0.006	0.036	-0.004
Return Std dev (t-1)	0.107	0.071	0.090	0.109	0.072	0.092	0.105	0.070	0.087
ROA	0.032	0.138	0.044	0.047	0.120	0.055	0.014	0.154	0.033
R&D	0.030	0.064	0.000	0.032	0.066	0.000	0.028	0.062	0.000
Sales growth	0.071	0.213	0.053	0.101	0.212	0.076	0.036	0.209	0.030
Turnover (t-1)	2.042	2.164	1.453	2.276	2.448	1.637	1.777	1.749	1.262

Table 3: Effect of CEO Overconfidence on Securities Class Actions

This table contains models that analyze the relationship between CEO overconfidence and likelihood of occurrence of a securities class action (SCA). The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. "Holder67" and "CEO180TradingOC" are two measures of CEO overconfidence. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator			
Model	[1]	[2]	[3]	[4]
CEO Holder67	0.278***			
	[0.100]			
CEO180TradingOC		0.386***		
		[0.121]		
CEO180TradingOC (t-1)			0.296**	
			[0.143]	
CEO180TradingOC (t-2)				0.373**
				[0.170]
NYSE (t-1)	-0.108	-0.106	-0.108	-0.110
	[0.125]	[0.125]	[0.125]	[0.125]
Ln(Assets) (t-1)	0.381***	0.383***	0.381***	0.381***
	[0.044]	[0.044]	[0.043]	[0.044]
ROA (t-1)	0.527	0.635*	0.626*	0.628*
	[0.349]	[0.354]	[0.353]	[0.353]
Sales Growth (t-1)	1.236***	1.289***	1.292***	1.288***
	[0.213]	[0.210]	[0.210]	[0.210]
R&D (t-1)	1.564	1.687*	1.675*	1.677*
	[0.994]	[0.997]	[1.001]	[1.004]
PP&E (t-1)	-1.279***	-1.294***	-1.299***	-1.301***
	[0.380]	[0.380]	[0.379]	[0.380]
MB(t-1)	0.053***	0.055***	0.055***	0.055***
	[0.008]	[0.008]	[0.008]	[0.008]
Return (t-1)	-6.162***	-5.842***	-5.834***	-5.867***
	[1.321]	[1.317]	[1.322]	[1.320]
Skewness of Return (t-1)	-0.083	-0.084	-0.082	-0.083
	[0.066]	[0.066]	[0.066]	[0.066]
Std. Dev. of Return (t-1)	2.440**	2.284**	2.320**	2.328**
	[1.119]	[1.061]	[1.075]	[1.079]
Turnover (t-1)	0.091***	0.097***	0.096***	0.096***
	[0.019]	[0.019]	[0.019]	[0.019]
Institutional Holding (t-1)	0.202***	0.209***	0.207***	0.206***
	[0.067]	[0.068]	[0.068]	[0.068]
Equity Proceeds (t-1)	1.774***	1.823***	1.806***	1.800***
	[0.513]	[0.521]	[0.519]	[0.520]
Debt Proceeds (t-1)	-0.064	-0.048	-0.047	-0.039
	[0.234]	[0.231]	[0.233]	[0.232]
Insider Trading (t-1)	0.092	0.119	0.107	0.113
	[0.473]	[0.474]	[0.474]	[0.474]
Insider Holding (t-1)	-2.818*	-2.773*	-2.801*	-2.802*
	[1.513]	[1.492]	[1.493]	[1.490]
IND_WC (t-1)	0.019	0.019	0.019	0.019
	[0.019]	[0.020]	[0.020]	[0.020]
IND_ALTMAN-Z (t-1)	-0.001	-0.001	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	19,074	19,074	19,074	19,074
R-Squared	0.133	0.133	0.132	0.132

Table 4: Effect of Team Overconfidence on Securities Class Actions

This table contains models that analyze the relationship between top managers' (team) overconfidence and likelihood of occurrence of a securities class action (SCA). The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. "Holder67" and "180TradingOC" are two measures of CEO overconfidence. We used overconfidence of CEO, senior executives, junior executives, and the entire management team. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator								
Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Team Holder67	0.483***								
	[0.171]								
Team180TradingOC (t-2)									0.173*
									[0.092]
CEO Holder67			0.278***		0.308**				
			[0.100]		[0.139]				
Senior Executive Holder67		0.502***		0.781***					
		[0.173]		[0.268]					
Junior Executive Holder67				-0.297*	-0.134				
				[0.171]	[0.159]				
CEO 180TradingOC (t-2)						0.373**			
						[0.170]			
Senior Executive 180TradingOC (t-2)							0.258***		
							[0.099]		
Junior Executive 180TradingOC (t-2)								0.061	
								[0.211]	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,067	19,056	19,074	10,241	10,252	24,006	18,526	10,036	6,636
Pseudo R-squared	0.134	0.134	0.133	0.145	0.142	0.170	0.175	0.179	0.205

Table 5: Effect of Sarbanes-Oxley Act on the relationship between CEO Overconfidence on Securities Class Actions

This table contains models that analyze the effect on Sarbanes-Oxley Act (SOX) on the relationship between CEO overconfidence and likelihood of occurrence of a securities class action (SCAs). The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. We define 1996 to 2002 as the pre-SOX period and 2003 to 2008 as the post-SOX period. We define SOX-compliance firm as a firm that had 100% independent nominating committee, 100% independent audit committee and majority independent board. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator		
Sample	All	Compliant	Non-Compliant
	[1]	[2]	[3]
Holder67	0.501***	0.393	0.538***
	[0.173]	[0.435]	[0.202]
Holder67 × Post SOX	-0.355*	0.430	-0.494**
	[0.210]	[0.526]	[0.237]
Post SOX	-0.089	0.470	-0.107
	[0.360]	[0.690]	[0.391]
Industry Fixed Effect	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Observations	12,208	1,847	10,127
Pseudo R-squared	0.140	0.369	0.129
Difference between coefficient associated with "Holder67 × Post SOX" between compliant and non-compliant samples			
χ^2 value	3.50		
P value	0.0613		

Table 6: Effect of CEO overconfidence on the likelihood of success of Securities Class Actions

This table contains models that analyze conditional on there being a security class action, what is the likelihood that the security class actions is successful. This sample has only sued firms in it; i.e., the sample of observations is associated with a SCA. The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t and the SCA results in a successful litigation in the future. "Holder67" and "CEO Trading-based-OC" are two measures of CEO overconfidence. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	Likelihood of success of a Securities Class Actions	
	[1]	[2]
CEO Holder67	0.088	
	[0.236]	
CEO 180TradingOC (t-2)		0.257
		[0.408]
Controls	Yes	Yes
Industry Fixed Effect	Yes	Yes
Year Fixed Effect	Yes	Yes
Observations	1,028	1028
Pseudo R-squared	0.170	0.170

Table 7: CEO Overconfidence and *Successful* SCAs

This table contains models that replaces the security class action indicator with an indicator that equals one if the firm was subject to a security class action that turns out to be successful and equal zero otherwise (i.e., either an unsuccessful SCA or no SCA). The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	Successful SCA Indicator
CEO Holder67	0.299**
	[0.152]
Controls	Yes
Industry Fixed Effects	Yes
Year Fixed Effects	Yes
Observations	16588
Pseudo R-squared	0.0967

Table 8: CEO overconfidence and likelihood of future class actions

This table contains models that analyze the relationship between CEO overconfidence and repeat Security Class Actions. The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. "Holder67" and "CEOTradingOC" are two measures of CEO overconfidence. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Subsample	Sued Before	Never Sued	Sued Before	Never Sued
Model	[1]	[2]	[3]	[4]
CEO Holder67	-0.263	0.312**		
	[0.175]	[0.126]		
CEO 180TradingOC (t-4)			-0.252	0.588*
			[0.502]	[0.335]
Controls	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Observation	882	13,896	857	12,904
Pseudo R-squared	0.132	0.103	0.119	0.103
Difference in CEO Holder67 (χ^2)	7.01			
Difference in CEO Holder67 (P val)	0.0081			
Difference in CEO 180TradingOC(t-4) (χ^2)	2.03			
Difference in CEO 180TradingOC(t-4) (P val)	0.1583			

Table 9: Impact of SCAs on CEO confidence-level

This table contains models analyze the impact of a SCA on subsequent CEO CONFIDENCE. We define CONFIDENCE as the average value per vested option scaled by the average strike price of the options. The average value per vested option is the total (estimated) value of all options (Execucomp: 'opt_unex_exer_est_val') scaled by the total number of such options (Execucomp: 'opt_unex_exer_num'). The average strike price works on the simplifying assumption that the options have call-like payoff-structures; and thus, the strike price (X) is $X = S - (S - X)$, where S is the prevailing stock price and we compute the value of the options ($S - X$) as the aforementioned average value per vested option that we use as the numerator. All models control for the controls in Table 3. Panel A focuses on the impact of SCAs in general on subsequent confidence. Panel B focuses on only the impact of the first SCA and omits observations that post-date that SCA. The regressions are OLS regressions. All models include SIC two-digit industry effects and year effects. Brackets contain standard errors (based on standard errors clustered by firm) and superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Dependent Variable	CEO Confidence (t)		
Sub-sample	Full	Return(t) ≥ 0	Return(t-1) ≥ 0
Model	[1]	[2]	[3]
Panel A: Impact of SCAs on confidence			
SCA(t-1)	-0.066	0.003	-0.008
	[0.068]	[0.130]	[0.142]
Controls	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Observations	14,915	7,219	7,547
R-squared	0.205	0.285	0.235
Panel B: Focusing on first law suit only			
In t-1, has had one suit but not two	-0.145***	-0.177*	-0.203**
	[0.055]	[0.091]	[0.085]
Controls	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Observations	14,074	6,904	7,234
R-squared	0.208	0.290	0.238

Table 10: Confidence level of Newly Hired CEO

This table contains logit models that analyze whether the new CEO after a turnover event is overconfident. The sample is cross-sectional and analyzes the overconfidence of the new CEO (measured in years t or $t + 1$) as a function of pre-turnover characteristics in year $t - 1$ and in which the CEO in year t differs from that in year $t - 1$. We include only firm-year observations in which there is a turnover. The dependent variable in Columns 1 and 2 is the Holder67 measure of the new CEO computer in year t immediately after the turnover where the CEO in year t differs from that in year $t - 1$. The Dependent variable in Columns 3 and 4 is similar but computes the Holder67 measure in year $t + 1$. All models include SIC two-digit industry effects and year effects. Brackets contain standard errors (based on standard errors clustered by firm) and superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Dependent Variable	Holder67 (t)		Holder67 (t+1)	
	[1]	[2]	[3]	[4]
Prior CEO Sued	-0.386*		-0.378*	
	[0.203]		[0.201]	
Num SCAs Against Prior CEO		-0.161**		-0.158*
		[0.080]		[0.082]
Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,427	1,427	1,370	1,370
Pseudo R-squared	0.155	0.155	0.138	0.139

Table 11: Robustness Test – Using Media-based Measures of Overconfidence

This table contains regressions that examine the likelihood of a SCA using media-based measures of CEO overconfidence. The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator
NETNEWS(t-1)	0.107***
	[0.038]
Controls	Yes
Industry Fixed Effects	Yes
Year Fixed Effects	Yes
Observations	2986
Pseudo R-squared	0.161

Table 12: Robustness test – Controlling for CEOs' Compensation Contracts, Age, and Governance

This table contains various models that test the relationship between CEO overconfidence and the likelihood of a security class action. The dependent variable is an indicator that equals one if the firm is subject to a security class action in year t. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator
Panel A: Option Intensity	
CEO Holder67	0.257**
	[0.102]
Option Intensity	0.305**
	[0.155]
Controls	Yes
Industry & Year Fixed Effect	Yes
Observations	18,811
R-squared	0.143
Panel B: Wealth-Performance Sensitivity	
CEO Holder67	0.250**
	[0.120]
ln(WPS)	-0.026
	[0.045]
Controls	Yes
Industry & Year Fixed Effect	Yes
Observations	11,901
Pseudo R-squared	0.152
Panel C: CEO age	
CEO Holder67	0.277***
	[0.101]
Age	-0.005
	[0.007]
Controls	Yes
Industry & Year Fixed Effect	Yes
Observations	19,053
R-squared	0.141
Panel D: Anti-takeover provisions	
CEO Holder67	0.215*
	[0.112]
GINDEX	-0.037
	[0.024]
Controls	Yes
Industry & Year Fixed Effect	Yes
Observations	14,468
R-squared	0.152

Table 13: Robustness Test – Removing Repeatedly Sued Firms from the Sample

This table contains models that analyze the relationship between CEO overconfidence and Securities Class Actions. The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator
CEO HOLDER67(t-1)	0.286***
	[0.104]
Controls	Yes
Industry Fixed Effect	Yes
Year Fixed Effect	Yes
Observations	18954
Pseudo R-squared	0.133

Table 14: Robustness Test – CEO Overconfidence, Earnings Management and SCAs

This table contains models analyze the relationship between CEO overconfidence, accruals, and SCA-likelihood. The models are logit models in which the dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. We report regression coefficients. The appendix contains the variable definitions. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator
CEO Holder67	0.467***
	[0.122]
ABS Discretionary Accruals	2.279***
	[0.657]
CEO Holder67 × ABS Discretionary Accruals	-0.950
	[0.799]
Controls	Yes
Industry Fixed Effects	Yes
Year Fixed Effects	Yes
Observations	16,091
R-squared	0.136

Online Appendix

This online appendix reports additional results, including additional robustness tests. The relevant tables are as follows.

- Table OA1 contains additional summary statistics for the sample.
- Table OA2 contains propensity score-based matching models.
- Table OA3 reports models that use a 'residual' measure of CEO overconfidence.
- Table OA4 analyzes the relationship between CEO overconfidence and stock return volatility.
- Table OA5 assess the role of the firm's stock return performance.
- Table OA6 examines the relationship between overconfidence and CEO age.
- Table OA7 reports results for linear probability models, which we estimate using OLS.
- Table OA8 reports results for models using firm-year clustering and Hoberg-Philips industry classifications.
- Table OA9 contains FAS 123R effects on CEO overconfidence and litigation risk.

Table OA1: Additional Summary Statistics

This table contains the summary statistics. The variable definitions are in the variable Appendix.

	Full Sample			Over-confident CEOs			Non-Over-confident CEOs		
	Mean	Median	Std Dev	Mean	Median	Std Dev	Mean	Median	Std Dev
Panel A: Firm Variables									
Altman-Z	4.922	6.413	3.508	6.122	7.483	4.152	3.579	4.589	2.961
Debt proceeds (net)	0.011	0.084	0.000	0.015	0.085	0.000	0.006	0.083	0.000
Equity proceeds (net)	-0.004	0.093	0.000	-0.004	0.098	0.000	-0.005	0.085	0.000
FPS	0.282	0.450	0.000	0.311	0.463	0.000	0.249	0.432	0.000
Goodwill	0.097	0.134	0.029	0.101	0.138	0.028	0.094	0.129	0.029
Governance Index (Gindex)	9.307	2.631	9.000	9.117	2.667	9.000	9.511	2.577	10.000
Insider Trading	0.020	0.108	0.002	0.027	0.120	0.003	0.012	0.092	0.001
NYSE Indicator	0.626	0.484	1.000	0.603	0.489	1.000	0.652	0.476	1.000
POSTSOX indicator	0.679	0.467	1.000	0.670	0.470	1.000	0.690	0.463	1.000
Return skewess (t-1)	0.173	0.791	0.150	0.168	0.785	0.146	0.178	0.767	0.155
US incorporated	0.981	0.138	1.000	0.978	0.147	1.000	0.984	0.126	1.000
Working capital (WC)	0.220	0.206	0.195	0.238	0.212	0.216	0.199	0.197	0.174
Panel B: Other Variables									
BETA	1.260	0.661	1.170	1.328	0.669	1.227	1.182	0.643	1.103
MSE	0.025	0.013	0.021	0.025	0.013	0.022	0.024	0.014	0.020
Panel C: Industry Variables									
IND_Altman-Z	-23.614	65.932	-0.349						
IND_Assets (mns)	6859.480	13367.350	1707.560						
IND_Debt proceeds (net)	-0.026	0.678	0.022						
IND_Equity proceeds (net)	0.148	0.420	0.091						
IND_Goodwill	0.067	0.048	0.056						
IND_MB	6.269	6.996	4.041						
IND_PP&E	0.249	0.182	0.184						
IND_ROA	-1.196	2.680	-0.313						
IND_R&D	0.097	0.145	0.019						
IND_Sales growth	-0.360	1.809	0.012						
IND_WC	-1.497	3.476	-0.127						

Table OA2: Robustness Test – Propensity Score and Panel Models

This table contains models that ensure the results are robust to modeling technique. Columns 1-6 use different propensity score techniques. Columns 1-3 match firms with overconfident CEOs with firms with non-overconfident CEOs. Column 1 contains a first-stage regression that predicts the likelihood that the firm has an overconfident CEO (as a function of firm-characteristics). Column 2 matches the control sample of non-overconfident firms with the set of overconfident firms as follows. We obtain the set of propensity scores from Column 1. Next we construct a distribution of propensity scores for the set of overconfident firms. Then we identify the 10^{th} percentile cut-off. Finally, we estimate the regression (in Column 2) omitting any non-overconfident firm whose propensity score lies below this 10^{th} percentile cut-off. In Column 3, we undertake one-to-four nearest neighbor matching. This functions by running the aforementioned first-stage model and obtaining the propensity scores from that model. The second-stage then retains the treatment firm and the nearest four control firms (which have the smallest difference in propensity score with the treatment firms). Columns 4-6 do a similar process but matching sued firms with non-sued firms. Column 7 contains a panel regression that uses firm and year fixed effects. We report regression coefficients. Brackets contain standard errors (based on standard errors clustered by firm) and superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Dependent variable	CEO HOLDER67(t)	SCA Indicator		SCA Indicator			SCA Indicator
Regression Technique	First stage-Logit	Matched sample. Remove lower 10% by P-Score	Matched sample. 1-to-4 nearest distance matching.	First stage-Logit	Matched sample. Remove lower 10% by P-Score	Matched sample. 1-to-4 nearest distance matching.	Panel Regression
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
CEO HOLDER67(t-1)		0.359***	0.368***		0.293***	0.268**	0.604***
		[0.112]	[0.111]		[0.107]	[0.113]	[0.129]
NYSE(t-1)	0.199**	0.021	-0.058	-0.021	-0.085	-0.039	
	[0.093]	[0.140]	[0.139]	[0.127]	[0.135]	[0.140]	
LNASSET(t-1)	-0.104***	0.347***	0.347***	0.280***	0.223***	0.130***	1.177***
	[0.030]	[0.049]	[0.048]	[0.042]	[0.051]	[0.045]	[0.128]
WC(t-1)	-0.019	-0.238	-0.147	-0.979**	0.094	0.676*	-0.335
	[0.266]	[0.431]	[0.418]	[0.415]	[0.409]	[0.407]	[0.513]
ROA(t-1)	1.623***	0.233	0.139	0.671**	0.078	-0.196	0.887**
	[0.330]	[0.409]	[0.344]	[0.342]	[0.308]	[0.357]	[0.435]
SALES GROWTH(t-1)	1.001***	1.324***	1.225***	1.076***	0.681***	0.21	0.944***
	[0.106]	[0.241]	[0.225]	[0.176]	[0.227]	[0.220]	[0.234]
R&D(t-1)	1.011	1.496	1.003	1.581*	0.311	-0.315	3.462**
	[0.680]	[1.045]	[1.061]	[0.895]	[1.026]	[1.021]	[1.380]
GOODWILL(t-1)	0.778**	-0.57	-0.625	-0.795	-0.443	0.15	0.12
	[0.308]	[0.517]	[0.499]	[0.500]	[0.488]	[0.492]	[0.630]
PP&E(t-1)	0.343	-1.716***	-1.954***	-2.071***	-0.545	-0.125	-2.051**
	[0.222]	[0.474]	[0.465]	[0.392]	[0.480]	[0.481]	[0.831]
ALTMAN Z(t-1)	0.047***	0.017**	0.014**	0.022***	0.008	0	0.035***
	[0.012]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.009]
MB(t-1)	0.038***	0.048***	0.052***	0.050***	0.037***	0.013	0.060***
	[0.012]	[0.009]	[0.009]	[0.008]	[0.008]	[0.009]	[0.014]
RETURN(t-1)	5.625***	-10.618***	-10.671***	-9.820***	-6.410***	-1.974	-6.167***
	[0.532]	[1.623]	[1.577]	[1.499]	[1.545]	[1.442]	[1.171]
SKEW(t-1)	-0.032	-0.026	-0.027	-0.072	0.015	0.054	0.102*
	[0.023]	[0.078]	[0.074]	[0.073]	[0.070]	[0.071]	[0.058]
RETURN STD DEV(t-1)	0.433	0.934	0.927	2.408**	0.547	-0.387	-1.932**
	[0.396]	[0.697]	[0.688]	[0.986]	[0.691]	[0.724]	[0.935]
TURNOVER(t-1)	0.153***	0.075***	0.074***	0.059***	0.058***	0.035*	0.075***
	[0.023]	[0.018]	[0.018]	[0.018]	[0.017]	[0.018]	[0.026]
INST(t-1)	0.003	0.159**	0.173**	0.106*	0.140*	0.055	0.611***
	[0.062]	[0.074]	[0.074]	[0.059]	[0.072]	[0.073]	[0.198]
EQUITY PROCCEEDS(t-1)	0.713	1.880***	1.892***	2.225***	1.324***	0.247	1.065
	[0.447]	[0.499]	[0.471]	[0.460]	[0.436]	[0.472]	[0.672]
DEBT PROCCEEDS(t-1)	0.405**	-0.123	-0.187	0.126	-0.082	-0.121	-0.303
	[0.178]	[0.267]	[0.259]	[0.235]	[0.263]	[0.272]	[0.318]
INSIDER TRADING(t-1)	0.022	0.167	0.063	0.255	0.125	0.085	0.731**
	[0.239]	[0.487]	[0.497]	[0.463]	[0.403]	[0.358]	[0.338]
INSIDER HOLDING(t-1)	1.334**	-2.596*	-2.038	-2.13	-0.904	-0.525	-3.466**
	[0.635]	[1.450]	[1.502]	[1.342]	[1.441]	[1.346]	[1.387]
Industry FE	No	Yes	Yes	No	Yes	Yes	No
Year FE	No	Yes	Yes	No	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No	Yes
Pseudo R-squared	0.075	0.153	0.151	0.095	0.094	0.076	4230
Observations	16178	13924	15153	16958	11537	4074	407

Table OA3: Robustness Test – Residual Measure of Overconfidence

This table contains regressions that examine the likelihood of a SCA using a Holder67 'residual' measure of overconfidence. We define the Residual CEO HOLDER67 (t-1) variable as the residual from the regression CEO HOLDER67 (t-1) = $\alpha + \beta$RETURN (t-1) + ε. The models are logit models in which the dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. We report regression coefficients. Brackets contain standard errors (based on standard errors clustered by firm) and superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Dependent variable	SCA Indicator
Residual CEO HOLDER67(t-1)	0.181*
	[0.098]
Controls	Yes
Industry Fixed Effect	Yes
Year Fixed Effect	Yes
Observations	18958
Pseudo R-squared	0.134

Table OA4: Online Appendix – Interaction of Overconfidence and Riskiness of the firm

This table contains logit models that include the interaction of the Holder67 variable with the firm's stock return volatility. All models include SIC two-digit industry effects and year effects. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator
Holder67	0.360**
	[0.171]
Holder67 × Std Dev of Return(t-1)	-0.478
	[1.186]
Std Dev of Return(t-1)	2.373**
	[1.159]
Controls	Yes
Year Fixed Effects	Yes
Industry Fixed Effects	Yes
Observations	18,715
R-Squared	0.131

Table OA5: Robustness Test – Interaction of CEO Overconfidence, with Stock Returns

This table contains models analyze the relationship between CEO overconfidence, prior returns, and SCA-likelihood. The models are logit models in which the dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. We report regression coefficients. The models contain the set of control variables in Table 3. All models include SIC two-digit industry effects and year effects. Brackets contain standard errors (based on standard errors clustered by firm) and superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Dependent Variable	SCA Indicator
Panel A: Past-year return	
CEO Holder67	0.334***
	[0.104]
Return(t-1)	-7.768***
	[2.184]
CEO Holder67 × Return(t-1)	3.594
	[2.405]
Controls	Yes
Industry Fixed Effect	Yes
Year Fixed Effect	Yes
Observations	18,715
Pseudo R-squared	0.132
Panel B: Negative Return Indicator	
CEO Holder67	0.478***
	[0.152]
Negative Return (t-1)	0.592***
	[0.168]
CEO Holder67 x Negative Return(t-1)	-0.280
	[0.198]
Controls	Yes
Industry Fixed Effect	Yes
Year Fixed Effect	Yes
Observations	18,715
R-squared	0.132

Table OA6: Robustness Test – Interaction of CEO Overconfidence with CEO Age

This table contains models that analyze the relationship between CEO overconfidence, CEO age, and securities class actions. Panels A and B analyze young CEOs and old CEOs (young CEOs being those whose age is in the bottom half of the sample; conversely for old CEOs). All models include SIC two-digit industry effects and year effects. All models are LOGIT models that include industry and year fixed effects, and use standard errors clustered by firm. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA indicator
Panel A: Young CEOs	
Holder67	0.231*
	[0.136]
Controls	Yes
Year Fixed Effect	Yes
Observations	10,013
Pseudo R-squared	0.120
Panel B: Old CEOs	
Holder67	0.414**
	[0.168]
Controls	Yes
Industry Fixed Effect	Yes
Year Fixed Effect	Yes
Observations	8,277
Pseudo R-squared	0.175

Table OA7: Robustness Test – Using Linear Probability Models

This table contains linear probability models (as opposed to logit models), which we estimate using an OLS regression. The regressions are OLS regressions. All models include SIC two-digit industry effects and year effects. Brackets contain standard errors (based on standard errors clustered by firm) and superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Dependent Variable	SCA indicator
Holder67	0.015***
	[0.005]
Controls	Yes
Year fixed effect	Yes
Industry fixed effect	Yes
Observations	19,354
R-squared	0.067

Table OA8: Effect of CEO Overconfidence on SCAs using Double Clustering and H-P Classification

This table contains models that analyze the relationship between CEO overconfidence and likelihood of occurrence of a securities class action (SCAs). The dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. "Holder67" and "CEOTradingOC" are two measures of CEO overconfidence. The appendix contains the variable definitions. All models are LOGIT models that include Hoberg-Phillips Indistry and year fixed effects, and use *double standard errors* clustered by firm and year. The significance levels at the 1%, 5%, and 10% are denoted by ***, ** and *, respectively.

Dependent Variable	SCA Indicator	
Model	[1]	[2]
Holder67	0.262***	
	[0.069]	
CEO trading measure (raw returns)		-0.475***
		[0.071]
Controls	Yes	Yes
Hoberg-Phillips Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	18,722	9,792
Pseudo R-Squared	0.151	0.188

Table OA9: FAS 123R, CEO overconfidence, and SCAs

This table contains models that examine the role of FAS 123R in moderating the impact of CEO overconfidence on SCAs. The models are logit models in which the dependent variable is an indicator that equals one if the firm is subject to a SCA in year t. The models include control variables from Table 3. We interact the Holder67 CEO overconfidence measure with a post FAS indicator (that equals one if the observation post-dates 2005). We split the sample into high option intensity and low option intensity sub-samples, where we define option intensity as the proportion of total compensation (Execucomp: `tdc1`) that comes from option grants. We report regression coefficients. Brackets contain standard errors (based on standard errors clustered by firm) and superscripts ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Dependent Variable	SCA Indicator
Panel A: HIGH option intensity (>p75)	
CEO Holder67(t-1)	0.617***
	[0.182]
CEO Holder67(t-1) × Post FAS	-0.606**
	[0.270]
Post FAS	-0.169
	[0.242]
Observations	4630
Pseudo R-squared	0.089
Panel B: LOW option intensity(< p75)	
CEO Holder67(t-1)	0.298*
	[0.164]
CEO Holder67(t-1) × Post FAS	0.000
	[0.216]
Post FAS	-0.716***
	[0.180]
Controls	Yes
Year Fixed Effect	Yes
Industry Fixed Effect	Yes
Observations	13,897
Pseudo R-squared	0.158