Insider Trading Around Environmental Lawsuits*

Mansoor Afzali
Department of Accounting and Commercial Law
Hanken School of Economics
mansoor.afzali@hanken.fi

Gonul Colak
Department of Accounting and Finance
University of Sussex
g.colak@sussex.ac.uk

Niclas Meyer†
Department of Finance and Economics
Hanken School of Economics
niclas.meyer@hanken.fi

Abstract: We investigate insider trading patterns around corporate environmental lawsuits. Using an event-specific econometric design, we find that insiders in firms facing environmental lawsuits sell more and larger volumes of shares in the weeks leading up to the filing of the lawsuits. This trading pattern is more prominent for top executives, lawsuits associated with ex-post severe negative market reactions, and firms operating in opaque information environments. Additional analysis suggests that a strong corporate culture based on integrity reduces this opportunistic insider behavior. Overall, our findings indicate that insiders use private information about upcoming environmental lawsuits to sell shares in advance, especially when such lawsuits have a material impact on stock prices.

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†Corresponding author

1 Introduction

Prior research on insider trading shows that insiders trade opportunistically before other major corporate events. For instance, Cheng and Lo (2006) find that corporate insiders time their trades and the public disclosure of voluntary information to maximize their profits. Evidence also suggests that insiders do not abstain from trading before publicly disclosing economically material information related to internal control weaknesses (Skaife et al., 2013), corporate accounting scandals (Agrawal & Cooper, 2015), and Securities and Exchange Commission (SEC) investigations (Blackburne et al., 2021). We extend this literature by examining whether insiders use their informational advantage to sell their shares opportunistically before major environmental lawsuits are filed against their firms. We also ask whether the insider level and ex-post market reaction to environmental lawsuits affect insider trading patterns.

Insiders may engage in strategic stock selling before environmental lawsuits due to the significant financial and reputational risks such lawsuits pose. Legal liabilities, fines, cleanup costs, and reputational damage from these environmental lawsuits can negatively affect a firm's stock price or credit risk (Capelle-Blancard & Petit, 2019; Karpoff et al., 2005; Kölbel et al., 2017; Sato et al., 2024). Since environmental cases often involve lengthy investigations, insiders may have prior knowledge of compliance issues or pending regulatory actions. A notable example is BP's misleading disclosures during the 2010 Deepwater Horizon oil spill, which was publicly backed by executives and where internal data showed much higher oil leakage than publicly reported (Securities and Exchange Commission [SEC], 2012). Such private insider information may prompt insiders to sell shares preemptively to avoid potential losses.

To test our hypotheses, we hand-collect information on environmental lawsuits filed against S&P1500 firms during the period 2004-2020 from the U.S. Federal Judiciary's Public Access to Court Electronic Records (PACER) database. We obtain insider transaction data from 2iQ Research and construct an event-specific weekly panel

data sample that allows us to track the insider's trading patterns for the same lawsuit event over time. This methodology controls for unobservable and time-invariant insider, firm, or lawsuit characteristics that can affect insider trading. Our analyses reveal four important insights into the insider trading patterns of affected firms. First, insiders are net sellers several weeks before the week of the environmental lawsuit filing date. Second, the pre-lawsuit selling pattern is more prominent for top executives than other insiders, suggesting that the trades are opportunistic and private-information-driven. Third, lawsuits that generate more severe negative market reactions are preceded by more insider selling, indicating that insiders trade based on the perceived economic materiality of environmental lawsuits. Finally, we document that insiders of firms with opaque financial reporting environments are more likely to engage in opportunistic trading behavior, while insiders of firms with strong corporate integrity cultures are less likely.

Our paper contributes to the existing literature in several unique ways. Our baseline results highlight that insiders use their informational advantage to trade on material information yet to be disclosed to the public. In this case, our findings closely relate to two other studies. First, Agrawal and Cooper (2015) study whether insiders sell their shares before disclosing material earnings misstatements. They find that insiders sell before the revelation of earnings misstatements and that this tendency is particularly pronounced when the market reaction is more damaging. In the second study, Blackburne et al. (2021) examine whether insiders sell before SEC investigations become public information. They find that insiders do not abstain from selling their shares despite the economically material nature of undisclosed SEC investigations. Our findings are in line with these results. Specifically, we show that not only do insiders sell before environmental lawsuits are filed against their firm, but this selling becomes even more prominent when the perceived risks of such lawsuits are more significant. These findings are consistent with the notion that insiders possess material information about the lawsuits they subsequently use to extract economic rent.

We also contribute to the literature on mechanisms restricting opportunistic insider trading behaviors. Prior research shows that corporate policies on insider trading (Bettis et al., 2000), corporate governance systems (Dai et al., 2016; Jagolinzer et al., 2011), voluntary restrictions (Lee et al., 2014), media (Dai et al., 2015), common ownership (Chen et al., 2023), judge ideology (Huang et al., 2024), and proprietary costs (Choi et al., 2024) limit these opportunistic behaviors. Our findings indicate that the strength of corporate integrity culture also helps restrict opportunistic insider trading before environmental lawsuits.

The rest of the paper is as follows. In Section 2, we review the related literature and develop our hypotheses. In Section 3, we present the data, sample, and methodology. In Section 4 and Section 5, we present our main and additional analyses. Finally, we conclude the paper in Section 6.

2 Literature Review and Hypothesis Development

Insiders play an important role in making financial markets more efficient (Piotroski & Roulstone, 2004). Prior research suggests that insiders typically trade for two main reasons. First, consistent with the information provision hypothesis, insiders use their informational advantage to trade and inform the public (Fidrmuc et al., 2013; Lakonishok & Lee, 2001; Seyhun, 1986). Numerous early studies (e.g., Finnerty, 1976; Jaffe, 1974; Lorie & Niederhoffer, 1968; Pratt & DeVere, 1970; Seyhun, 1986, 1988, 1992) demonstrate that open market purchases and sales by corporate insiders predict future returns. Insider trading can also predict abnormal returns around corporate events, such as SEOs (Cziraki et al., 2021; Rossi & Sahlström, 2019). Investors can see such trading behavior as signals for future growth opportunities and trade on that information (Ausubel, 1990; Fishman & Hagerty, 1992; Hirschey & Zaima, 1989; Leland, 1992). Such incorporation of private information into stock prices can lead to greater market efficiency (Morck et al., 2000; Piotroski & Roulstone, 2004).

In contrast, consistent with the rent-extraction hypothesis, researchers show that insiders exploit their informational advantage to extract economic rents. Prior research finds that insiders time their trades around major corporate events. For instance, Keown and Pinkerton (1981) show that abnormal stock price movements occur up to 12 days before the public announcement of mergers and acquisitions, suggesting information leakage through insider trading. Penman (1982) finds that insiders time their trades around the announcement of earnings forecasts such that they buy (sell) before good (bad) earnings forecasts. Cheng and Lo (2006) provide similar evidence, showing that managers strategically issue bad news forecasts to lower stock prices before purchasing shares while avoiding such behavior when selling shares due to higher litigation risks. Similar timing of trades is documented around stock repurchases (Lee et al., 1992; Netter & Mitchell, 1989; Raad & Wu, 1995), dividend announcements (John & Lang, 1991), earnings announcements (Allen & Ramanan, 1995; Huddart et al., 2007; Park & Jang, 1995), bankruptcy petitions (Seyhun & Bradley, 1997), seasoned equity offerings (Clarke et al., 2001; Hauser et al., 2003), disclosure of material weaknesses in internal control (Skaife et al., 2013), announcement of accounting scandals (Agrawal & Cooper, 2015), and audit reports (Arif et al., 2022).[1]

We argue that insiders may engage in strategic selling before environmental lawsuits due to the significant financial and reputational risks such lawsuits pose to their firms. Environmental litigation can lead to substantial legal liabilities, regulatory fines, cleanup costs, and reputational damage, all of which negatively affect a company's stock price or credit risk (Capelle-Blancard & Petit, 2019; Karpoff et al., 2005; Kölbel et al., 2017; Sato et al., 2024). Anticipating such adverse outcomes, insiders might be motivated to sell shares before the information becomes public, thus avoiding potential losses. Insiders' informational advantage is particularly relevant in environ-

[1]Besides these two reasons, insiders can also trade to meet their liquidity needs or to diversify their portfolios. For example, Lakonishok and Lee (2001) note that not all insider sales are driven by negative information; some are motivated by diversification or liquidity needs. Similarly, Ofek and Yermack (2000) analyze how executives manage risk by selling their own company stock and engaging in hedging activities.

mental cases, where legal proceedings often follow prolonged regulatory investigations or incidents that may not be immediately apparent to the public. Insiders are likely aware of the firm's environmental compliance issues, pending regulatory inspections, or ongoing negotiations with environmental agencies long before formal legal actions are announced.

A notable example is the 2010 Deepwater Horizon oil spill, in which the SEC charged BP with misleading investors by understating the severity of the oil leak. BP's internal data indicated a potential flow rate as high as 146,000 barrels per day, while public disclosures estimated only 5,000 barrels per day. This discrepancy was concealed during regulatory investigations and backed by executives publicly (SEC, 2012). Agrawal and Cooper (2015) find that insiders of firms with material earnings misstatements substantially sell more stock during the misstated period, particularly when insider selling incentives are aligned with earnings manipulation. More recently, Blackburne et al. (2021) show that insiders trade on private information related to undisclosed SEC investigations. The authors find that insider sales before these economically material and publicly undisclosed investigations significantly predict abnormal returns. We therefore state our first hypothesis (in alternative form) as follows:

> **H1:** Corporate insiders are more likely to sell stocks before the filing of an environmental lawsuit against their firm.

Based on the prior literature, we also make two cross-sectional hypotheses. First, we test whether insider level (top five executives versus other insiders) influences the probability and degree of selling before environmental lawsuits. On the one hand, the top five executives, presumably facing more significant reputational concerns, may be less likely to trade opportunistically before such events. For instance, Jeng et al. (2003) show that trades made by senior executives, such as the CEO, tend to cause more minor market reactions. They attribute this to the increased regulatory and market scrutiny that CEOs face, which encourages more cautious trading behavior.

On the other hand, the top five executives have superior information about their firm's prospects and may be more involved with the regulatory authorities before any lawsuits are filed. Such superior information could result in greater selling before a major corporate event, similar to the findings of Agrawal and Cooper (2015). Given these competing views in the prior literature, we state our second hypothesis (in null form) as follows:

> **H2:** The level of the corporate insider does not influence their trading patterns before the filing of an environmental lawsuit against their firm.

For our second cross-sectional hypothesis, we argue that the potential economic impact of the lawsuit can be associated with greater insider sales before the filing. Since insiders have better information on the potential outcome of a lawsuit, their trades can correspond to the perceived investor reaction on the filing date. This expectation is supported by the findings of Blackburne et al. (2021), who show that insiders trade on undisclosed and economically material information. In this case, we would expect more sales with larger trade values before lawsuits that severely impact the stock prices. Conversely, a more material lawsuit may attract more media attention, which is previously shown to limit insider trading probabilities Dai et al. (2015). In such a case, insiders may trade less prominently, engaging in fewer sale transactions with smaller trade values. Given these opposing viewpoints, we state our third hypothesis (in null form) as follows:

> **H3:** The perceived economic impact of the environmental lawsuit does not affect insider trading patterns before filing.

3 Data, Sample, and Methodology

In this section, we describe our data, sample selection criteria, and our methodology to assess whether insiders engage in opportunistic selling before environmental lawsuit filing dates.

3.1 Environmental Lawsuit Data

Following prior research (e.g., Aharony et al., 2015; Liu, 2018, 2020; Liu et al., 2020), our environmental lawsuit data comes from the PACER database, a comprehensive resource for federal appellate, district, and bankruptcy court records in the U.S., managed by the Administrative Office of the U.S. Courts. For corporate lawsuits, PACER offers data on legal actions against firms, including cases related to environmental issues. These cases include lawsuits related to environmental compliance, pollution, and regulatory breaches that affect ecosystems and public health.[2] To locate corporate environmental lawsuits through PACER, we use a similar approach as Aharony et al. (2015) and Liu (2018), among other. First, we download information on all cases for which the nature of the lawsuit equals "893: Environmental Matters". We then hand-match corporate entities' names with the defendant's name on the case. To reduce this laborious task, we restrict our sample to S&P1500 firms.

3.2 Insider Trading Data

We obtain insider transaction data from 2iQ Research, a leading insider trading data and analytics provider. The company specializes in tracking, aggregating, and analyzing insider transactions across global markets and covers the buying and selling activities of corporate executives, directors, and other insiders. Prior research uses 2iQ Research's insider transaction data to examine the influence of insider network centrality on the value relevance of insider trading in Europe (Afzali & Martikainen, 2021) and to assess whether mandatory adoption of say on pay affects executives' incentives to engage in insider trading (Bourveau et al., 2024). We focus on direct open-market insider purchases and sales of top executives, upper-level managers, and non-executive directors filed through the SEC.[3] After excluding transactions that do

[2]Figure A1 in Appendix A provides an example of an environmental lawsuit case summary from PACER database. Retrieved: December 12, 2024.

[3]Since we want to focus on insider trading patterns of insiders likely to be aware of the lawsuit before it is filed, we retain insiders with 2iQ Insider Level code "A," "B," and "C." We also remove cases where the 2iQ transaction label is Over-the-Counter (OTC) and cases where the 2iQ asset class

not meet these criteria, our data covers the period 2003 through 2020.

3.3 Sample Construction

Table 1 presents our sample selection procedure. We start with a list of 15,883 cases filed between 2003 and 2020 with available information on PACER. We then exclude cases where we cannot find an S&P 1500 company name that matches the defendant's name (14,546 cases). Following Liu et al. (2020), we exclude high-volume cases filed against Exxon Mobil in 2006 (138 cases). We next exclude multiple lawsuits filed on the same date against the same firm (102 cases), lawsuits for which there is no stock data on CSRP (195 cases), and lawsuits for which there is no insider trading data on 2iQ Research (428 cases). Our final sample comprises 474 environmental lawsuits filed against 194 unique firms between 2003 and 2020.

[Insert Table 1 around here]

Table 2, Panel A provides the number of lawsuits by year for all S&P 1500 firms and our sample of 474 lawsuits. Panel B provides summary statistics for the cumulative abnormal returns (CARs) around the lawsuit filing date. For all S&P 1500 firms, the average cumulative market-adjusted returns over the [–2, +2] window is –0.314 percent[4]. The average market reaction for lawsuits in our sample is negative but close to zero percent. Figure 1 depicts our sample's histogram of CARs around environmental litigations. Darker shades of blue indicate more severe negative market reactions. There is considerable variation in the level of CARs, indicating that not every environmental lawsuit may be economically material.

[Insert Table 2 and Figure 1 around here]

For our research design, we construct an event-specific balanced sample of insider transactions on a weekly basis. Specifically, for each lawsuit and insider, we create 17

does not equal "Equity."

[4]This market reaction is similar to those reported in related papers such as Liu et al. (2020) (she reports a CAAR[–2, +2] of –0.6%.)

weekly observations centered around week 0, i.e., the week of the lawsuit filing date. This design allows us to track insider trading of an insider up to eight weeks before, and up to eight weeks after, the lawsuit filing date. To be included in our sample, we require at least one transaction (purchase or sale) by an insider over the entire 17-week period. This criterion ensures that our sample comprises active insider traders. Our final insider trading sample comprises 18,594 weekly observations for 757 unique insiders belonging to 194 firms. During this period, insiders engage in 501 purchase and 3,698 sale transactions.

3.4 Measures of Insider Trading

We compute three measures of insider trading to assess whether insiders sell more before an environmental litigation is filed against their firm. These measures are constructively similar to the net sales ratio employed in the prior literature (e.g., Cziraki et al., 2021; Suk & Wang, 2021).[5] For our first measure, we rely on the weekly difference between the logged number of sales and the logged number of purchases, calculated as:

$$Net\,Sale\,Trades_{i,j,w,t} = log(1 + \#Sales)_{i,j,w,t} - log(1 + \#Purchases)_{i,j,w,t}, \quad (1)$$

where $\#Sales$ ($\#Purchases$) is the number of sales (purchases) executed by insider i in week w of year t around environmental lawsuit j. Similarly, we define two other variables that incorporate the volume and value of shares in the transaction as follows:

$$Net\,Shares\,Sold_{i,j,w,t} = log(1 + Shares\,Sold)_{i,j,w,t} - log(1 + Shares\,Purchased)_{i,j,w,t}, \quad (2)$$

[5]One disadvantage of using net sales ratio, particularly in our context, is that when either purchases or sales equal zero, the variable only takes the values of -1 or 1. Consider the following example. An insider sells 500 shares and does not purchase any shares during a week. The net sales ratio would be $\frac{500-0}{500+0} = 1$, while our log difference measure would be $log(1+500) + log(1+0) \approx 2.7$. Our results remain qualitatively unchanged if we employ the standard net sales ratio instead of our log difference measures.

$$Net\,Value\,Sold_{i,j,w,y} = log(1 + Value\,Sold)_{i,j,w,y} - log(1 + Value\,Purchased)_{i,j,w,y}, \tag{3}$$

where $Shares$ ($Value$) indicates the number of shares (total values of shares) sold or purchased during the week. Table 2, Panel C presents some summary statistics for the main variables in our model. From the total of 18,594 weeks, insiders only trade (buy or sell) in 1,230 weeks, with a mean $Net\,Sale\,Trades$ value of 0.172. Similarly, the means for the variables $Net\,Shares\,Sold$ and $Net\,Value\,Sold$ are 0.295 and 0.441, respectively, suggesting greater selling than buying on overall. This pattern is consistent with the U.S. setting, where insiders are generally net sellers. The mean values for our insider trading measures are higher in Weeks[–6,–1] compared to other weeks and for top executives compared to other insiders.

3.5 Empirical model

To study insider trading patterns around environmental lawsuits, we estimate the following panel data fixed effects regression:

$$Insider\,Trading_{i,j,w,t} = \beta_{1-6} Environmental\,Lawsuit_{j,[w-6,w-1],t} + \delta_{i,j} + \theta_{w,t} + \varepsilon_{i,j,w,t}, \tag{4}$$

where the dependent variable is one of our three measures of insider trading *Net Sale Trades*, $Net\,Shares\,Sold$, or $Net\,Value\,Sold$, calculated for each insider i and lawsuit j in week w of year t. *Environmental Lawsuit* is a set of six dummy variables for each week preceding the lawsuit filing week. We include insider-lawsuit fixed effects ($\delta_{i,j}$) and week-by-year fixed effects ($\theta_{w,t}$) in all regressions. This event-specific econometric design allows us to track insider trading of the same insider for the same environmental

lawsuit over time.[6] We cluster standard errors at the insider-lawsuit level, which, together with the included fixed effects, reduces concerns related to serial correlation in the residuals that can potentially bias our inferences.

4 Results

We start our empirical analyses by estimating Eq. 4 using our sample of 18,594 weekly observations. The results from these estimations are provided in Table 3. We find that insiders are more likely to execute sale transactions and sell in larger volumes before the lawsuit filing date. Specifically, the coefficients on indicator variables for Week[–3], Week[–4], and Week[–5] are positive and statistically significant at the 10 percent or better significance level in column (1) and statistically significant at the 5 percent or better significance level in columns (2) and (3). These results are consistent with our main hypothesis (H1) and suggest that insiders may have anticipatory knowledge of impending legal actions, prompting them to adjust their trading behavior in the weeks leading up to the filing date. This behavior aligns with the prior evidence on insider trading, where insiders leverage private knowledge to extract economic rents.

[Insert Table 3 around here]

We next test our cross-sectional hypotheses (H2 and H3). First, in Table 4, we estimate a slightly modified version of Eq. 4 and include one dummy variable that equals one if the week in which the insider trades falls within [–6,–1] weeks of the lawsuit filing week, and zero otherwise. We then interact this variable with $Top\,Insider$, an indicator variable that equals one if the insider executing the trade is a top five executive, president, or board chair, and zero for all other insiders. We find that the interaction term (Week[–6,–1] × Top Insider) is positive and significant at the 10 percent or better significance level across all three measures of insider selling behavior,

[6]Since a firm in our sample can have multiple lawsuits over the years, insider-lawsuit fixed effects subsume firm fixed effects. Our results are robust to including firm and insider fixed effects instead of insider-lawsuit fixed effects.

which implies that top executives are more likely to engage in pre-lawsuit selling activity than other insiders. These findings suggest that the level of the corporate insider does indeed play a role in pre-lawsuit trading behavior, which is inconsistent with our null hypothesis (H2). These results also align with the view that top-level insiders, despite facing greater scrutiny, may still trade on superior information regarding the firm's prospects and potential regulatory outcomes.

[Insert Table 4 around here]

To test our second cross-sectional hypothesis (H3), we create three indicator variables that denote the severity of the negative market reaction to environmental lawsuits around the filing date. Our first indicator variable equals one if the CARs are below 0 percent (i.e., negative), and zero otherwise. Table 5 columns (1) and (2) show that the interaction term between this indicator variable and Week[–6,–1] is positive but statistically insignificant across both measures of insider selling activity ($Net\,Sale\,Trade$ and $Net\,Value\,Sold$).[7] Our second indicator variable equals one if the CARs are below -2%, and zero otherwise. Results in columns (3) and (4) of Table 5 show that the interaction term between this indicator variable and Week[–6,–1] is positive but once again statistically insignificant across both measures of insider selling activity. Our third indicator variable equals one if the CARs are below -5%, and zero otherwise. Results in columns (5) and (6) reveal that the interaction term between this indicator variable and Week[–6,–1] is positive and statistically significant at the 10 percent and 5 percent significance levels across the two measures of insider selling activity.

[Insert Table 5 around here]

These findings suggest that insider trading patterns before the filing of environmental lawsuits are influenced by the perceived severity of the lawsuit's economic

[7]For brevity, we do not report the results based on $Net\,Shares\,Sold$, however, results are similar when we use $Net\,Shares\,Sold$.

impact, The interaction term in columns (5) and (6) indicates that insiders are more likely to engage in sales with higher trade values in the weeks leading up to lawsuits associated with larger negative CARs (below -5%). This result is consistent with the view that insiders are motivated to act on material information about lawsuits they anticipate will significantly adversely impact the firm's stock price. At lower levels of perceived severity (e.g., CARs below 0 percent or -2%), the lack of statistical significance suggests that the potential gains from trading on this information are insufficient to outweigh the risks associated with regulatory scrutiny or reputational damage. Overall, the findings in Table 5 provide support for the argument that the economic impact of lawsuits influences insider trading behavior, leading to the rejection of the null hypothesis (H3).

5 Additional Analyses

In this section, we explore whether cross-sectional differences in firms' information environment and corporate culture mediate the pre-lawsuit selling activity.

5.1 The Effect of Reporting Opacity

Financial reporting opacity has previously been shown to influence various aspects of market behavior, including the cost of equity, trading patterns, and the likelihood of stock price crashes. There are several reasons why financial reporting opacity can mediate the pre-lawsuit selling. First, financial reporting opacity amplifies information asymmetry, as firms with less transparent disclosures obscure the ability of external investors to detect or interpret signals related to material events, such as impending environmental lawsuits. Bhattacharya et al. (2003) demonstrate that opacity increases the cost of equity and decreases trading volume by creating barriers to efficient market functioning. In the context of lawsuits, this opacity may increase insiders' informational advantage, as external stakeholders are less equipped to anticipate or price the

financial risks associated with pending legal actions. Opacity is also strongly correlated with the prevalence of informed trading, as evidenced by Maffett (2012). This relationship indicates that opaque firms facilitate opportunities for insiders to engage in private, economically significant transactions. Furthermore, Hutton et al. (2009) associate opacity with higher R^2 values and greater stock price crash risk, reflecting a tendency for opaque firms to conceal adverse news until it triggers dramatic market corrections.

Given the above line of reasoning, we examine how financial reporting opacity influences pre-lawsuit insider selling patterns and expect a positive association between the two. To gauge financial reporting opacity, we follow Callen et al. (2020) and use the absolute value of the performance-adjusted discretionary accruals, estimated separately for each industry (two-digit SIC code) and year group separately (see, Kothari et al., 2005). The results for this specification are reported in Table 6. The main variable of interest is the interaction term between Week[–6,–1] and *Reporting Opacity*. The results show that the coefficient on the interaction term is positive and statistically significant at the 1 percent level in all three columns. These findings indicate that opacity amplifies the extent to which insiders engage in opportunistic trading before the filing of environmental lawsuits. The results also align with prior literature, such as Maffett (2012), which emphasizes the role of opaque information environments in facilitating informed trading.

[Insert Table 6 around here]

5.2 The Effect of Corporate Integrity Culture

Corporate culture has gained significant academic attention in recent years. Graham et al. (2022) survey executives in the U.S. and find that the majority value corporate culture and believe that strengthening it will lead to an increase in firm value. The strength of corporate culture, particularly its integrity dimension, can have implica-

tions for corporate behavior, governance, and performance. There are several reasons why a strong culture of integrity can mediate pre-lawsuit insider selling. First, a corporate culture rooted in integrity promotes ethical behavior and reduces the likelihood of opportunistic actions by insiders. For instance, Biggerstaff et al. (2015) show that firms led by unethical CEOs are more likely to engage in corporate misbehavior, including financial fraud and acquisitions designed to obscure misconduct. This suggests that a lack of ethical grounding in corporate culture can facilitate opportunistic and self-serving behaviors, such as pre-lawsuit insider trading.

A strong integrity culture has also been shown to enhance firms' financial stability and stakeholder trust. Bao et al. (2024) find that firms with strong integrity cultures experience higher credit ratings by reducing financial risk and signaling creditworthiness. This finding implies that ethical corporate environments may disincentivize insiders from exploiting private information, as such behavior could undermine the firm's long-term credibility and market position. Similarly, Biggerstaff et al. (2015) show that executives with poor ethical behavior, as evidenced by prior legal infractions, are more likely to perpetrate fraud and create a loose control environment, which increases the propensity for financial misreporting. Ethical leadership, in contrast, can set a tone that mitigates such risks and creates an environment where pre-lawsuit insider trading may be less likely to occur. Following these studies, we predict that a strong integrity culture reduces pre-lawsuit selling.

To measure integrity culture, we rely on the machine-learning-based measure of corporate culture introduced by Li et al. (2021). Specifically, we create an indicator variable, $Strong\,Integrity\,Culture$, that equals one if the firm is in the top tercile of the integrity dimension of corporate culture in a given year, and zero otherwise. We interact this variable with Week[–6,–1] and report the results in Table 7. The coefficient on the interaction term is negative and statistically significant in all three columns, indicating that insiders in firms with more integrity-oriented corporate cultures are

less likely to engage in pre-lawsuit selling behavior. These findings underscore the important role of corporate culture, particularly its integrity dimension, in shaping ethical behavior and deterring opportunistic insider activity.

[Insert Table 7 around here]

6 Conclusions

Our study examines insider trading behavior in the weeks leading up to environmental lawsuit filings. Using an event-specific econometric approach, we document several key findings. First, insiders engage in significant pre-lawsuit selling, especially top executives, indicating opportunistic trading driven by private information. Second, this behavior is more pronounced when lawsuits are associated with severe ex-post market reactions, suggesting that insiders trade based on the anticipated materiality of the lawsuits. Third, firms operating in opaque financial reporting environments exhibit heightened insider trading while firms with strong corporate integrity cultures demonstrate reduced pre-lawsuit selling.

Our findings carry some important implications for regulatory and corporate policy. Enhanced transparency through stricter financial reporting standards may help reduce opportunistic insider trading in the context of material legal events. Additionally, promoting and reinforcing a culture of integrity within firms can serve as an internal mechanism to curb such behavior. Policymakers might consider strengthening corporate governance frameworks that emphasize ethical leadership and accountability, while regulatory authorities could intensify oversight in firms with known opacity risks to safeguard market integrity. Together, these measures can contribute to reducing information asymmetry and ensuring fairer markets.

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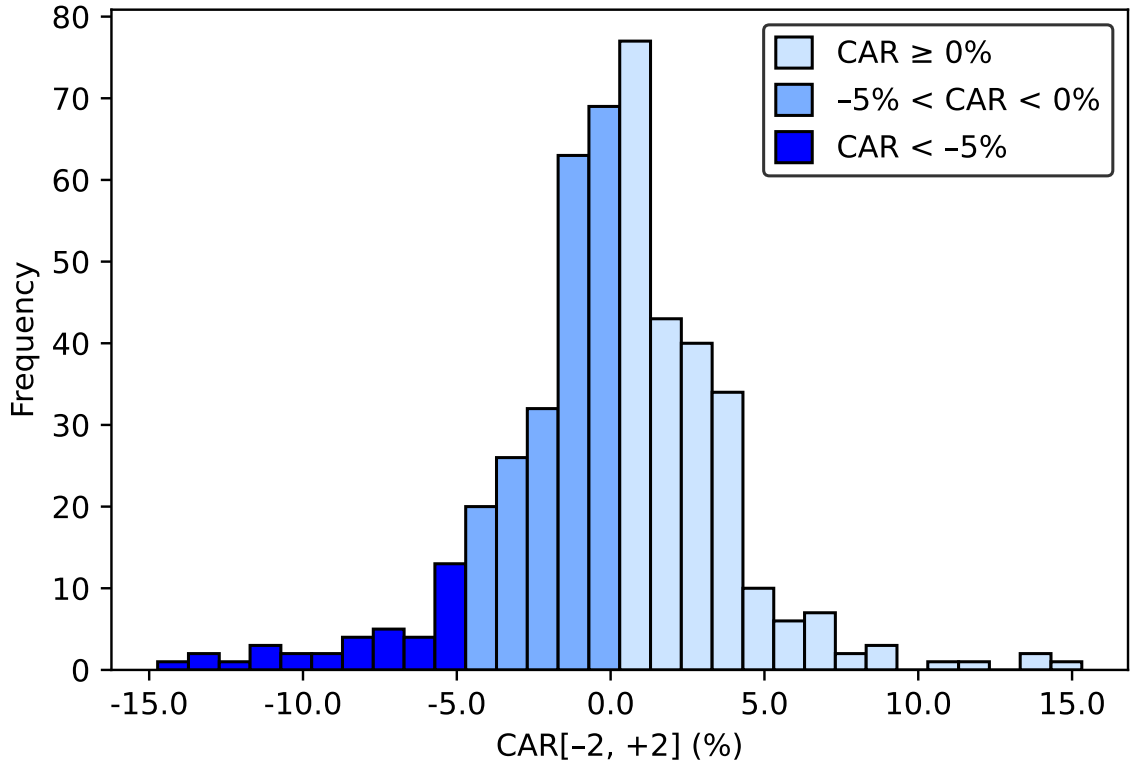
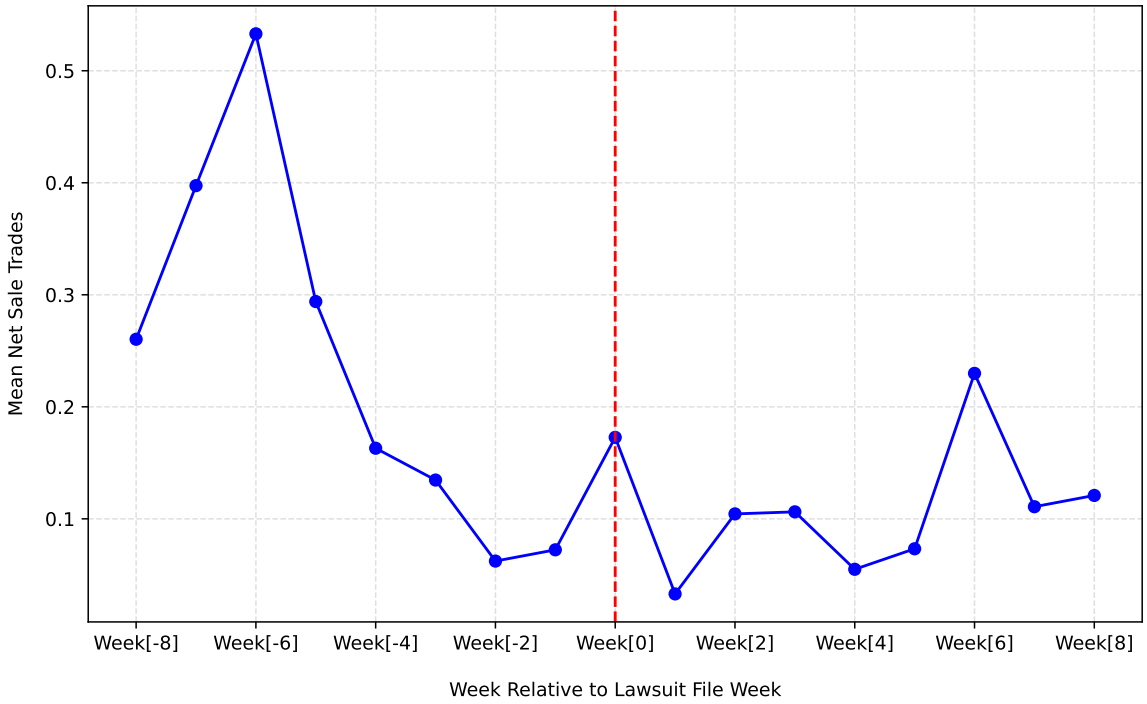
Figure 1: Histogram of CARs Around Environmental Lawsuit Filing Date



This figure plots the histogram of cumulative abnormal returns (CARs) around the filing date of environmental lawsuits. The sample contains 474 environmental lawsuits filed against 194 unique S&P 1500 firms during 2003-2020. CARs are cumulative market-adjusted returns over -2 and +2 days of the event date.

Figure 2: Insider Trading Activity Around Environmental Lawsuit Filing



This figure shows the average $Net\,Sale\,Trades$ $(\#Sales - \#Purchases)$ executed by an insider during the weeks around the environmental lawsuit filing date. Week[0] represents the week of the environmental lawsuit filing date.

Table 1: Sample Selection

Description	Count
Total environmental lawsuits on PACER filed between 2003-2020	15,883
Less: Lawsuits not filed against S&P 1500 firms	(14,546)
Less: Lawsuits filed against Exxon Mobil in 2006	(138)
Less: Multiple lawsuits filed on the same date against the same firm	(102)
Less: Lawsuits for which there is no stock data on CRSP	(195)
Less: Lawsuits for which there is no insider trading data on 2iQ	(428)
Final sample of environmental lawsuits	474
Final weekly insider trading sample	18,594
Comprising:	
Unique firms	194
Unique insiders	757

Notes. This table presents our sample selection procedure. Data on environmental lawsuits, insider transactions, and stock returns are obtained from the PACER database, 2iQ Research, and CRSP, respectively.

Table 2: Descriptive Statistics

Panel A: Number of Environmental Lawsuits by Year

Year	All S&P 1500	Our Sample
2003	68	25
2004	62	31
2005	65	38
2006	45	23
2007	66	37
2008	61	29
2009	54	32
2010	83	47
2011	59	39
2012	43	24
2013	56	31
2014	43	32
2015	40	21
2016	29	19
2017	39	26
2018	29	13
2019	29	16
2020	31	8
Total	902	491

Panel B: Market Reaction to Environmental Lawsuits

Variable	Sample	Obs.	Mean	SD	Min	p25	Median	p75	Max
CAR[–2, +2]	All S&P 1500	902	-0.314	4.264	-30.261	-1.92	-0.021	1.692	15.316
CAR[–2, +2]	Our Sample	491	-0.065	3.656	-14.725	-1.727	0.081	1.788	15.316

Panel C: Summary Statistics for Main Variables

Variable	Total Weeks	Trade Weeks	$Net\,Sale\,Trades$ (Mean)	$Net\,Shares\,Sold$ (Mean)	$Net\,Value\,Trades$ (Mean)
Full Sample	18,594	1,230	0.172	0.295	0.441
Week[–6,–1]	6,552	425	0.210	0.308	0.454
Other Weeks	12,042	805	0.151	0.288	0.434
Top Insiders	2,805	219	0.713	0.327	0.496
Other Insiders	15,789	1,011	0.076	0.289	0.431
Dummy CARs $\geq 0\%$	9,324	630	0.265	0.343	0.508
Dummy CARs $< 0\%$	9,270	600	0.078	0.247	0.374
Dummy CARs $< -2\%$	4,077	263	0.092	0.222	0.336
Dummy CARs $< -5\%$	1,552	103	0.054	0.117	0.202

Notes. This table presents various descriptive statistics for our sample. Panel A shows the number of lawsuits by year and sample type. Panel B displays the summary statistics for the CARs around the environmental lawsuit filing date. Panel C presents summary statistics for main variables in our sample.

Table 3: Baseline Results

Dependent variable:	Net Sale Trades (1)	Net Shares Sold (2)	Net Value Sold (3)
Week[–6]	-0.002	-0.062	-0.084
	(-0.25)	(-0.74)	(-0.68)
Week[–5]	0.022**	0.184**	0.274**
	(2.55)	(2.43)	(2.49)
Week[–4]	0.027**	0.224***	0.327***
	(2.42)	(2.81)	(2.86)
Week[–3]	0.018*	0.166**	0.247**
	(1.75)	(2.05)	(2.12)
Week[–2]	0.008	0.079	0.110
	(0.97)	(1.11)	(1.08)
Week[–1]	0.004	0.059	0.089
	(0.51)	(0.84)	(0.87)
Constant	0.030***	0.257***	0.384***
	(15.30)	(16.50)	(17.23)
Insider × Lawsuit FE	Yes	Yes	Yes
Week × Year FE	Yes	Yes	Yes
Adjusted R^2	0.111	0.076	0.077
Observations	18,594	18,594	18,594

Notes. This table reports our baseline regression results. The sample includes weekly trading patterns of all insiders in firms facing environmental lawsuits during 2003-2020. $Net\,Sale\,Trades$ is the logged number of sales minus purchases in a week. $Net\,Shares\,Sold$ is the logged number of shares sold minus purchased in a week. $Net\,Value\,Trades$ is the logged value of shares sold minus purchased in a week. Week[–6] to Week[–1] are indicator variables for each week preceding the environmental lawsuit filing week. We report t-statistics based on robust standard errors clustered at the insider-lawsuit level in parentheses. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Table 4: Trading Patterns by Insider Level

Dependent variable:	Net Sale Trades (1)	Net Shares Sold (2)	Net Value Sold (3)
Week[–6,–1]	0.008	0.076*	0.116*
	(1.46)	(1.74)	(1.84)
Top Insider	0.101	1.350**	1.998**
	(1.47)	(2.37)	(2.55)
Week[–6,–1] × Top Insider	0.027*	0.221**	0.299*
	(1.94)	(1.99)	(1.95)
Constant	0.015	0.053	0.083
	(1.38)	(0.61)	(0.69)
Insider × Lawsuit FE	Yes	Yes	Yes
Week × Year FE	Yes	Yes	Yes
Adjusted R^2	0.111	0.077	0.078
Observations	18,594	18,594	18,594

Notes. This table reports our baseline regression results by Insider Level. The sample includes weekly trading patterns of all insiders in firms facing environmental lawsuits during 2003-2020. $Net\,Sale\,Trades$ is the logged number of sales minus purchases in a week. $Net\,Shares\,Sold$ is the logged number of shares sold minus purchased in a week. $Net\,Value\,Trades$ is the logged value of shares sold minus purchased in a week. $Week[-6,-1]$ is an indicator variable that equals one if the weekly observation is within $[-6,-1]$ of the lawsuit filing week, and zero otherwise. $Top\,Insider$ is an indicator that equals one if the insider is a top five executive, president, or chairman of the board, and zero otherwise. We report t-statistics based on robust standard errors clustered at the insider-lawsuit level in parentheses. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Table 5: Trading Patterns by Severity of Lawsuit

Dependent variable:	Net Sale Trades (1)	Net Value Sold (2)	Net Sale Trades (3)	Net Value Sold) (4)	Net Sale Trades (5)	Net Value Sold (6)
Week[–6,–1]	0.010	0.095	0.010*	0.122*	0.010*	0.123*
	(1.52)	(1.19)	(1.70)	(1.77)	(1.77)	(1.90)
Dummy CARs $< 0\%$	-0.041	-1.006				
	(-1.50)	(-1.62)				
Week[–6,–1] $\times$ Dummy CARs $< 0\%$	0.004	0.137				
	(0.49)	(1.31)				
Dummy CARs $< -2\%$			-0.017	-0.196		
			(-0.93)	(-0.58)		
Week[–6,–1] $\times$ Dummy CARs $< -2\%$			0.010	0.182		
			(0.97)	(1.46)		
Dummy CARs $< -5\%$					-0.035	-0.897
					(-0.87)	(-1.11)
Week[–6,–1] $\times$ Dummy CARs $< -5\%$					0.030*	0.466**
					(1.65)	(2.44)
Constant	0.050***	0.885***	0.034***	0.427***	0.033***	0.459***
	(3.62)	(2.84)	(7.27)	(5.48)	(8.54)	(6.43)
Insider $\times$ Lawsuit FE	Yes	Yes	Yes	Yes	Yes	Yes
Week $\times$ Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.111	0.077	0.111	0.077	0.111	0.077
Observations	18,594	18,594	18,594	18,594	18,594	18,594

Notes. This table reports our baseline regression results by the severity of the lawsuit. The sample includes weekly trading patterns of all insiders in firms facing environmental lawsuits during 2003-2020. $Net\,Sale\,Trades$ is the logged number of sales minus purchases in a week. $Net\,Shares\,Sold$ is the logged number of shares sold minus purchased in a week. $Net\,Value\,Trades$ is the logged value of shares sold minus purchased in a week. $Week[-6,-1]$ is an indicator variable that equals one if the weekly observation is within $[-6,-1]$ of the lawsuit filing week, and zero otherwise. Dummy CARs $< 0\%$ is an indicator that equals one if the CARs around the environmental lawsuit filing date is negative, and zero otherwise. Dummy CARs $< -2\%$ and Dummy CARs $< -5\%$ are indicator variables that equal one if the CARs are below -2% and below -5%, respectively, and zero otherwise. We report t-statistics based on robust standard errors clustered at the insider-lawsuit level in parentheses. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Table 6: The Effect of Reporting Opacity

Dependent variable:	Net Sale Trades (1)	Net Shares Sold (2)	Net Value Sold (3)
Week[–6,–1]	0.003	0.025	0.046
	(0.42)	(0.46)	(0.59)
Week[–6,–1] × Reporting Opacity	0.131***	1.164***	1.607***
	(3.47)	(3.57)	(3.50)
Constant	0.029***	0.245***	0.369***
	(14.38)	(15.57)	(16.38)
Insider × Lawsuit FE	Yes	Yes	Yes
Week × Year FE	Yes	Yes	Yes
Adjusted R^2	0.126	0.083	0.085
Observations	17,472	17,472	17,472

Notes. This table reports the regression results for the effect of reporting opacity on insider trading patterns before environmental lawsuits. The sample includes weekly trading patterns of all insiders in firms facing environmental lawsuits during 2003-2020. $Net\,Sale\,Trades$ is the logged number of sales minus purchases in a week. $Net\,Shares\,Sold$ is the logged number of shares sold minus purchased in a week. $Net\,Value\,Trades$ is the logged value of shares sold minus purchased in a week. $Week[-6,-1]$ is an indicator variable that equals one if the weekly observation is within $[-6,-1]$ of the lawsuit filing week, and zero otherwise. *Reporting Opacity* is the absolute value of performance-adjusted discretionary accruals. We report t-statistics based on robust standard errors clustered at the insider-lawsuit level in parentheses. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Table 7: The Effect of Corporate Integrity Culture

Dependent variable:	Net Sale Trades (1)	Net Shares Sold (2)	Net Value Sold (3)
Week[–6,–1]	0.022***	0.185***	0.265***
	(3.44)	(3.54)	(3.58)
Week[–6,–1] × Strong Culture	-0.019*	-0.154*	-0.204*
	(-1.74)	(-1.85)	(-1.70)
Constant	0.027***	0.230***	0.346***
	(12.90)	(13.90)	(14.62)
Insider × Lawsuit FE	Yes	Yes	Yes
Week × Year FE	Yes	Yes	Yes
Adjusted R^2	0.118	0.084	0.084
Observations	16,722	16,722	16,722

Notes. This table reports the regression results for the effect of corporate integrity culture on insider trading patterns before environmental lawsuits. The sample includes weekly trading patterns of all insiders in firms facing environmental lawsuits from 2003 to 2020. $Net\,Sale\,Trades$ is the logged number of sales minus purchases in a week. $Net\,Shares\,Sold$ is the logged number of shares sold minus purchased in a week. $Net\,Value\,Trades$ is the logged value of shares sold minus purchased in a week. $Week[-6,-1]$ is an indicator variable that equals one if the weekly observation is within $[-6,-1]$ of the lawsuit filing week, and zero otherwise. $Strong\,Integrity\,Culture$ is an indicator variable that equals one if the firm is in the top tercile of the integrity dimension of corporate culture based on Li et al. (2021), and zero otherwise. We report t-statistics based on robust standard errors clustered at the insider-lawsuit level in parentheses. Levels of significance are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Appendix A

Figure A1: Example Environmental Lawsuit from PACER Database

1:07-cv-00735-GJQ United States of America v. ArvinMeritor, Inc.
Gordon J. Quist, presiding
Date filed: 07/30/2007
Date terminated: 10/11/2007
Date of last filing: 10/11/2007

Case Summary

Office: Southern Division (1)	**Filed:** 07/30/2007	
Jury Demand: None	**Demand:**	
Nature of Suit: 893	**Cause:** 42:9613 Environmental Matters	
Jurisdiction: U.S. Government Plaintiff	**Disposition:** Judgment - Judgment on Consent	
County: Oakland	**Terminated:** 10/11/2007	
Origin: 1	**Reopened:**	
Lead Case:	None	
Related Case:	None	**Other Court Case:** None
Defendant Custody Status:		
Flag: CLOSED		