Does Shareholder Litigation Deter Insider Trading?

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ABSTRACT

While prior literature focuses on the e˙ect of ex ante litigation occurrence risk on insider trading, this paper examines how the merits and rigorousness of actual litigation a˙ect insider trading behavior for both defendant firms and their industry peers. Using a large litigation sample from 1996 to 2009, we find a significant decrease in the intensity of the insider stock sales for defendant firms following lawsuits that score high in a composite strength index that captures the merits and rigorousness of the litigation. Further analyses indicate that the decrease is mainly driven by the decline in opportunistic insider selling. We also find the decrease to be more pronounced for the defendant firms with lower levels of ex ante litigation risk. Finally, we find a significant decrease in opportunistic insider selling for industry peers of defendant firms following lawsuits, especially when the lawsuits are strong, suggesting a positive externality of shareholder litigation. This paper provides the first evidence on the existence of and variations in the deterrent e˙ect of actual class action lawsuits on insider trading.

Keywords: Insider trading, shareholder litigation, lawsuit strength

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1 Introduction

Corporate insiders can exploit their information advantages over other market participants by trading their stocks to extract private rents (Beneish, 1999; Huddart *et al.*, 2007; Jagolinzer *et al.*, 2011). In the last decade, many corporations involved in scandals (e.g., Countrywide Financial, Enron, Global Crossing, HealthSouth, etc.) engaged in egregious insider stock trading.[1] Recent media reports and academic studies have also indicated widespread opportunistic trades by executives (Cohen *et al.*, 2012; Strasburg and Albergotti, 2012). For instance, by examining the executives' trading activities in the week before their companies make news, Pulliam and Barry (2012) find that "one of every 33 who dipped in and out posted average returns of more than 20% (or avoided 20% downturns) in the following week". Such informed insider trading undermines the confidence of outsider shareholders in the fairness of the equity markets and reduces their participation. It also makes the deterrence of informed insider trading a top priority for regulators and investors (Bushman *et al.*, 2005; Securities and Exchange Commission, 2013; Siconolfi, 2012). In this paper, we investigate whether shareholder securities litigation, a widely used disciplinary mechanism against managerial opportunism, can deter such trading for both the defendant firms (specific deterrence) and their peers (general deterrence).[2]

Insiders make their stock trading decisions on the basis of expected benefits and costs from such trades. Although insiders can benefit financially from trading on private information, such trades may also incur significant costs, particularly those arising from securities class actions. More specifically, insider trading during the class period reflects the intent (*scienter*) of the insiders to benefit from the alleged fraud, and it can be used as inculpatory evidence by the plaintiffs to strengthen the merits of lawsuits (Billings, 2008; Thevenot, 2012). Furthermore, even though executives are insured and often indemnified for their corporate legal liability, securities lawsuits lead to personal costs to executives. For example, Strahan (1998) and Niehaus and Roth (1999) show that the defendant firms in securities class actions are more likely to

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[1]For instance, in the case of Countrywide Financial, managers were accused of selling more than $400 million worth of stockholdings at inflated prices.

[2]Specific deterrence (general deterrence) focuses on how litigation changes insider trading behavior of the sued firm (industry peers of the sued firm).

replace their Chief Executive Officer (CEOs), especially when insider selling during the class period is high and the settlement amount is large. Insiders consequently engage in fewer trades when the perceived litigation occurrence risk is high (Huddart *et al.*, 2007; Thevenot, 2012). After a securities lawsuit, the defendant firm experiences an increase in the perceived litigation risk (Core, 1997; Cao and Narayannamoorthy, 2011 and 2014). This premise suggests that the insider trading should be decrease following a lawsuit, because the insiders would revise upward the associated litigation risk and revise downward the expected net benefits from the trading. Given that insider sales, as opposed to insider purchases, are much more likely to be used as evidence against insiders in litigation (Cheng *et al.*, 2010; Rogers, 2008; Brochet and Srinivasan, 2014), the deterrent effect should be mainly manifested in the decrease in insider selling.

On the other hand, there are substantial criticisms on the effectiveness of securities class action lawsuits in constraining managerial opportunism. First, several studies (e.g., Weiss and Beckerman, 1995; Baker and Griffith, 2009) suggest that securities lawsuits are largely frivolous and driven by the motivation of attorneys to extract the settlements from firms experiencing large stock price declines. Second, ownership dispersion provides plaintiffs with weak incentives to monitor the litigation process. Consequently, the plaintiff attorneys are typically in control of the class action, and they prefer a quick settlement over a lengthy and risky litigation to recover their time and efforts invested in the lawsuits (Weiss and Beckerman, 1995; Fisch, 1997; Berger *et al.*, 2001). Finally, directors and officers are rarely punished financially by lawsuits because their liabilities are likely covered by the directors and officers (D&O) liability insurance (Black *et al.*, 2006).

To empirically investigate the possible deterrent effect of actual shareholder litigation on insider trading, we collect a sample of Section 10b-5 securities class action lawsuits filed from January 1, 1996 to October 28, 2009. To control for the characteristics of sued firms, we use propensity score matching models to construct a group of control firms that have a likelihood of being sued similar to that of the defendant firms in our sample. Following prior literature (e.g., Cheng and Lo, 2006; Rogers, 2008; Huddart *et al.*, 2007; Thevenot, 2012) that uses the volumes of insider trading as a proxy for the intensity of informed insider trading, we examine the change in the abnormal volumes of insider trading following lawsuits.[3] We focus on the so-called C-suite executives (i.e., the highest-level officers with "chief" in their titles, e.g., Chief Executive Officer (CEO), Chief Financial Officer (CFO), and Chief Operating Officer (COO)), because they possess more private information and set the tone at the top

[3]We do not imply that these trades are illegal, since the legality of a trade can only be verified by the court.

(Skaife *et al.*, 2013). We find a significant decrease in the volume of insider sales following the lawsuits.[4]

Next, we explore the factors that drive the post-lawsuit decrease in the insider sales. The criticism on the effectiveness of securities litigation suggests that the deterrent effect exists only when a lawsuit has merits and is rigorously litigated. Such strong lawsuits are more likely to increase the perceived litigation risk and decrease executives' expected net benefits from insider trading, thereby reducing opportunistic trading. To capture the merits of the lawsuit and the rigorousness of the litigation process, we construct a composite lawsuit strength index comprising seven provisions based on the lawsuit characteristics. Drawing on previous literature, we identify these seven measures, namely, (1) whether the lawsuit involves serious accounting allegations; (2) whether the lawsuit involves a prior financial restatement; (3) whether the lawsuit has an audit firm named as a co-defendant; (4) whether the revelation of potential fraud triggers strong negative market reactions; (5) whether the lawsuit is led by an institutional plaintiff; (6) whether or not the lawsuit is dismissed; and (7) whether the lawsuit generates a large amount of settlement.

We then examine whether the deterrent effect is conditional on the strength of the lawsuit. When we conduct subsample analyses, we find that the decrease is limited to the subsample of lawsuits at the top half of the composite strength index (termed "strong lawsuits" hereinafter). Specifically, relative to the three years before the class period, insider sales subsequent to lawsuit filings decrease on average by 64.1% and 82.6%, as measured by the scaled shares and value traded, respectively. No similar decrease in insider sales is observed for the other subsample (termed "weak lawsuits" hereinafter). We also observe a significant decrease in selling by various types of insiders, including CEOs, CFOs, other officers, and directors, following strong lawsuits. These results suggest that only the meritorious and rigorously litigated lawsuits can effectively deter future informed insider trading in defendant firms.

We conduct a large array of robustness analyses. A possible concern with inferences based on insider sales is that some sales are driven by diversification or portfolio rebalancing motives. Consequently, the decrease in the overall insider selling might not reflect the reduction in opportunistic insider selling. To mitigate this concern, we perform two additional tests. First, following Cohen *et al.* (2012), we classify insider sales into "opportunistic" and "routine" sales. Cohen *et al.* (2012) provide robust evidence that their measures of opportunistic trades capture "information-driven" trades, whereas routine trades are not predictive of future returns. For strong lawsuits, we find a significant post-litigation decrease in opportunistic sales but not in routine

[4]We find no significant change in insider purchases, which is consistent with the fact that insider sales are associated with higher potential litigation costs than insider purchases (e.g., Cheng *et al.*, 2010).

sales. This finding suggests that the decline in the volumes of insider sales comes mainly from the decrease in opportunistic sales. In contrast, we do not find a similar decrease in opportunistic sales following weak lawsuits. Second, in the multivariate regression models, we further control for the grant and exercise of options, which are highly correlated with stock sales (Huddart and Ke, 2007), and continue to find similar results. We also find that the deterrent effect on insider sales persists atleast five years after the lawsuit filings. Our results are also robust after we control for executive turnovers, use alternative litigation risk models, use a control group matched by the level of insider trading during the class period, and control for the price decline before the lawsuit filings.

We also conduct several additional analyses of the deterrent effect. First, we compare firms with low and high levels of ex ante litigation risk. We propose that the deterrent effect should be stronger for the group with lower levels of ex ante litigation risk. The increase in litigation risk is likely to be higher for firms with lower levels of ex ante litigation risk, and, accordingly, the deterrent effect will be stronger. As expected, we find a more pronounced decrease in insider sales for firms that have lower levels of ex ante litigation risk. Second, we find that lawsuits with allegations of illegal insider trading may have a stronger deterrent effect on subsequent insider trading. Specifically, we find that only lawsuits with insider trading allegations lead to significant decreases in insider sales, indicating that such allegations increase the perceived litigation risk associated with insider sales. Third, we explore the effect of law firm quality on deterring the subsequent insider sales. We find that having a top law firm serving as the plaintiff attorney does lead to a more significant drop in insider sales.

Fourth, to examine whether the securities lawsuits can generate positive externalities, we expand our examination of the deterrent effect to industry peers of the defendant firms. While our previous results indicate that the post-litigation decreases in opportunistic insider sales of defendant firms are limited to strong lawsuits, we find a significant decrease in the intensity of opportunistic insider sales for peer firms following both strong and weak securities lawsuits (the decrease is greater for strong lawsuits). We interpret this change in insider trading behavior as being driven by the increased "perceived" litigation risk for peer firms following litigation.

This paper makes several contributions to the literature. First, to the best of our knowledge, this is the first paper that examines the impact of actual private securities lawsuits on insider trading. Prior studies (Cheng and Lo, 2006; Huddart *et al.*, 2007; Rogers, 2008; Cohen *et al.*, 2012; Thevenot, 2012) have demonstrated that informed insider trading decreases at the perceived risk of potential private securities litigation. These studies use ex ante perceived litigation occurrence risk to evaluate the deterrent effect of litigation on insider trading, and generally document a negative association between ex

ante perceived litigation risk and insider trading intensity.[5] However, this result does not reveal to what extent actual lawsuits will effectively deter opportunistic insider trading. This is because, lawsuits often differ significantly in their merits and the rigorousness of the litigation process, which are not captured by the ex ante estimates of litigation likelihoods employed in the prior studies. Examination of the change in insider trading around actual litigation allows us to better identify the significant variations in the deterrent effect of lawsuits. Our study suggests that the deterrent effect on subsequent insider trading is contingent upon the merits and the rigorousness of the litigation process of the lawsuits. Future researchers should consider these critically important lawsuit characteristics when they empirically model litigation risk associated with insider trading.

Second, it is important to determine the effectiveness of litigation in mitigating informed insider trading, because of the widespread illegal insider trading (Cohen *et al.*, 2012; Pulliam and Barry, 2012; Siconolfi, 2012) and the high cost of litigation to society. We provide strong evidence that private securities class actions, especially those have merits and are rigorously litigated, can effectively constrain future informed insider trading in both defendant firms and their industry peers. Notably, our work is the first to provide valuable evidence that securities litigation can deter opportunistic insider sales of the peer firms of defendants. This finding of positive externality also provides some justification for the costly securities litigation. Finally, extant literature (e.g., Beneish, 1999) suggests that earnings management and insider trading are positively related in providing each other with opportunities and incentives. We extend this line of literature by examining this relation through change analysis, and we find that firms with reduction in earnings management also experience a greater decrease in insider sales.

The rest of our study is organized as follows. Section 2 reviews the related literature. Section 3 describes the sample selection and data sources. Section 4 presents the empirical analysis on the impact of litigation on insider trading. Sections 5 and 6 present the robustness checks and additional analyses. Section 7 provides concludes.

2 Related Literature

2.1 Insider Trading and Litigation Risk

The courts have long recognized that insider trading can be used to infer fraudulent intent in securities class actions. This evidence of intent helps

[5]These studies use the actual litigation occurrence (an indicator variable) as the dependent variable in a logistic regression to estimate the determinants of litigation, and then use the estimated coefficients on these determinants to compute an individual firm's predicted likelihood of being a lawsuit target.

plaintiffs satisfy the filing requirement and improve their bargaining powers in settlement negotiations. For instance, the Private Securities Litigation Reform Act (PSLRA) of 1995 requires plaintiffs to show strong inference of the fraudulent intent of defendants in their filings (Griffin and Grundfest, 2002). Since the magnitude of insider trading is correlated to the insiders' financial incentives for engaging in the alleged fraudulent activities, prior empirical studies have documented a statistical association between the volume of insider trading and litigation incidence. For example, Johnson *et al.* (2007) examine the impact of the PSLRA on a sample of high technology firms. They find a strong correlation between the volume of abnormal insider selling and litigation incidence after the PSLRA. Moreover, using a sample of firms facing large and negative earnings news, Billings (2008) reveals that the volume of abnormal trades of managers prior to negative news revelations is positively associated with litigation incidence and the settlement amount.

2.2 Effect of Potential Litigation Risk on Insider Trading

The adverse consequences associated with litigation provide managers with incentives to refrain from trading when the perceived litigation risk is high. Using a sample of restatement firms, Thevenot (2012) shows that the insider sales volume decreases at the perceived possibility of private litigation and SEC enforcement estimated from determinants models. In particular, Thevenot (2012, p. 376) argues that "[i]f the estimate of the litigation likelihood increases by 10% points, the dollar value of net sales decreases by over $24 million." Huddart *et al.* (2007) also examine how the threat of jeopardy (i.e., litigation costs and negative publicity) disciplines insider trading. On the basis of evidence from 10b-5 class actions, they demonstrate that insiders avoid profitable trades (e.g., trades prior to the announcement of good and bad news) when they perceive the jeopardy associated with such trades to be high. Similarly, Rogers (2008) suggests that the desire to reduce the litigation risk induces managers to provide high-quality disclosures before insider sales. Cohen *et al.* (2012) attempted to identify informative insider trades by classifying insider traders into routine traders and opportunistic traders. Consistent with the notion that insider trading is dampened by increasing potential legal costs, they report a decrease in the fraction of opportunistic traders following the high-profile coverage of SEC's pursuit of illegal insider trading cases. Collectively, these studies provide strong evidence that "perceived" litigation risk mitigates the opportunistic trading behavior of insiders.

2.3 Effect of Litigation on Subsequent Insider Trading

Prior literature indicates that insiders make trading decisions based on their perceived payoffs from trading and potential litigation costs associated with the

trades (Cheng and Lo, 2006; Huddart *et al.*, 2007; Rogers, 2008; Cohen *et al.*, 2012; Thevenot, 2012). On the benefit side, managers can obtain financial gains from their informed trading. On the cost side, informed insider trading can be legally inferred as the intent to commit fraud, and thus increases the risk of both public enforcement and private litigation.

After litigation, insiders are likely to revise their beliefs in the costs and benefits of their trading, thus changing their post-litigation trading behavior. Specifically, insiders are likely to reduce their stock trading if the increased perceived litigation costs exceed the trading profits.[6] Prior research indicates that managers' perceived litigation costs increase following a lawsuit. For instance, Core (1997) and Cao and Narayanamoorthy (2011, 2014) indicate that firms with a litigation history carry higher coverage limits of D&O legal liability insurance and are also charged higher premium rates by insurance companies. In addition to the cost of lawsuit settlement, a lawsuit brings other significant damages to the defendant firm and its insiders, such as the cost of legal defense, reputational damages, managers' time and attention, and increased difficulty in recruiting directors and auditors Black *et al.*, 2006; Johnson *et al.*, 2000. Consequently, having experienced a lawsuit, insiders are likely to restrain themselves from conducts that could cause future litigation. Insider trading can be used to infer fraudulent intent and increase the litigation likelihood (Johnson *et al.*, 2007; Rogers *et al.*, 2011); at the same time, the risk of private litigation is much higher for insider selling than for insider purchase (Cheng and Lo, 2006; Rogers, 2008). Thus, insiders in firms that have been sued are likely to revise upward, the potential litigation costs of insider sales after the litigation. This reasoning suggests that insiders should decrease their stock selling following litigation.[7]

In contrast, few changes will emerge in post-litigation insider trading practices if the lawsuit has no disciplinary effect on the insiders of defendant firms. Prior research indicates that the disciplinary effect can be limited due to several reasons. First, the filing of a securities lawsuit can be motivated by the desire of attorneys to obtain a settlement from the defendant firm (Sale, 1998). Attorneys would target firms experiencing large stock price declines

[6]Following lawsuits, the net benefit of insider trading can also be lower due to a decrease in the expected benefit of insider trading. For instance, the price declines following lawsuits reduce the profitability of insider trading. We discuss this premise in our additional analysis "whether the results are driven by decreases in stock prices following the lawsuits".

[7]Insiders may also restrain themselves from insider sales during the litigation period in order to show their confidence in their companies. Nevertheless, as long as executives reduce selling to restore firm reputation and investor confidence tarnished by a shareholder lawsuit, any decrease in insider sales can still be attributed to shareholder litigation. In addition, we have employed a large number of additional tests and various robustness checks to corroborate our main findings. Our set of evidence, taken as a whole, is more consistent with the deterrence story rather than alternative explanations including stock declines during lawsuits and executives' signaling incentives.

regardless of the presence of any actual fraud (Casey, 2008). Consequently, many securities lawsuits are non-meritorious and are settled, as the defendant firms are eager to avoid any further burden of the lengthy and costly litigation process (Baker and Griffith, 2009). Second, ownership dispersion causes collective action problems, in which plaintiffs have incentives to "free ride" on the efforts of other plaintiffs. Therefore, plaintiffs have weak incentives to engage in the litigation process (Macy and Miller, 1991). The class action litigation aims to address the collective action problems by empowering the lead plaintiffs and the plaintiff attorneys to pursue a single, unified action (Bebchuk, 1988). However, this empowerment of plaintiff attorneys causes litigation agency problems when the interests of attorneys are misaligned with those of shareholders. Attorneys typically prefer a quick settlement over a lengthy and risky litigation to recover their time and efforts invested in the lawsuits (Weiss and Beckerman, 1995). The litigation agency problems are most severe, when the lead plaintiffs cannot effectively monitor the plaintiff attorneys (Fisch, 1997; Berger *et al.*, 2001). The deterrent effect of a weak lawsuit is likely inconsequential and shall not change the insider trading behavior of executives. Finally, even if a lawsuit has merits and is rigorously litigated, executives typically have their legal liabilities covered by D&O liability insurance, and they rarely have to pay any settlement out of their own pockets (Black *et al.*, 2006; Coffee, 2006). These arguments suggest that lawsuits might have no disciplinary effect on insiders and would not deter insider misbehavior.

The preceding literature review suggests that the effectiveness of a lawsuit in deterring informed insider trading is contingent upon the merits and rigorousness of the lawsuit, which we term "the strength of the lawsuit". We use several lawsuit characteristics to capture the strength of the lawsuit. First, prior studies (Carleton *et al.*, 1996; Bajaj *et al.*, 2003; Thompson and Sale, 2003) indicate that the merits of a lawsuit can be reflected by a number of accounting-related lawsuit characteristics. These characteristics include the following: (1) whether the lawsuit involves allegations of GAAP violation; (2) whether the lawsuit involves a prior restatement; and (3) whether the lawsuit has an accounting firm named as a co-defendant. For instance, Thompson and Sale (2003) provide evidence that post-PSLRA, the majority of the alleged malfeasances involve accounting misrepresentations, implying that accounting-related allegations are more likely to have merits than other types of allegation.[8] Second, a lawsuit is also viewed as having more merits if its revelation event (which marks the end of class period) triggers significant negative market reactions, indicating the severity of misrepresentation and

[8]If an allegation of GAAP violation is accompanied by a restatement, such an allegation is evidently supported by hard evidence of wrongdoing (i.e., the restatement). Consequently, Palmrose and Scholz (2004) indicate that lawsuits preceded by accounting restatements, especially those related to core earnings, have merits and significant negative litigation consequences.

investor losses (Carleton *et al.*, 1996; Bajaj *et al.*, 2003). Third, Cheng *et al.* (2010) demonstrate that institutional lead plaintiffs tend to litigate rigorously and can improve the effectiveness of discipline on defendant firms.[9] Finally, the merits and the rigorousness of a lawsuit can also be captured by, whether the lawsuit survives the motion to dismiss and achieves a large settlement (Johnson *et al.*, 2007; Johnson *et al.*, 2000; Cheng *et al.*, 2010; Dyck *et al.*, 2010). Specifically, surviving the motion to dismiss and achieving a large settlement imply that the merits of a lawsuit have been validated by judicial scrutiny and that the lawsuits have been rigorously litigated. Our study explicitly identifies these lawsuit characteristics that capture the merits and rigorousness of a lawsuit. We posit that greater monetary and reputational penalties imposed by meritorious and rigorously litigated lawsuits should force insiders to significantly revise upward the perceived litigation costs associated with stock trading, which should subsequently mitigate their desires to engage in future informed trades.

3 Sample Selection, Data Source, and Descriptive Statistics

3.1 Propensity Score Matching

Prior studies (e.g., Johnson *et al.*, 2000; Kim and Skinner, 2012) indicate that certain firm characteristics are associated with the likelihood of becoming the target of a lawsuit. Our findings will be biased if these ex ante characteristics of lawsuit firms result in future changes in insider trading even without the lawsuit. Another concern is that, our results are caused by a contemporaneous downward trend in insider trading occurring in all firms. To control for the potential selection bias and market-wide changes in insider trading, we use the propensity score matching method to construct a sample of control firms.[10] The propensity score is the predicted probability of becoming a lawsuit target in the subsequent year, estimated from a logistic regression model consisting of

[9]The lead plaintiff has a vital role in litigation by representing all class members in selecting and retaining the class counsel, monitoring the litigation process, and negotiating with the defendant. Institutional investors, as opposed to individual investors, serving as the lead plaintiff can discipline the defendant firms more effectively (Cheng *et al.*, 2010). Furthermore, the highly detrimental impact of opportunistic insider trading on shareholder value (Jagolinzer *et al.*, 2011; Siconolfi, 2012) provides institutional shareholders with strong incentives to mitigate such trading through securities class actions. For instance, in a class action against Apple Inc., the New York City Employees' Retirement System, as the lead plaintiff, obtains a settlement that contains a provision to require the firm to adopt a stricter insider trading policy (Green, 2011).

[10]Propensity score matching is widely used method for dealing with selection bias; it measures the "treatment effect" as the outcome for the treated firm minus the outcome for an untreated firm with equal treatment probability (e.g., Li and Prabhala, 2007; Lawrence *et al.*, 2011). Our results are similar if we use the inverse propensity score reweighting method (Paik *et al.*, 2015).

determinants of litigation incidence prediction models used by Johnson *et al.* (2000), Rogers and Stocken (2005), and Kim and Skinner (2012).[11] Specifically, we regress an indicator variable of being a lawsuit target on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, and retail industry dummies, and year fixed effects.[12] We estimate this logistic regression for all firms in the Compustat database with available data from 1996 to 2009, and then use the obtained coefficients to estimate the propensity score for each firm. Next, we identify non-lawsuit firms with the closest propensity scores as the lawsuit firms in the year prior to the litigation and include these non-lawsuit firms as control firms in our empirical analysis.[13]

3.2 Sample and Data Source

We obtain the sample of Section 10b-5 federal private securities class actions from the Securities Class Action Services (SCAS) of Institutional Shareholder Services (ISS).[14] Section 10b-5 prohibits the deployment of manipulative and deceptive practices in connection with stock sales or purchases.[15] Insider trading is often used in 10b-5 lawsuits to infer the fraudulent intent. Because PSLRA exerts substantial impact on private securities litigation (e.g., Johnson *et al.*, 2007), we restrict the sample to lawsuits filed after 1995 to reduce the heterogeneity in the litigation environment. The ending date of our SCAS

[11] The results are similar if we use any of the three litigation risk models in Kim and Skinner (2012) to estimate the probability of becoming a lawsuit target. The results are also similar if we identify the control firms using alternative matching methods, such as matching by industry and then by size, book-to-market, and return momentum quintiles.

[12] These variables have been documented by prior literature (e.g., Francis *et al.*, 1994; Jones and Weingram, 1996; Johnson *et al.*, 2000; Rogers and Stocken, 2005; Kim and Skinner, 2012) as related to the lawsuit occurrence.

[13] We allow one lawsuit firm to be matched to a maximum of three control firms that have the closest propensity scores. In addition, we require the distance of propensity scores to be within 0.005. Furthermore, the mean (median) ex ante litigation risk is 10.4% (9.1%) for both treatment firms and matched control firms.

[14] Although not all private securities class actions involve allegations of illegal insider trading, the levels of insider trading are documented to be associated with lawsuit occurrences (e.g., Johnson *et al.*, 2007). Prior studies (e.g., Thevenot, 2012; Huddart *et al.*, 2007) have focused on the effect of potential private securities litigation (i.e., 10b-5 litigation) threat on deterring informed insider trading regardless of the presence of allegations of insider trading.

[15] Section 10b-5 of the Securities Exchange Act of 1934 states that "It shall be unlawful for any person, directly or indirectly, by the use of any means or instrumentality of interstate commerce, or of the mails or of any facility of any national securities exchange, (a) to employ any device, scheme, or artifice to defraud, (b) to make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in the light of the circumstances under which they were made, not misleading, or (c) to engage in any act, practice, or course of business which operates or would operate as a fraud or deceit upon any person, in connection with the purchase or sale of any security".

lawsuit sample is October 28, 2009. We collect information on the class period, filing date, allegation type, lead plaintiff type (institutional or individual), and litigation outcomes (whether the lawsuit is settled or dismissed, and settlement amounts if the case is settled) from the SCAS.

In addition to lawsuit data, we obtain the required financial statement data from Compustat, insider trading data from Thomson Reuters Insider Filing Data Files, institutional ownership data from Thomson's 13F database, and daily stock return data from the Center for Research in Security Prices. The Appendix provides detailed definitions of each variable used in our empirical analysis. Our final sample consists of 1611 Section 10b-5 private securities lawsuits that have the required data available.

In our regression models, our sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date. This process yields a final sample consisting of 40,646 firm-year observations with available data.

3.3 Descriptive Statistics

Table 1 shows the descriptive statistics on our regression sample. With regard to insider trading during the sample period, C-suite executives on average sell 0.204% and buy 0.033% of the outstanding shares of their firms, or 0.301% and 0.027% of the firm market value, respectively.[16] Of the 1,611 lawsuits in our sample, 32.3% have been dismissed, 61% have reached a settlement, and the remaining 6.7% have not been resolved up to October 28, 2009.[17] Up to 28.1% of our sample lawsuits are led by institutional lead plaintiffs. Up to 40.2% of sample lawsuits allege accounting violations by the defendant firms, and 3.8% of sample lawsuits name accounting firms as the defendants.[18]

4 Empirical Results

4.1 Main Regression Model

We estimate Equation 1 to test the change in insider trading around the filing of lawsuits. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after

[16]During the class period, the C-suite executives in lawsuit firms sell 0.427 percent and buy 0.034 percent of the outstanding shares of their firms, or 0.647 percent and 0.018 percent of the firm market value, respectively (untabulated).

[17]Our results are robust to excluding those unresolved lawsuits from the sample.

[18]In our sample of 1,611 lawsuits, there are only 51 cases that also have SEC enforcements. We analyze the deterrent effect of these special cases and do not find the effect significantly differs from that of other lawsuits. This could be due to the small sample size and thus lack of statistical power.

Variable	N	Mean	Std	5%	25%	Median	75%	95%
Panel A: Regression sample								
Insider Trading Measures								
SALESHR (%)	40,646	0.204	0.636	0.000	0.000	0.000	0.107	1.036
BUYSHR (%)	40,646	0.033	0.217	0.000	0.000	0.000	0.000	0.105
SALEVALUE (%)	40,646	0.301	1.040	0.000	0.000	0.000	0.123	1.466
BUYVALUE (%)	40,646	0.027	0.196	0.000	0.000	0.000	0.000	0.074
Control Variables								
LAGSIZE	40,646	6.664	2.096	3.149	5.204	6.695	8.127	10.155
LAGBM	40,646	0.474	0.533	0.048	0.195	0.368	0.623	1.339
LAGRET	40,646	0.134	0.859	−0.749	−0.354	−0.041	0.325	1.622
Panel B: Underlying lawsuit sample								
D_ILP	1,611	0.281	0.450	0.000	0.000	0.000	1.000	1.000
D_GAAP	1,611	0.402	0.490	0.000	0.000	0.000	1.000	1.000
D_RESTATE	1,611	0.221	0.415	0.000	0.000	0.000	0.000	1.000
D_ACCTFIRM	1,611	0.038	0.192	0.000	0.000	0.000	0.000	0.000
D_DISMISS	1,611	0.323	0.468	0.000	0.000	0.000	1.000	1.000
TOTAL_AMOUNT	755	13.783	40.008	0.300	1.350	3.700	10.000	46.600
CASH_AMOUNT	754	12.535	34.181	0.300	1.275	3.500	10.000	44.000
CAR3_REV	1,611	−0.168	0.405	−0.603	−0.323	−0.153	−0.020	0.179

Table 1: Descriptive Statistics

Note: This table presents the descriptive statistics on the sample for the analysis of the change in insider trading intensity around the filing of shareholder lawsuits. We focus on the trading transactions of C-Suite executives, such as Chief Executive Officers (CEOs), Chief Financial Officers (CFOs), Chief Operating Officers (COOs), and Chief Investment Officer (CIOs). The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The values of insider trading measures are expressed in percentages. The Appendix contains the definitions of variables.

the lawsuit filing date with required data.

$$\begin{aligned} Insider\ Trading_{it} = {} & \beta_0 + \beta_1 CLASSPRD_{it} + \beta_2 POSTFILING_{it} \\ & + \beta_3 DSUED_{i,} + \beta_4 DSUED_i \times CLASSPRD_{it} \\ & + \beta_5 DSUED_i \times POSTFILING_{it} + \beta_6 LAGSIZE_{it} \\ & + \beta_7 LAGBM_{it} + \beta_8 LAGRET_{it} \\ & + \beta_9 INDAVG\_IT_{it} + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

where *Insider Trading* represents the scaled number of shares of insider sales (*SALESHR*), the scaled dollar value of insider sales (*SALEVALUE*), the scaled number of shares of insider purchases (*BUYSHR*), and the scaled dollar value of insider purchases (*BUYVALUE*) in separate tests, respectively. Specifically, *SALESHR* (*BUYSHR*) denotes the total number of shares sold (purchased) by insiders during the fiscal year, scaled by the number of shares outstanding.[19] *SALEVALUE* (*BUYVALUE*) represents the total dollar value of shares sold (purchased) by insiders during the fiscal year, scaled by beginning market value of equity. Our main analysis examines trading by the C-suite executives. We focus on C-suite executives because they have the greatest access to their firms' private information that can be used to extract rents via stock trading, and they are responsible for setting the "tone at the top" for a company's ethical culture (Committee of Sponsoring Organizations (COSO), 1992; Skaife *et al.*, 2013). Our insider trading measures (i.e., *SALESHR*, *SALEVALUE*, *BUYSHR*, and *BUYVALUE*) capture the insider trading volumes, which are used by prior literature (e.g., Cheng and Lo, 2006; Rogers, 2008; Huddart *et al.*, 2007; Thevenot, 2012) as a proxy for the intensity of informed insider trading. Because these insider trading variables are left-censored at zero, we use Tobit models to estimate these regressions.

In terms of explanatory variables, *CLASSPRD* is an indicator variable that takes the value of one if the firm-year overlaps with the class period, and zero otherwise. *POSTFILING* is an indicator variable that takes the value of one if the firm-year is in or after the year of lawsuit filing, and zero otherwise. We follow Rogers and Van Buskirk (2009) and select the three years prior to the class period start date as the benchmark period for the change in insider trading. We do not choose the class period as the benchmark period, because insider trading during the class period is abnormally high (Griffin and Grundfest, 2002), causing difficulty in interpreting any decrease relative to this abnormal period. *DSUED* is an indicator variable that takes the value of one if the firm is the defendant in a lawsuit, and zero otherwise. We interact *DSUED* with *POSTFILING* to test the post-lawsuit change in insider trading for sued firms.[20]

[19] Our results are very similar if the numbers of shares traded by insiders are scaled by their shareholdings.

[20] In an alternative specification, we use three-year indicator variables (for the three

Following prior literature (e.g., Jagolinzer *et al.*, 2011; Thevenot, 2012), we use the logarithm of the market value of equity at the beginning of fiscal year ($LAGSIZE$), book-to-market ratio at the beginning of fiscal year ($LAGBM$), and buy-and-hold abnormal returns over the previous fiscal year ($LAGRET$) as control variables. We also control for the industry effect by including the average insider trading of firms in the same two-digit SIC industry during the fiscal year ($INDAVG\_IT$). Thus, our regression model essentially examines the change in *abnormal* insider trading following litigation.

4.2 Change in Insider Trading after the Lawsuit Filing

Table 2 reports the estimation results for Equation 1 using the full sample of lawsuits. We find significantly negative coefficients on $DSUED \times POSTFILING$ for the insider sales measures (coeff. $= -1.105$ for $SALESHR$ and -1.688 for $SALEVALUE$), but not for the insider purchases measures (i.e., $BUYSHR$ and $BUYVALUE$). This result indicates that litigation elicits a change in insider sales but not in purchases, consistent with the notion that litigation focuses only on insider sales (Cheng and Lo, 2006; Rogers, 2008; Brochet and Srinivasan, 2014).

To test whether the decrease in insider sales shown in Table 2 is associated with the merits and rigorousness of lawsuits, we construct a composite strength index to capture the lawsuit merits and rigorousness in the litigation process. The index comprises seven provisions that have been shown (as discussed in the literature review section) to be indicators of merits and rigorousness of a lawsuit (Carleton *et al.*, 1996; Bajaj *et al.*, 2003; Thompson and Sale, 2003; Cheng *et al.*, 2010; Dyck *et al.*, 2010).[21] Specifically, we add one point to the index for the presence of each one of the following seven lawsuit characteristics[22]:

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years after lawsuit filing, respectively) instead of $POSTFILING$ in Equation 1 and interact $DSUED$ with these year variables. The results (untabulated) indicate that the level of insider selling in the first two years after litigation is significantly lower than that prior to the class period, whereas the negative coefficient on the interaction between the year three indicator variable and $DSUED$ is marginally significant.

[21] Admittedly, these lawsuit characteristics may be correlated with each other. For instance, prior studies (Carleton *et al.*, 1996; Bajaj *et al.*, 2003; Cheng *et al.*, 2010; Johnson *et al.*, 2007) indicate that the settlement amount is positively associated with allegation of GAAP violation, having an accounting firm as a co-defendant, and the magnitude of negative market returns around the revelation event. However, the complexity of a lawsuit allows an aggregated measure (i.e., the composite strength index) to more effectively capture the overall strength of a lawsuit. For instance, when we test the deterrent effect on the basis of individual lawsuit characteristics (one at a time), we find that the characteristic of having an institutional lead plaintiff is associated with the strongest deterrent effect, but it is still not as strong as using the aggregated measure.

[22] Alternatively, we weigh each of these characteristics differently according to their impact on the settlement amount. Specifically, we regress the logarithm of total settlement amount on individual lawsuit strength proxies (excluding D_BIGSET). Using the estimated coefficients, the new lawsuit length index is computed as $(0.34641)^* D\_ILP + (0.44914)^* D\_GAAP +$

Dependent Variable	SALESHR	SALEVALUE	BUYSHR	BUYVALUE
CLASSPRD	0.939***	1.340***	0.635***	0.574***
	(4.04)	(3.46)	(4.05)	(3.94)
POSTFILING	0.645**	0.457	0.499***	0.348**
	(2.17)	(1.00)	(3.17)	(2.53)
DSUED	0.434	0.378	0.272	0.177
	(1.07)	(0.59)	(1.16)	(0.88)
DSUED × CLASSPRD	0.752*	1.086	0.092	−0.064
	(1.81)	(1.61)	(0.34)	(−0.29)
DSUED × POSTFILING	−1.105**	−1.688**	0.252	0.184
	(−2.21)	(−2.21)	(0.95)	(0.81)
LAGSIZE	0.417***	0.464***	−0.527***	−0.502***
	(5.88)	(4.25)	(−10.80)	(−10.62)
LAGBM	−2.682***	−3.983***	0.435***	0.529***
	(−8.68)	(−8.42)	(3.14)	(4.07)
LAGRET	1.903***	2.717***	−0.235***	−0.193**
	(13.54)	(11.79)	(−2.81)	(−2.39)
INDAVG_IT	0.457***	0.374***	0.138***	−0.000
	(10.36)	(12.75)	(6.06)	(−0.16)
No. of Observations	40,646	40,646	40,646	40,646
F statistic	47.054	45.356	21.160	18.013
P-value	0.000	0.000	0.000	0.000

Table 2: Change in Insider Trading Intensity After Lawsuit Filing

Note: This table presents the change in the intensity of insider trading of both sued and matched control firms around the filing date of shareholder lawsuits. We focus on trading transactions by C-suite executives. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The t-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

(1) The lawsuit involves accounting allegations;

(2) The lawsuit involves a prior financial restatement[23];

$(0.20956)^* D\_RESTATE + (0.71653)^* D\_ACCTFIRM + (-0.29913)^* CAR3\_REV + (-1.27974)^* D\_DISMISS$. With this new index measure, our results are very similar and all our inferences remain the same.

[23]Some lawsuits have no restatements, but allege GAAP violations and name audit firms as the defendants. This can be caused by firms' reluctance to admit material misstatement in their financial statements. For example, Srinivasan *et al.* (2015) find that U.S. listed firms from less strict legal regimes tend to refrain from making restatements. Donelson *et al.* (2012) identify a sample of accounting lawsuits without restatements and find that these

(3) The lawsuit has an audit firm named as a co-defendant;

(4) Market reaction to the lawsuit-triggering news is below the sample median;

(5) The lawsuit is led by an institutional investor;

(6) The lawsuit is not dismissed; and

(7) The lawsuit generates a settlement greater than $3 million (Dyck *et al.*, 2010).[24]

We find the 25th percentile, median, mean, and 75th percentile of the composite strength index to be 1, 2, 2.395, and 3, respectively (untabulated results). We classify these lawsuits with a composite strength index score of greater than (equal to or less than) two as strong (weak) lawsuits.

In Table 3, we partition our sample into two subsamples based on the composite lawsuit strength index. We then estimate Equation 1 for these two subsamples, respectively. Table 2 indicates that the significant change only occurs for insider *sales*. Therefore, from this point on, we focus only on insider sales.[25] Given that the dependent variable is both *SALESHR* and *SALEVALUE*, the coefficients on $DSUED \times POSTFILING$ are significantly negative for the subsample of strong lawsuits, but not for the subsample of weak lawsuits. This finding indicates that in the post-lawsuit period, only defendant firms of strong lawsuits experience a significant decrease in insider sales relative to the three years before the class period. Specifically, the decreases are 64.1% and 82.6%, as measured by the scaled shares and value traded, respectively.[26]

In sum, although Table 2 shows a significant decrease in insider sales following litigation, Table 3 provides evidence that the decrease is limited to strong lawsuits.

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lawsuits tend to be less rules-based, and they attribute this finding to plaintiffs' inability to observe detailed violations.

[24]The results change very little if we redefine the nuisance settlements using the $10 million cutoff.

[25]From the untabulated results, we find no significant change in insider purchases regardless of the strength of the lawsuits.

[26]The average insider sales for the subsample of strong lawsuits in the benchmark period (the three years before the class period) are 0.00237 and 0.00345, as measured by *SALESHR* and *SALEVALUE*, respectively (untabulated). For the subsample of strong lawsuits in Table 3, the coefficients on *POSTFILING* and $DSUED \times POSTFILING$ are 0.001158 and −0.002677, respectively, when the insider sales are measured by *SALESHR*, and 0.001301 and −0.004152, respectively, when the insider sales are measured by *SALEVALUE*. Subsequently, relative to the benchmark period, the post-litigation decreases in insider sales are 64.1% $((0.001158 - 0.002677)/0.00237)$ for *SALESHR*, and 82.6% $((0.001301 - 0.004152)/0.00345)$ for *SALEVALUE*, respectively.

	SALESHR		SALEVALUE	
Dependent Variable	Strong Lawsuits	Weak Lawsuits	Strong Lawsuits	Weak Lawsuits
CLASSPRD	0.972***	0.934***	1.427***	1.287**
	(3.68)	(2.82)	(3.27)	(2.29)
POSTFILING	1.158***	0.229	1.301**	−0.248
	(3.12)	(0.61)	(2.34)	(−0.41)
DSUED	0.605	0.275	0.696	0.097
	(1.22)	(0.51)	(0.88)	(0.11)
DSUED × CLASSPRD	0.685	0.827	0.972	1.190
	(1.33)	(1.36)	(1.17)	(1.22)
DSUED × POSTFILING	−2.677***	0.029	−4.152***	0.043
	(−4.36)	(0.04)	(−4.39)	(0.04)
Control Variables	YES	YES	YES	YES
No. of Observations	19,270	20,938	19,270	20,938
F statistic	35.071	32.355	33.466	30.697
P-value	0.000	0.000	0.000	0.000
Comparing Coefficients on DSUED × POSTFILING	Chi-squared 15.39 *p*-value 0.00		Chi-squared 14.92 *p*-value 0.00	

Table 3: Analysis Conditional on the Composite Index of Lawsuit Strength

Note: This table presents the change in the intensity of insider trading of both the sued and matched control firms around the filing date of shareholder lawsuits, which are conditional on a composite index of lawsuit strength (STRENGTHINDEX). We focus on trading transactions by C-suite executives. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The *t*-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

4.3 Change in Insider Sales for All Types of Insiders

CEOs and CFOs are more likely to be listed as co-defendants than other insiders; hence, the effect of lawsuits on constraining insider trading is more likely to be manifested in their insider trading following the lawsuits. Nevertheless, we also extend our analysis to directors and other officers. In Table 4, we present the results for strong and weak lawsuits in Panels A and B, respectively. When conducting the analysis, we employ both insider selling measures (*SALESHR* and *SALEVALUE*). In Panel A, all four types of insiders experience a significant decrease in stock sales following the lawsuits, as indicated by

Type of Insiders	CEOs		CFOs		Other Officers		Directors	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel A: Strong lawsuits								
CLASSPRD	1.020***	1.517***	0.217***	0.316***	−0.081	−0.331	−0.152	−0.651
	(2.86)	(2.72)	(3.30)	(2.67)	(−0.51)	(−1.30)	(−0.27)	(−0.81)
POSTFILING	1.615***	2.055***	0.204***	0.257*	−0.561***	−1.575***	−1.680***	−3.153***
	(3.34)	(2.99)	(2.68)	(1.85)	(−3.12)	(−5.50)	(−2.84)	(−3.74)
DSUED	0.285	0.397	0.071	0.064	−0.220	−0.423	−0.476	−0.539
	(0.44)	(0.40)	(0.62)	(0.32)	(−0.70)	(−0.88)	(−0.54)	(−0.42)
DSUED × CLASSPRD	1.205*	1.775*	−0.021	0.010	0.435	0.542	1.343	2.529*
	(1.81)	(1.70)	(−0.17)	(0.05)	(1.29)	(1.05)	(1.26)	(1.65)
DSUED × POSTFILING	−3.054***	−4.875***	−0.691***	−1.124***	−1.203***	−1.724***	−3.016***	−4.533***
	(−3.86)	(−4.09)	(−4.89)	(−4.42)	(−3.42)	(−3.21)	(−2.97)	(−3.12)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
No. of Observations	19,270	19,270	19,270	19,270	19,270	19,270	19,270	19,270
F statistic	26.345	25.774	32.173	28.093	42.546	34.289	30.375	27.850
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4: Analysis Conditional on the Type of Insiders

Type of Insiders	CEOs		CFOs		Other Officers		Directors	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel B: Weak lawsuits								
CLASSPRD	0.721*	0.979	0.202**	0.426***	0.190	0.340	0.381	0.683
	(1.75)	(1.45)	(2.52)	(2.65)	(1.07)	(1.15)	(0.67)	(0.79)
POSTFILING	0.416	0.234	−0.071	−0.184	−0.391*	−1.322***	−2.115***	−3.769***
	(0.89)	(0.32)	(−0.76)	(−1.05)	(−1.94)	(−4.11)	(−3.44)	(−3.92)
DSUED	−0.272	−0.615	−0.032	−0.049	−0.127	−0.156	−0.700	−0.366
	(−0.38)	(−0.55)	(−0.25)	(−0.20)	(−0.39)	(−0.29)	(−0.78)	(−0.27)
DSUED × CLASSPRD	1.613**	2.834**	−0.022	−0.201	0.834**	0.240	1.652	1.045
	(2.11)	(2.27)	(−0.16)	(−0.78)	(2.06)	(0.38)	(1.59)	(0.68)
DSUED × POSTFILING	0.097	0.070	0.025	0.016	0.236	0.147	0.774	0.663
	(0.11)	(0.05)	(0.16)	(0.05)	(0.61)	(0.23)	(0.70)	(0.41)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
No. of Observations	20,938	20,938	20,938	20,938	20,938	20,938	20,938	20,938
F statistic	24.222	22.581	23.578	22.053	39.578	30.419	18.396	17.003
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4: Continued

Note: This table presents the change in the intensity of insider selling of both sued and matched control firms around the filing date of shareholder lawsuits conditional on the type of insiders. Panel A and Panel B report the results for two subsamples partitioned by the median of a composite index of lawsuit strength (STRENGTHNDEX). The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The t-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

the significantly negative coefficients on $DSUED \times POSTFILING$ across all columns. Meanwhile, consistent with the results in Table 3, in Panel B (i.e., weak lawsuits), the coefficients on $DSUED \times POSTFILING$ are not significant in any specification. In sum, Table 4 shows that strong lawsuits can deter stock selling by all types of insiders.

5 Robustness Check

5.1 Change in Opportunistic and Routine Insider Sales After the Lawsuit Filing

The previously documented decrease in the volume of insider sales might be caused by reduced routine trades (i.e., trades driven by portfolio diversification or rebalancing instead of the private information of insiders). To rule out this explanation, we conduct an additional test to analyse whether a substantial decrease in opportunistic (non-routine) sales occurs following litigation. We estimate Equation 2 for this test. As in Equation 1, the sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data.

$$\begin{aligned} &Opportunistic/Routine\ Sales_{i,t} \\ &\quad = \alpha_0 + \alpha_1 CLASSPRD_{i,t} + \alpha_2 POSTFILING_{i,t} + \alpha_3 DSUED_{i,} \\ &\qquad + \alpha_4 DSUED_i \times CLASSPRD_{i,t} + \alpha_5 DSUED_i \times POSTFILING_{i,t} \\ &\qquad + \beta_6 LAGSIZE_{i,t} + \beta_7 LAGBM_{i,t} + \beta_8 LAGRET_{i,t} \\ &\qquad + \beta_9 INDAVG\_IT_{i,t} + \grave{v}_{i,t}, \end{aligned} \tag{2}$$

where *Opportunistic/Routine Sales* represents opportunistic/routine sales, measured by the number of shares traded in opportunistic/routine sales scaled by outstanding shares ($SALESHR$) or by the value of opportunistic/routine sales scaled by the market value of equity ($SALEVALUE$). Following Cohen *et al.* (2012), we classify insider trades as either opportunistic or routine trades according to the trading history of the insider.[27] At the beginning of each calendar year, we designate an insider as a routine trader if he or she has placed a trade in the same calendar month for at least three consecutive years. We define opportunistic traders as those showing no obvious discernible pattern in the timing of their past trades. All subsequent trades that are made after

[27] Cohen *et al.* (2012) provide robust evidence that their measures of opportunistic trades capture "information-driven" trades, whereas routine trades are not predictive of future returns. Findings from Li *et al.* (forthcoming) imply a way to classify opportunistic insider trading based on opportunistic management forecasts. Since restricting the sample to observations with available management forecasts will significantly reduce our sample and power, we focus on the non-routine insider trading.

categorizing each insider as either routine or opportunistic are accordingly classified as either "routine trades" or "opportunistic trades."[28] The other variables in Equation 2 are defined as in Equation 1.

Table 5 shows the changes in opportunistic and routine sales following lawsuit filings, which are analyzed using Equation 2. Panel A examines the change following strong lawsuits. First, we analyze the opportunistic sales and find that the coefficients on $DSUED \times POSTFILING$ are significantly negative (coeff. $= -2.890$ and -4.549, respectively) for both *SALESHR* and *SALEVALUE*. Second, when examining the routine sales, we find no significance for the coefficients on $DSUED \times POSTFILING$ with either insider selling measures. The results in Panel A suggest that compared with the levels prior to the class period, opportunistic sales (but not routine sales) significantly decrease following the filing of strong lawsuits. Panel B examines the change following weak lawsuits. No significant coefficient on $DSUED \times POSTFILING$ exists for either opportunistic or routine sales. Overall, Table 5 suggests that the significant post-litigation decrease in insider selling among the defendant firms of strong lawsuits is mainly driven by the decrease in opportunistic insider sales.[29] This finding is consistent with the notion that meritorious and rigorously fought litigation constrains opportunistic information-driven insider trades.

5.2 Controlling for Stock Options

We perform another test to further rule out the possibility that our results are driven by the change in liquidity-driven trades. The grant or exercise of stock options induces insider sales because such activities promote the need for stock diversification and rebalancing (Huddart and Ke, 2007). We control for the grant and exercise of options in all applicable multivariate regression models, in order to address the concern that the post-litigation decrease in insider sales is caused by the decrease in the granting and exercising of stock options. All the models produce similar results (untabulated).

5.3 Controlling for Executive Turnovers

Executive turnovers following lawsuits could confound our results because new executives have portfolio holdings different from those of their predecessors. Comparing the trading behaviors of incumbent and previous executives may

[28] SEC Rule 10b5-1 affords insiders an affirmative defense against illegal insider trading if insiders can set up program trades and execute them faithfully. Insiders can still behave opportunistically under this plan. For example, this rule allows the participant to cancel a sale, and an insider who anticipates a future price increase can cancel the sales. However, this effect is likely to be secondary and limiting data to the pre-Rule 10b5-1 period will severely reduce our sample size.

[29] We perform a similar analysis for insider purchases and find no significant change in either routine or opportunistic insider purchases after the lawsuit filing.

	Opportunistic Insider Sales		Routine Insider Sales	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel A: Strong lawsuits				
CLASSPRD	0.871***	1.236***	0.373	0.552
	(3.32)	(2.80)	(0.82)	(0.84)
POSTFILING	0.966***	1.025*	1.061**	1.432**
	(2.62)	(1.87)	(2.15)	(1.98)
DSUED	0.588	0.686	−0.390	−0.616
	(1.26)	(0.91)	(−0.48)	(−0.50)
DSUED × CLASSPRD	0.715	1.079	−0.077	−0.162
	(1.38)	(1.28)	(−0.11)	(−0.15)
DSUED × POSTFILING	−2.890***	−4.549***	−0.311	−0.352
	(−4.70)	(−4.79)	(−0.39)	(−0.29)
Control Variables	YES	YES	YES	YES
No. of Observations	19,270	19,270	19,270	19,270
F statistic	33.508	31.320	13.690	13.718
P-value	0.000	0.000	0.000	0.000
Panel B: Weak lawsuits				
CLASSPRD	1.085***	1.623***	−0.059	−0.085
	(3.22)	(2.81)	(−0.16)	(−0.16)
POSTFILING	0.225	−0.196	0.696	0.830
	(0.60)	(−0.32)	(1.34)	(1.23)
DSUED	0.281	0.079	−1.239	−1.781
	(0.53)	(0.09)	(−1.44)	(−1.49)
DSUED × CLASSPRD	0.957	1.398	−0.171	−0.288
	(1.54)	(1.39)	(−0.25)	(−0.30)
DSUED × POSTFILING	0.050	0.053	0.424	0.711
	(0.07)	(0.05)	(0.53)	(0.64)
Control Variables	YES	YES	YES	YES
No. of Observations	20,938	20,938	20,938	20,938
F statistic	31.551	28.829	8.442	9.247
P-value	0.000	0.000	0.000	0.000

Table 5: Change in the Intensity of Opportunistic and Routine Insider Sales After Lawsuit Filing

Note: This table presents the change in the intensity of opportunistic and routine insider trades of both sued and matched control firms around the filing date of shareholder lawsuits. Panel A and Panel B report the results for two subsamples partitioned by the median of a composite index of lawsuit strength (STRENGTHINDEX). We focus on trading transactions by C-suite executives. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The t-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

not be a meaningful way of identifying the effect of litigation on insider trading. Therefore, we conduct some tests to ensure the robustness of our results after controlling for the post-litigation executive turnovers. We choose to focus on changes of CEOs and CFOs because these executives are more likely to experience post-litigation turnovers.

Table 6 presents our estimations of Equation 1 after controlling for executive turnovers. Panels A and B represent the results for the subsamples of lawsuits with high and low composite strength scores, respectively. We re-estimate Equation 1 in each panel after initially excluding lawsuits followed by CEO turnovers and then excluding lawsuits with CFO turnovers. Specifically, in the first two columns of Panel A, we examine lawsuit cases without CEO turnovers. Significantly negative coefficients on $DSUED \times POSTFILING$ (coeff. $= -2.153$) exist when $SALESHR$ is the dependent variable. Results are similar for the other insider selling measure ($SALEVALUE$). Even after we exclude lawsuit cases with CFO turnovers, we continue to observe a significant decrease in insider selling after the litigation.

Panel B of Table 6 presents the analysis for the subsample of weak lawsuits after excluding lawsuits cases with CEO and CFO turnovers. Consistent with our prior findings, the coefficients on $DSUED \times POSTFILING$ are insignificant, which suggests that weak lawsuits have no deterrent effect on subsequent insider trading.

5.4 Alternative Litigation Risk Models

As previously discussed, we use the propensity score matching method to construct a sample of control firms with likelihoods of being sued similar to those of our sample lawsuit firms. This likelihood is estimated using a logistic regression model, which uses the determinants of litigation risk, as documented by Johnson *et al.* (2000) and Rogers and Stocken (2005). For robustness check, we estimate the litigation likelihood in Table 7 using the three litigation risk models proposed by Kim and Skinner (2012). These three models use a comprehensive set of widely available data, such as firm size, sales growth, abnormal returns, return volatility, return skewness, and stock turnover. Furthermore, to avoid variables directly reflecting the lawsuit-triggering event (e.g., current-year return variables), two of these three models use lagged return variables. Unlike the litigation risk models proposed in earlier studies Johnson *et al.* (2000), Rogers and Stocken (2005), and Kim and Skinner (2012) exclude variables related to corporate governance (e.g., CEO power and monitoring) for two reasons. First, these variables mainly capture managerial opportunism, which drives only a small portion of shareholder lawsuits. Second, variables on governance structures are available only for a limited sample of firms.

The results are very similar to those presented in Table 3. We find significantly negative coefficients on $DSUED \times POSTFILING$ for all three litigation

	Excluding Cases with CEO Turnovers		Excluding Cases with CFO Turnovers	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel A: Strong lawsuits				
CLASSPRD	1.290***	1.843***	1.048***	1.484***
	(4.32)	(3.77)	(3.46)	(3.03)
POSTFILING	1.598***	1.854***	1.246***	1.292*
	(3.67)	(2.91)	(2.76)	(1.95)
DSUED	0.472	0.417	0.483	0.465
	(0.85)	(0.47)	(0.83)	(0.51)
DSUED × CLASSPRD	0.666	0.897	0.687	1.016
	(1.11)	(0.94)	(1.12)	(1.04)
DSUED × POSTFILING	-2.153***	−3.240***	−1.910**	−2.848**
	(−2.99)	(−3.00)	(−2.55)	(−2.54)
Control Variables	YES	YES	YES	YES
No. of Observations	15,080	15,080	14,554	14,554
F statistic	32.955	32.337	27.654	27.969
P-value	0.000	0.000	0.000	0.000
Panel B: Weak lawsuits				
CLASSPRD	1.046***	1.420**	1.214***	1.766***
	(2.72)	(2.19)	(3.07)	(2.62)
POSTFILING	0.252	−0.232	0.182	−0.331
	(0.58)	(−0.34)	(0.42)	(−0.47)
DSUED	0.286	0.051	0.352	−0.037
	(0.45)	(0.05)	(0.54)	(−0.04)
DSUED × CLASSPRD	1.033	1.427	0.834	1.290
	(1.44)	(1.25)	(1.15)	(1.13)
DSUED × POSTFILING	0.525	0.801	0.483	0.979
	(0.64)	(0.64)	(0.58)	(0.77)
Control Variables	YES	YES	YES	YES
No. of Observations	18,071	18,071	17,291	17,291
F statistic	28.795	27.098	28.185	26.969
P-value	0.000	0.000	0.000	0.000

Table 6: Controlling for Executive Turnovers

Note: This table presents the change in the intensity of insider trading of both sued and matched control firms around the filing date of shareholder lawsuits when the executive turnovers after the filing of lawsuits are controlled for. Panel A and Panel B report results for two subsamples partitioned by the median of a composite index of lawsuit strength (STRENGTHINDEX). We focus on trading transactions by C-suite executives. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The t-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

	Litigation Risk Models in Kim and Skinner (2012)					
	Model 1		Model 2		Model 3	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel A: Strong lawsuits						
CLASSPRD	1.500***	2.388***	0.932***	1.300***	1.140***	1.732***
	(4.29)	(4.20)	(3.36)	(3.02)	(4.49)	(4.12)
POSTFILING	1.310***	1.291**	1.056***	1.074**	1.006***	1.078**
	(3.49)	(2.29)	(3.37)	(2.29)	(3.74)	(2.51)
DSUED	0.776	1.235	0.058	−0.028	0.242	0.295
	(1.48)	(1.54)	(0.12)	(−0.04)	(0.58)	(0.45)
DSUED × CLASSPRD	0.114	−0.082	0.693	1.052	0.412	0.294
	(0.20)	(−0.09)	(1.33)	(1.29)	(0.91)	(0.40)
DSUED × POSTFILING	−2.855***	−4.140***	−2.568***	−3.932***	−2.053***	−3.221***
	(−4.53)	(−4.28)	(−4.51)	(−4.45)	(−4.19)	(−4.18)
Control Variables	YES	YES	YES	YES	YES	YES
No. of Observations	18,697	18,697	20,037	20,037	27,299	27,299
F statistic	48.865	49.089	41.605	42.608	47.468	48.034
P-value	0.000	0.000	0.000	0.000	0.000	0.000

Table 7: Alternative Litigation Risk Models for Estimating Propensity Scores

	Litigation Risk Models in Kim and Skinner (2012)					
	Model 1		Model 2		Model 3	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel B: Weak lawsuits						
CLASSPRD	1.559***	2.302***	1.025***	1.429***	0.607	0.957
	(4.49)	(3.90)	(3.44)	(2.86)	(1.45)	(1.46)
POSTFILING	1.273***	1.174**	0.673*	0.359	0.130	−0.197
	(3.60)	(2.16)	(1.95)	(0.63)	(0.30)	(−0.30)
DSUED	1.100**	1.691**	0.126	−0.050	−1.415**	−2.145**
	(2.01)	(1.99)	(0.23)	(−0.06)	(−2.15)	(−2.18)
DSUED × CLASSPRD	0.114	0.001	0.650	0.934	1.451*	2.576**
	(0.18)	(0.00)	(1.08)	(0.98)	(1.92)	(2.18)
DSUED × POSTFILING	−0.582	−0.637	−0.223	−0.253	1.303	1.822
	(−0.82)	(−0.59)	(−0.32)	(−0.23)	(1.61)	(1.54)
Control Variables	YES	YES	YES	YES	YES	YES
No. of Observations	22,063	22,063	22,528	22,528	8,361	8,361
F statistic	47.293	41.713	18.806	21.285	23.872	22.859
P-value	0.000	0.000	0.000	0.000	0.000	0.000

Table 7: Continued

Note: This table presents the change in the intensity of insider selling of both sued and matched control firms around the filing date of shareholder lawsuits, using alternative litigation risk models for estimating propensity scores. Panel A and Panel B report results for two subsamples partitioned by the median of a composite index of lawsuit strength (STRENGTHINDEX). We focus on trading transactions by C-suite executives. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. Propensity score is the predicted probability of becoming a lawsuit target in the following year, estimated from one of the three litigation risk models in Kim and Skinner (2012). The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The t-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

risk models after estimating Equation 1 in Panel A for the strong lawsuits, whereas we do not find any significant coefficient on $DSUED \times POSTFILING$ in Panel B for the weak lawsuits. These results suggest that our main findings are not likely to be driven by the selection of a particular litigation risk model.

5.5 Matching by Insider Selling During the Class Period

One alternative explanation for our findings is that managers sell a lot of shares during the class period and thus are likely to sell fewer shares during the post-filing period than the managers in control firms. To address this concern, we construct a different set of control firms. Instead of matching treatment and control firms by the propensity score (i.e., the probability of getting sued), we identify control firms with levels of insider selling during the years of class period similar to those of the sued firms. After this matching, we re-estimate our results under Equation 1. As a result of this matching, by construction, the coefficients on $DSUED \times CLASSPRD$ become insignificant (untabulated). Importantly, we continue to find significantly negative coefficients on $DSUED \times POSTFILING$. Furthermore, when we partition the sample into two subsamples according to the lawsuit strength index, we find that the deterrent effect is significantly larger for the subsample of strong lawsuits. This analysis helps rule out the alternative explanation that our results are mainly driven by the fact that sued firms tend to naturally have lower insider selling during the post-filing period as a result of higher insider selling in previous periods.

5.6 The Deterrent Effect Over Time

To examine the deterrent effect over time, we extend our sample period to include five years after lawsuit filing and modify Equation 1 by replacing *POST-FILING* with five indicator variables (*YEAR0* to *YEAR4*) as shown below:

$$\begin{aligned} Insider\ Trading_{it} = {} & \beta_0 + \beta_1 CLASSPRD_{it} + \beta_2 POSTFILING_{it} \\ & + \beta_3 DSUED_{i,} + \beta_4 DSUED_i \times CLASSPRD_{it} \\ & + \beta_5 DSUED_i \times YEAR0 + \beta_6 DSUED_i \times YEAR1 \\ & + \beta_7 DSUED_i \times YEAR2 + \beta_8 DSUED_i \times YEAR3 \\ & + \beta_9 DSUED_i \times YEAR4 + \beta_{10} LAGSIZE_{it} \\ & + \beta_{11} LAGBM_{it} + \beta_{12} LAGRET_{it} \\ & + \beta_{13} INDAVG\_IT_{it} + \varepsilon_{i,t} \end{aligned} \tag{3}$$

In the full-sample analysis (untabulated), we find significantly negative coefficients on all the interaction terms between *DSUED* and year (except $DSUED \times YEAR2$), indicating that the decrease in insider sales persists five

years after lawsuit filing. When we partition the sample by the composite lawsuit strength index, we find that generally this decrease over time in insider sales is more pronounced for the subsample of strong lawsuits. Overall, we find this deterrent effect on insider sales persists at least five years after lawsuit filings.

5.7 Whether the Results are Driven by Stock Price Decreases Before the Lawsuits

Following a lawsuit, if the stock price of the defendant firm significantly drops and is no longer overvalued, the insiders may have little incentive to engage in stock selling. In this case, our documented decrease in insider sales could merely reflect this decrease in incentives to sell. We have conducted several tests to address this concern. First, in all of our regression analyses, we explicitly control for the stock return momentum and other determinants of insider trading. Consequently, we should be capturing the change in the abnormal volume of insider trading after controlling for the stock performance of the firm. Second, because securities lawsuits are often triggered by stock price declines, we use a different approach to better control for the impact of possible stock price declines prior to the lawsuit filing. Specifically, in addition to *LAGRET* (buy-and-hold abnormal returns over year t-1), we include two more stock return variables, *LAG2RET* and *LAG3RET* (buy-and-hold abnormal returns over year t-2 and year t-3, respectively), in the baseline regression model Equation 1. In our sample of 1,611 lawsuits, 90% (99%) of the cases were filed within 365 (1,100) days of the class period end. Therefore, these three lagged return variables should capture abnormal stock returns during the past three years (including those declines caused by the revelation events and any additional negative news prior to the lawsuit filing date). Table 8 presents the results for this robustness check. Panel A shows significantly negative coefficients on $DSUED \times POSTFILING$, indicating a significant drop in insider sales after the lawsuit filing. Panel B shows that the coefficients on $DSUED \times POSTFILING$ are negatively significant only for the subsample of strong lawsuits. These results indicate that our main findings are robust to the inclusion of these additional return variables. This new test should alleviate the concern that our finding of a significant decrease in insider selling is mainly driven by stock price declines before the lawsuit filing.

6 Additional Analysis

6.1 Analysis Conditional on Ex ante Litigation Risk

We argue that the observed decrease in insider selling following shareholder lawsuits is caused by an increase in the perceived litigation risk associated with insider trading. In this case, the decrease in insider selling should be

Dependent Variable	SALESHR	SALEVALUE
Panel A: Analysis based on the full sample		
CLASSPRD	0.966***	1.579***
	(4.11)	(3.89)
POSTFILING	0.727**	0.727
	(2.48)	(1.59)
DSUED	0.249	0.257
	(0.62)	(0.39)
DSUED × CLASSPRD	0.225	0.301
	(0.53)	(0.42)
DSUED × POSTFILING	−1.116**	−1.700**
	(−2.32)	(−2.21)
LAGSIZE	0.311***	0.336***
	(4.44)	(3.05)
LAGBM	−1.913***	−2.904***
	(−6.53)	(−6.30)
LAGRET	1.858***	2.694***
	(12.24)	(10.71)
LAG2RET	0.888***	1.339***
	(6.80)	(6.32)
LAG3RET	0.493***	0.635***
	(3.67)	(2.81)
INDAVG_IT	0.407***	0.338***
	(8.91)	(11.26)
No. of Observations	33,794	33,794
F statistic	27.816	27.258
P-value	0.000	0.000

	SALESHR		SALEVALUE	
Dependent Variable	Strong Lawsuits	Weak Lawsuits	Strong Lawsuits	Weak Lawsuits
Panel B: Analysis conditional on the composite index of lawsuit strength				
CLASSPRD	0.818***	1.093***	1.287***	1.841***
	(3.19)	(3.26)	(3.04)	(3.05)
POSTFILING	1.148***	0.344	1.420***	0.086
	(3.13)	(0.94)	(2.60)	(0.14)
DSUED	0.315	0.171	0.329	0.220
	(0.63)	(0.32)	(0.41)	(0.25)
DSUED × CLASSPRD	0.738	−0.419	1.172	−0.788
	(1.37)	(−0.68)	(1.34)	(−0.77)
DSUED × POSTFILING	−1.966***	−0.433	−3.190***	−0.556
	(−3.12)	(−0.67)	(−3.34)	(−0.51)
LAGSIZE	0.382***	0.239***	0.458***	0.204
	(4.39)	(2.99)	(3.66)	(1.50)

Table 8: Including Two Additional Lagged Return Variables

	SALESHR		SALEVALUE	
Dependent Variable	Strong Lawsuits	Weak Lawsuits	Strong Lawsuits	Weak Lawsuits
LAGBM	−1.981***	−1.865***	−2.824***	−2.997***
	(−4.67)	(−5.30)	(−4.44)	(−5.12)
LAGRET	2.042***	1.666***	2.945***	2.441***
	(10.70)	(9.90)	(9.64)	(8.44)
LAG2RET	1.088***	0.730***	1.589***	1.145***
	(6.32)	(5.14)	(5.80)	(4.80)
LAG3RET	0.709***	0.324**	0.957***	0.391
	(4.00)	(2.18)	(3.29)	(1.51)
INDAVG_IT	0.424***	0.386***	0.320***	0.349***
	(7.86)	(6.99)	(8.96)	(9.30)
No. of Observations	16,348	17,080	16,348	17,080
F statistic	22.746	17.832	21.144	17.691
P-value	0.000	0.000	0.000	0.000
Comparing Coefficients on DSUED × POSTFILING	Chi-squared 4.91 *p*-value 0.03		Chi-squared 5.41 *p*-value 0.02	

Table 8: Continued

Note: This table presents the change in the intensity of insider trading of both sued and matched control firms around the filing date of shareholder lawsuits. Panel A report the results based on the full sample. Panel B report results for two subsamples partitioned by the median of a composite index of lawsuit strength (STRENGTHINDEX). We focus on trading transactions by C-suite executives. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to five years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The *t*-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

more pronounced for firms that experience a greater increase in the perceived litigation risk after the lawsuit. Defendant firms with lower ex ante litigation risk should experience a greater increase in litigation risk following the actual litigation than their counterparts. Consequently, the deterrent effect of the litigation is likely to be stronger for these firms. We thus test whether the post-litigation decrease in insider selling is more pronounced for firms with lower ex ante litigation risk. The results are presented in Table 9.

First, we analyze strong lawsuits as identified by our composite strength index. We classify these strong lawsuits into two subsamples according to their levels of ex ante litigation risk, which is the predicted probability of

Dependent Variable	Strong Lawsuits				Weak Lawsuits			
	SALESHR		SALEVALUE		SALESHR		SALEVALUE	
	Ex ante Litigation Risk		Ex ante Litigation Risk		Ex ante Litigation Risk		Ex ante Litigation Risk	
	High	Low	High	Low	High	Low	High	Low
CLASSPRD	0.222	1.866***	−0.004	3.041***	0.971**	0.945**	0.965	1.788**
	(0.68)	(4.37)	(−0.01)	(4.26)	(2.16)	(2.01)	(1.23)	(2.30)
POSTFILING	0.154	2.124***	−0.355	2.882***	−0.231	0.786*	−1.361	1.065
	(0.39)	(3.57)	(−0.53)	(3.55)	(−0.44)	(1.65)	(−1.59)	(1.44)
DSUED	0.414	1.952**	0.498	2.626**	1.002	1.029	1.452	1.709
	(0.73)	(2.26)	(0.52)	(1.99)	(1.33)	(1.27)	(1.19)	(1.34)
DSUED × CLASSPRD	1.328**	0.224	2.274**	0.477	1.835**	0.851	2.274	1.233
	(2.00)	(0.24)	(2.16)	(0.31)	(2.06)	(0.84)	(1.61)	(0.74)
DSUED × POSTFILING	−1.575**	−4.090***	−2.409**	−6.400***	0.901	−1.746*	0.745	−2.551
	(−2.24)	(−3.79)	(−2.08)	(−3.99)	(0.90)	(−1.71)	(0.49)	(−1.52)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
No. of Observations	8,086	11,184	8,086	11,184	11,980	8,958	11,980	8,958
F statistic	14.447	26.013	15.168	23.709	16.022	21.698	15.523	22.006
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Comparing Coefficients on DSUED × POSTFILING	Chi-squared 5.08 *p*-value 0.02		Chi-squared 5.12 *p*-value 0.02		Chi-squared 5.90 *p*-value 0.02		Chi-squared 3.41 *p*-value 0.06	

Table 9: Analysis Conditional on Ex ante Litigation Risk

Note: This table presents the change in the intensity of insider selling of both sued and matched control firms around the filing date of shareholder lawsuits, which are conditional on the level of ex ante litigation risk. We focus on trading transactions by C-suite executives. The sample includes firm-years of both sued and control firms from the three years prior to the class period start date to three years after the lawsuit filing date with required data. Control firms are identified as firms that have never been sued during our sample period but have the closest propensity scores as the sued firms. The propensity score indicates the probability for a firm to be targeted by a lawsuit in the following year, which is estimated from the model in which the lawsuit target indicator variable is regressed on firm size, book-to-market, ROA, leverage, sales growth, return skewness, share turnover, market-adjusted annual return, beta, institutional ownership, discretionary accruals, regulated industry, high-tech industry, retail industry indicator variables, and year-fixed effects. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The *t*-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

becoming a lawsuit target in the subsequent year estimated from the logistic regression model previously described in the propensity score matching subsection. We then estimate Equation 1 for both subsamples. With both insider selling measures (*SALESHR* and *SALEVALUE*), all four coefficients on *DSUED* × *POSTFILING* are significantly negative. Furthermore, the decrease in insider sales is significantly greater for the subsample of firms with lower ex ante litigation risk. For instance, in terms of *SALESHR*, the coefficients on *DSUED* × *POSTFILING* are −1.575 and −4.090 for the subsamples of high and low ex ante litigation risk, respectively (chi-squared of 5.08 for the difference between these two coefficients). When examining weak lawsuits, we find similar results that defendant firms with lower levels of ex ante litigation risk experience a greater decrease in insider sales. For instance, using the *SALESHR* measure, the coefficient on *DSUED* × *POSTFILING* is significantly negative only for the subsample of defendant firms with lower levels of ex ante litigation risk. Table 9 shows that the decrease in insider sales is negatively associated with the ex ante level of litigation risk, which is consistent with our argument that the post-litigation decrease in insider sales is driven by the increase in the perceived litigation risk.

6.2 The Deterrent Effect of Allegation of Insider Trading

Lawsuits with allegations of opportunistic insider trading may have a stronger deterrent effect on insider trading. In untabulated analysis, we compare the deterrent effect of lawsuits with insider trading allegations with the effect of those without insider trading allegations. We find the decrease in insider selling is significant only for the lawsuits with insider trading allegations. For those without insider trading allegations, there is also some evidence of the deterrent effect but the coefficients are not statistically significant. These results indicate that the allegation of insider trading increases the perceived litigation risk related to the post-filing insider selling. In additional multivariate analysis, we find that the likelihood of having an allegation of insider trading is positively associated with insider sales (especially those by the CEO), potential investor losses, institutional ownership, and shares turnover, and is negatively associated with the length of class period, firm size, and book-to-market ratio.

6.3 The Deterrent Effect of Top Law Firm

Because a top law firm may inflict severer litigation outcomes on defendant firms, we test whether the deterrent effect is affected by the quality of plaintiff attorney. We define top law firms as those ranked in the top quintile of total settlement amount in the year prior to the filing of the lawsuit. We then partition our sample by whether the plaintiff attorney comes from a top law firm. In untabulated results, we find the coefficients on *DSUED* × *POSTFILING*

to be significantly more negative for the subsample of lawsuits with plaintiffs represented by a top law firm. This indicates that the deterrent effect is more pronounced when the lawsuit is litigated by top law firms.

6.4 Effect of Litigation on Insider Selling of the Peer Firms

In this section, we examine the general deterrent effect of litigation on the insider selling of peer firms. One important motivation for investors, especially institutional investors, to file lawsuits is to generate positive spillover effects on corporate America in general and on their portfolio firms in particular (Del Guercio and Hawkins, 1999). However, evidence on such positive externalities of securities litigation is scant.[30] Jennings *et al.* (2011) report that securities litigation can deter the aggressive earnings management of industry peers. To determine whether a similar deterrent effect can be found on the insider trading of industry peers, we modify Equation 1 as follows:[31]

$$\begin{aligned} Insider\ Sales_{it} = {} & \beta_0 + \beta_1 POSTFILING_{it} + \beta_2 LAGSIZE_{it} + \beta_3 LAGBM_{it} \\ & + \beta_4 LAGRET_{it} + \beta_5 INDAVG\_IT_{it} + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where *Insider Sales* represents the scaled number of shares (*SALESHR*) and the scaled dollar value (*SALEVALUE*) for insider sales and opportunistic/routine sales as defined in Equation 2. All other variables are defined as in Equation 1. The sample includes the firm-years of industry peer firms (i.e., non-sued firms with the same four-digit SIC code as the sued firms) from the three years prior to the lawsuit filing date to the three years after the lawsuit filing date with required data.[32]

Panel A of Table 10 presents the spillover effect on the industry peers of defendant firms following strong lawsuits. We examine the change in the volumes of insider sales, opportunistic sales, and routine sales as measured by both the scaled number of shares and the scaled dollar value (*SALESHR* and

[30] Cohen *et al.* (2012) report that news releases of SEC enforcements on insider trading are associated with a decrease in the fraction of insider trades that are opportunistic. However, they have not examined the impact of SEC enforcements on insider trading in firms involved in the SEC investigation. Instead, they examine the general deterrence of SEC enforcements on all public firms.

[31] Results are similar if we add the indicator variable *CLASSPRD* in the regression model. Untabulated results show that the coefficients on *CLASSPRD* are insignificant, suggesting that peer firms did not exhibit abnormal insider selling during the class period of the sued firm, compared to the pre-class period. Further, the coefficients on *POSTFILING* continue to be significantly negative for the subsample of strong lawsuits. That is, our results are robust to using the pre-class period as the benchmark period.

[32] Our results are similar if we define the peer firms according to the three-digit SIC codes. Also, there is some overlap between propensity score-matched control firms (in previous analyses) and peer firms in this industry-effect analysis, but the overlap is quite small. Only 2.85% of matched control firms are in the same 4-digit SIC industry as the sued firms.

	Insider Sales		Opportunistic Insider Sales		Routine Insider Sales	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel A: Strong Lawsuits						
POSTFILING	−0.581***	−0.724***	−0.599***	−0.766***	1.926***	2.466***
	(−4.02)	(−3.31)	(−4.22)	(−3.48)	(6.78)	(6.83)
LAGSIZE	0.810***	1.073***	0.702***	0.939***	1.662***	2.096***
	(9.34)	(8.43)	(8.88)	(7.75)	(10.63)	(10.33)
LAGBM	−2.913***	−4.396***	−2.640***	−4.110***	−2.897***	−3.692***
	(−9.40)	(−9.19)	(−9.87)	(−9.40)	(−4.51)	(−4.45)
LAGRET	2.741***	4.039***	2.641***	4.002***	1.072***	1.376***
	(13.63)	(12.42)	(14.02)	(12.84)	(3.10)	(2.94)
INDAVG_IT	0.583***	0.407***	0.516***	0.353***	0.240***	0.171***
	(13.46)	(12.81)	(12.86)	(11.87)	(3.49)	(4.17)
Control Variables	YES	YES	YES	YES	YES	YES
No. of Observations	62,887	62,887	62,887	62,887	62,887	62,887
F statistic	22.664	19.252	23.532	20.524	31.062	26.597
P-value	0.000	0.000	0.000	0.000	0.000	0.000

Table 10: Change in the insider selling intensity of industry peer firms after lawsuit filing

	Insider Sales		Opportunistic Insider Sales		Routine Insider Sales	
Dependent Variable	SALESHR	SALEVALUE	SALESHR	SALEVALUE	SALESHR	SALEVALUE
Panel B: Weak Lawsuits						
POSTFILING	−0.068	−0.149	−0.185*	−0.335*	2.368***	2.991***
	(−0.58)	(−0.81)	(−1.67)	(−1.83)	(9.05)	(9.23)
LAGSIZE	0.856***	1.231***	0.730***	1.079***	1.912***	2.441***
	(11.41)	(10.86)	(10.77)	(10.03)	(11.38)	(12.16)
LAGBM	−2.122***	−3.265***	−2.023***	−3.238***	−1.449***	−1.781***
	(−9.56)	(−9.18)	(−9.92)	(−9.40)	(−3.00)	(−2.88)
LAGRET	2.519***	3.760***	2.456***	3.809***	1.009***	1.199***
	(16.80)	(14.93)	(16.87)	(15.07)	(4.16)	(3.71)
INDAVG_IT	0.524***	0.390***	0.470***	0.351***	0.304***	0.221***
	(13.12)	(14.34)	(12.70)	(13.68)	(4.97)	(6.05)
Control Variables	YES	YES	YES	YES	YES	YES
No. of Observations	83,309	83,309	83,309	83,309	83,309	83,309
F statistic	32.937	32.149	31.154	29.378	36.601	40.273
P-value	0.000	0.000	0.000	0.000	0.000	0.000

Table 10: Continued

Note: This table presents the change in the intensity of insider selling of non-sued industry peer firms (firms with the same 4-digit SIC code as the sued firms) around the filing date of shareholder lawsuits. Panels A and B show the results for the two subsamples partitioned by the median of a composite index of lawsuit strength (STRENGTHINDEX). If multiple lawsuits are filed in a year in the same industry, we compute the average strength index for all lawsuits. The sample includes firm-years of industry peer firms from the three years prior to the lawsuit filing date to three years after the lawsuit filing date with required data. The intercepts are included but are not reported in this table. The coefficients are multiplied by 1000 for expositional purposes. The t-statistics enclosed in parentheses are based on the heteroscedasticity robust standard errors clustered by the firm. Here, *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. The Appendix contains the definitions of variables.

SALEVALUE). We find a significant decrease in both total insider selling and opportunistic selling.

Meanwhile, Panel B shows the spillover effect for the subsample of weak lawsuits. We do not find the coefficients on *POSTFILING* to be significant (although still negative) when the dependent variables are measures of insider sales. However, the coefficients on *POSTFILING* are significantly negative when the two measures of opportunistic sales are used as dependent variables, similar to the results presented in Panel A. These findings suggest that lawsuits, regardless of merit and rigorousness, have a deterrent effect on the opportunistic insider selling in peer firms.[33] Such an effect is particularly strong for high-merit lawsuits with rigorous litigation processes.

Overall, the findings in Table 10 support our conjecture that securities litigation, especially strong lawsuits, can deter insiders of peer firms from engaging in opportunistic stock selling.

7 Conclusion

Prior literature proposes that perceived litigation risk should deter insiders from trading their stockholdings (e.g., Cheng and Lo, 2006; Huddart *et al.*, 2007; Rogers, 2008; Cohen *et al.*, 2012; Thevenot, 2012). We examine the effect of actual private securities litigation on insider trading. We propose that a lawsuit will prompt insiders to revise upward the estimates of litigation risk and revise downward the expected benefits of the insider trading, which should result in a post-litigation decrease in insider trading. In addition, such a deterrent effect is likely contingent upon the strength of the lawsuit (specifically, merits and the rigorousness of the litigation process), because weak lawsuits tend to have little disciplinary power over corporate misbehaviors.

Our analyses, based on a large sample of lawsuits from 1996 to 2009, find a significant decrease in insider sales following lawsuit filings. However, such a decrease exists only for lawsuits with strong merits and that are rigorously pursued as identified by our composite lawsuit strength index. We also observe significant declines in stock selling by various types of insiders including CEOs, CFOs, directors, and other firm officers.

We conduct several robustness checks. Following Cohen *et al.* (2012), we identify opportunistic trades that tend to be informed and profitable. Consistent with our main conclusions, we find significant reductions in opportunistic insider sales following strong lawsuits. We also check the robustness of our results by controlling for executive turnovers and the grant or exercise of stock options, using alternative specifications of the litigation risk estimation model,

[33] Peer firms may have less information than the defendant firm regarding the merit and rigorousness of the lawsuit and thus are likely to always take some precautions (e.g., by reducing opportunistic insider sales) when observing a lawsuit.

matching control firms by the level of insider trading during the class period, and by controlling for the price decline before the lawsuit filings.

Furthermore, to ascertain that our findings are mainly driven by the increase in "perceived" litigation risk after lawsuits, we identify a subset of defendant firms that have a lower level of ex ante litigation risk and therefore should experience a greater increase in litigation risk subsequent to the lawsuit. Results show that insiders in these firms indeed reduce their selling to a greater extent. We also document that the decrease in insider sales is more pronounced when there is an allegation of insider trading in the lawsuit, and when a top law firm serves as the plaintiff attorney. Finally, we demonstrate that the deterrent effect can be extended to the industry peers of defendant firms as insiders in these peer firms similarly cut down the intensity of opportunistic stock sales.

Shareholder litigation imposes significant deadweight costs on investors and the judiciary. It is often asserted that deterrence is the only rationale that can justify these costs (e.g., Coffee, 2006). This paper provides the first evidence on the existence of and variations in the deterrent effect of shareholder lawsuits on insider trading. Overall, our findings suggest that securities lawsuits—particularly high-merit and rigorously litigated lawsuits—can be used as effective mechanisms for constraining opportunistic insider trading, partially justifying the social costs of litigation. Another implication of our findings is that future researchers should consider the merits and rigorousness of a lawsuit when assessing the potential effects of litigation costs on insider trading and other opportunistic behaviors.

A Appendix: Definitions of Variables

Variable name	Definition
Insider Trading Variables	
SALESHR	Total number of shares sold by insiders during the fiscal year, scaled by the number of shares outstanding.
BUYSHR	Total number of shares purchased by insiders during the fiscal year, scaled by the number of shares outstanding.
SALEVALUE	Total dollar value of shares sold by insiders during the fiscal year, scaled by beginning market value of equity.
BUYVALUE	Total dollar value of shares purchased by insiders during the fiscal year, scaled by beginning market value of equity.

Variable name	Definition
Opportunistic and Routine Trades	Following Cohen *et al.* (2012), we classify insider trades as opportunistic and routine according to the trading history of the insider. In the beginning of each calendar year, we classify an insider as a routine trader if he or she places a trade in the same calendar month for at least three consecutive years. An insider is classified as an opportunistic trader if there is no discernible pattern in his or her trading history. All subsequent trades of these insiders are classified as either "routine trades" or "opportunistic trades." To preserve the insider trade observations, we classify the trades made by insiders who do not have a trading activity for the past three years as opportunistic trades.
Insider Trading Determinants	
LAGSIZE	Logarithm of market value of equity at the beginning of the fiscal year.
LAGBM	Book-to-market ratio at the beginning of the fiscal year.
LAGRET	Buy-and-hold abnormal returns over the previous fiscal year.
INDAVG_IT	Average insider trading of firms in the same SIC2 industry during the fiscal year. The specific insider trading measure is consistent with the dependent insider trading variable used in the regression.
Lawsuit Characteristics and Strength Index	
CLASSPRD	One if a firm-year has the earnings announcement date falling between the class period of the lawsuit, and zero otherwise.
POSTFILING	One for any firm-years beyond YEAR 0, and zero otherwise. YEAR 0 is the fiscal year in which the lawsuit was filed. If the class period end date falls into the year of lawsuit filing, then YEAR 0 is defined as the year immediately after the lawsuit filing year.
DSUED	One if the observation is a defendant firm, and zero otherwise.
D_ILP	One if the lawsuit has an institutional investor as the lead plaintiff, and zero otherwise.

Variable name	Definition
D_GAAP	One if a violation of Generally Accepted Accounting Principles (GAAP) is alleged, and zero otherwise.
D_RESTATE	One if the lawsuit is preceded by an accounting restatement, and zero otherwise.
D_ACCTFIRM	One if an accounting firm is named as a defendant, and zero otherwise.
CAR3_REV	The three-day CAR around class period end.
D_CAR3	One if the three-day CAR around class period end (CAR3_REV) is below sample median, and zero otherwise.
D_DISMISS	One if the lawsuit is dismissed, and zero otherwise.
TOTAL_AMOUNT	Total amount of settlement for a lawsuit including cash and non-cash amounts (in thousands).
CASH_AMOUNT	Total cash amount of settlement for a lawsuit (in thousands).
D_BIGSET	One if the lawsuit generates a large TOTAL_AMOUNT (greater than 3 millions), and zero otherwise.
STRENGTHINDEX	A composite index of lawsuit strength based on seven lawsuit characteristics, and is expressed as follows: STRENGTHINDEX = D_ILP + D_GAAP + D_RESTATE + D_ACCTFIRM + D_CAR3 + (1–D_DISMISS) + D_BIGSET. Lawsuits are divided into strong and weak lawsuits using the sample median of the strength index.

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