Do Traders Front-Run News?
Evidence From Form 8-K Disclosures of Class Action Lawsuit Settlements

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Using a novel and unique dataset of class action settlement announcements from Form 8-K disclosures as a proxy for private information, we tested whether traders front-run on the announcements and whether traders capture cumulative abnormal return (CAR) surrounding the disclosures. Although overall volume does rise, there is no statistically significant evidence of front-running Form 8-K disclosures and no CAR surrounding the disclosures. This study, nonetheless, contributes to the literature by providing further evidence from a new dataset of class action litigation settlements that there is no front-running of news. The findings contribute to the contrary – albeit less popular – collection of studies that show traders do not have access to private information upon which to exploit through front-running to capture CAR.

Keywords: class action lawsuit settlements, event study, front-running, cumulative abnormal returns

INTRODUCTION

Traders who front-run – trade before – public disclosures (of previously private information) can capture abnormal returns at the expense of other market participants. Front-running from appropriated private information provides an unfair advantage over other investors. The information asymmetry – greater knowledge of relevant information – allows a party who possesses the information to exploit others. This leads to an adverse selection problem that creates inefficient capital allocation (Harris 2003).

Front-running presupposes traders have access to private information. However, previous studies have been inconclusive regarding whether traders actually have such access to private information upon which to front-run other market participants (Daske et al. 2005; Daske et al. 2006; Engelberg et al. 2012; Boehmer et al. 2020). There are few empirical studies regarding front-running because of the difficulty to directly test in the absence of available data (Chen et al. 2008). This paper provides a new mechanism to test whether private information is used for front-running through an examination of trading in the context of Form 8-K disclosures of class action lawsuit settlements. This study seeks to answer whether traders trade on private information.

Class action lawsuit settlement disclosures are ideal to determine whether traders obtain access to private information upon which to front-run. Class action lawsuit settlements are events that can provide opportunistic profiting, tempting some market participants to exploit private information. After all, litigation inherently involves private information, particularly between the parties. At the beginning of a

lawsuit, each side possesses information asymmetry against the other. Litigation facilitates a process of exchanges through discovery whereby opposing parties gain information possessed by the other side. Settlement results when information asymmetry is reduced. The parties gain sufficient information about their case and their opponent's case to reach a mutually agreeable valuation.

Information asymmetry is the basis upon which the respective parties formulate and reformulate the value of a case. Litigants have a great incentive to maintain favorable information asymmetry to preserve their respective settlement postures. Information about settlements is inherently private and closely guarded because any leak would compromise the potential settlement, its terms, or value.

The media, analysts, and investors generally monitor developments of class action lawsuits. Although settlements are highly anticipated, the exact timing of the announcements and the amounts to be paid are not readily predictable. Some traders – particularly short sellers – are sophisticated investors, but they are unlikely to do any better. Post-announcement trading would not provide any abnormal return from the public information because all investors possess the same information. If they have access to litigation private information, traders need to front-run settlement disclosures to exploit the adverse selection problem and capture outsized gains. Therefore, there is a strong implication that any front-running of Form 8-K disclosures of class action settlements derives from access to private information. Conversely, a lack of front-running implies no access of private information by traders.

This paper compiled a novel and unique dataset of class action settlement announcements from Form 8-K disclosures to use as a proxy for private information. A review of the Securities and Exchange Commission Electronic Data Gathering, Analysis, and Retrieval system (SEC EDGAR) from January 1, 2012 to December 31, 2021 provided a dataset of 327 disclosures. The events from the dataset were then evaluated with the daily short selling volume data provided by the Financial Industry Regulatory Authority (FINRA), which makes data available to the public by all self-regulatory organizations (SROs) and stock exchanges. From the databases, we are able to test whether traders truly gain private information to front-run Form 8-K disclosures.

Furthermore, this study explores whether traders capture abnormal returns from front-running the Form 8-K disclosures. Short interest volume and cumulative abnormal return are analyzed. Any shorting activity on private information is measured by increases of short interest volume immediately before the disclosures. Cumulative abnormal returns are measured around the disclosure events. This paper examines a prime front-running opportunity – settlements of class action lawsuits – to determine whether traders do gain access to private information upon which to exploit. The findings of the study are valuable to other market participants as well as regulators who continually grapple with leveling the playing field.

BACKGROUND

The SEC tries to maintain a level playing field by mandating timely disclosures. The intent of the regulation is to provide equal information access to all investors. Otherwise, a select subset of investors will benefit at the expense of the greater market. Firms are required to file Form 8-K public disclosures within 4 days of "material" events. Information is material if it would have an impact on profits or a line item in the financial statements, or if its absence would influence users of financial statements. Settlements of class action lawsuits reported as contingent liabilities are considered "material" events.

Class action lawsuits allow a representative plaintiff or plaintiffs to sue on behalf of an entire group (class) of other plaintiffs based on 4 general criteria: 1) numerosity, usually greater than 40 plaintiffs in the class; 2) commonality, common issues that will be resolved for all class members; 3) typicality, solving the claims of the named plaintiffs will likewise solve claims for the class members; and 4) adequacy of the class representative and counsel. Class action lawsuits usually involve hundreds of class members and tens of millions of dollars in amounts in controversy. Settlements are mutual agreements between the parties to forgo trial and end lawsuits.

Generally Accepted Accounting Principles (GAAP) require lawsuits to be reported as contingent liabilities in financial statements if 1) it is possible to estimate the value of the contingent liability and 2) there is a greater than 50% chance of realization. Three GAAP reporting categories are stipulated: 1)

"probable," which meets both of the above reporting requirements and is required to be disclosed; 2) "possible," which should be disclosed in a footnote; and 3) "remote" (e.g., a frivolous lawsuit), which need not be disclosed. Firms comply with SEC regulation by announcing settlements in Form 8-K disclosures within 4 days of the "material" event. Such settlement disclosures cannot wait to update the underlying lawsuit contingent liabilities in Form 10-K (annual) or Form 10-Q (quarterly) financial statement filings. Because class action lawsuits usually involve many plaintiffs leading to larger alleged damages and their settlements usually involve tens to hundreds of millions of dollars, disclosures of class action lawsuit settlements usually result in downward pressure on firm stock prices.

Class action lawsuits are contingent liabilities that may affect the financials of a firm. They are "material" and need to be disclosed when the liability is probable (greater than 50%) and the amount of the liability is reasonably calculated. If the potential is 50% or less or the amount is not calculatable, then the contingent liability may be disclosed at the discretion of management in a footnote of the financial statements. Class action lawsuits are first disclosed in firm financial reports when they are "material." Investors react to the news. Stock prices of a firm adjust to reflect the contingent liability over time until the final realization of a settlement, if any, in a Form 8-K disclosure. The event focus of this study is on the disclosures of class action settlements because they are the first publication of previously private information.

Negative disclosures provide opportunities for traders, particularly short sellers, if they can time trades prior to the disclosures. However, settlements are inherently private information. The parties to lawsuits have asymmetric litigation information. To preserve their litigation posture, they want to safeguard their respective private information up to the very moment of settlement or the conclusion of trial. It is highly unlikely for anyone without access to private information to guess the timing of settlement disclosures. Therefore, any consistent anticipation of impending negative announcements from settlements before Form 8-K disclosures is evidence of access to private information. Traders are trading on private information if they front-run Form 8-K disclosures of class action settlements.

LITERATURE REVIEW

The notion that sophisticated investors have an advantage over average market participants is intuitive. They have greater experience, resources, and networks. Therefore, sophisticated investors can use their informed knowledge of events to front-run trades.

Short selling is generally viewed as an advanced contrarian investment strategy to be exercised by experienced, knowledgeable investors. There are higher margin requirements. Short sellers are required to borrow shares (usually from a broker) to first sell on the open market. The hope is to later buy back the shares at a lower price to make a profit even after paying interest on the borrowed shares. There are greater risks in short selling. The downside risk is theoretically unlimited – not capped at the amount of the investment – because the price of the shorted stock could keep increasing. The short seller may get caught in a short squeeze where a stock rises so precipitously that short sellers are forced to buy back shares to avoid further losses or to meet margin calls. But the continuing buying fuels further price appreciation.

In general, traders who possess asymmetric information may exploit the adverse selection problem at the expense of others and the market. However, the literature is inconclusive. It has not explored front-running by traders in the litigation context.

Front-Running

Front-running has few studies due to limited data and inherently uncooperative participants to allow for direct testing. Nevertheless, studies have creatively used indirect data to find that short sellers front-run other investors before insider sales (Khan and Lu 2013), in syndicated lending (Massoud et al. 2011), in family-controlled firms (Anderson et al. 2012), in private placements with hedge fund involvement (Berkman et al. 2016), Securities and Exchange Commission enforcement actions regarding financial statement misrepresentations (Karpoff and Lou 2010), and Food and Drug Administration decisions (Bosch and Lee 1994; Reeb et al. 2014). Berkman and Eugster (2017) found that short sales rise substantially in

the days prior to drug development announcements from pharmaceutical firms when the announcements were most negative and none or less pronounced when the announcements were most positive. Huang et al. (2021) found that short sellers front run "going concern" disclosures issued by firm auditors from both public and private information. Short sellers have been shown to enjoy an informational advantage (Engelberg et al. 2012).

Conversely, using proprietary audit trail transaction data, Chakravarty and Li (2003) found that dual traders at the Chicago Mercantile Exchange do not engage in front-running. Christophe et al. (2004) found that traders do not trade ahead of earnings announcements. Christophe et al. (2010) found that traders do not trade ahead of analyst downgrades. Daske et al. (2005 and 2006) found no concentration of short sales prior to bad news events. Engelberg et al. (2012) found from their sample that the highest volume of short selling occurs on the day of – rather than prior to – a negative news announcement. These findings imply no front-running.

Short Selling

Short sellers are informed traders who seek to profit from anticipated future stock price drops. Short of corporate insiders, they are widely considered by researchers and practitioners to be sophisticated traders skilled at evaluating information about firms (e.g., Boehmer et al. 2008; Engelberg et al. 2012). They are found to predict adverse earnings announcements (Christophe et al. 2004; Christophe and Hsieh 2020), earnings restatements (Dedai et al. 2006), financial misrepresentations (Karpoff and Lou 2010), accounting restatements (Desai et al. 2006; Drake et al. 2015), analyst downgrades (Christophe et al. 2010), and bond rating downgrades (Henry et al. 2015). They are found to be more informed than analysts (Drake et al. 2011). They have better predictive abilities than analysts (Boehmer et al. 2020). Conversely, Daske et al. (2005 and 2006) found that short sellers are not able to predict negative news events.

Short sellers are found to be able to predict future stock price drops from either 1) evaluating negative public information better than others (Engelberg et al. 2012) or 2) gaining access to private information (Boehmer et al. 2020). They can then further exploit their advantage by trading ahead of others.

Form 8-K Disclosures

Information asymmetry between managers and market participants reduces market liquidity (Blankespoor et al. 2014). Public disclosures reduce information asymmetry and restore market liquidity (Beyer 2010). The Securities Act of 1934 requires publicly traded firms to disclose "material" information that affect financials and/or operations between required periodic disclosures through Form 8-K filings. Firms are required to promptly file Form 8-Ks to disclose material information instead of waiting until their next periodic disclosure, such as the quarterly on Form 10-Qs or annual on Form 10-Ks. Unlike Form10-Q and Form 10-K filings that contain indiscernible noise regarding other matters, Form 8-K disclosures are specific to a particular material event such as a settlement. Since August 23, 2004, the SEC rule, ''Additional Form 8-K Disclosure Requirements and Acceleration of Filing Date,'' shortened the requirement for firms to make Form 8-K disclosures of "material" information to within 4 business days of an event. Studies found these filings informative, timely, and helpful for price discovery (McMullin et al. 2019; Lerman and Livnat 2010; Pinsker 2006). The studies regarding Form 8-K disclosures are broad.

There are studies about the general Form 8-K disclosures. Cohen et al. (2015) found that insiders utilize the 4-day discretionary disclosure window to front-run their insider trades. Rawson et al. (2020) looked at Form 8-K disclosures to study managers' strategic use of contemporaneous unrelated announcements events to mitigate Form 8-K disclosures. Ben-Rephael et al. (2019) found that Form 8-K filings may have little direct information value, especially for retail investors. Disclosures are actually publications of previously private information to the public. Staying apprised of disclosures is an active economic endeavor that reveals the inefficiency of pricing disclosures (Blankespoor et al. 2020).

There are studies about the more specific Form 8-K Regulation Fair Disclosure (Reg FD). When an issuer selectively discloses "material" nonpublic information to certain individuals or entities – generally, securities market professionals, such as stock analysts, or large shareholders who may trade on the information – the issuer must also publicly disclose that information to promote full and fair disclosure.

However, Campbell et al. (2020) found that a subgroup of investors trade on "material" information prior to a firm's filing of Form 8-K Reg FD, in contravention of Reg FD's purpose. This study utilizes Form 8-K disclosures to study whether short sellers gain access to private information in the litigation context.

Litigation Asymmetry

Parties to litigation have to make decisions about litigation and settlements under imperfect information. Parties to a lawsuit bring private, asymmetric information about their respective cases. The litigation discovery process allows parties to learn the strengths and weaknesses of the opposing party's case, as well as their own. The majority of cases settle. It is the intent of the liberal rules of discovery contained in the 1938 adoption of the Federal Rules of Civil Procedure that increasing discovery – decreasing information asymmetry – would promote settlements (London 2013).

Two theories attempt to explain the litigation puzzle when parties opt, instead, for trial. Under the asymmetric theory of litigation, one party will reject settlement and opt for trial if it possesses information (which the other party does not possess) that gives it an edge at trial (Bebchuk 1984). Likewise, the divergent expectations theory of litigation posits that settlement negotiations fail when one party is more optimistic about its chances of prevailing at trial (Priest and Klein 1984). Both theories rely on asymmetric information to explain the litigation puzzle.

The settlement process may be analogized to a general bargaining context. The respective parties want to – at least, subjectively – feel that they did not get taken advantage of in the transaction. Pareto efficiency occurs when assets are allocated in the most economically efficient manner – where an economic change will not make one better off at the expense of another. Pareto optimality usually may not be achievable. However, control of information discovery is crucial to facilitate settlements. If one party is unable to persuade the other party that settlement was favorable to it, then the situation may rise to Pareto inefficiency failures (Shavell 1989). A party who feels that the other is gaining at its expense will reject settlement. Therefore, information leakage prior to settlement is highly detrimental.

Adverse Selection

Front-running from acquired private information creates an unfair advantage between the usurper short seller and the uninitiated market participants. An adverse selection problem arises where the short seller possesses asymmetric information to exploit. Undue resources are transferred from the uninitiated to the transgressor. The resulting limited market participation inhibits efficient capital allocation (Harris 2003).

HYPHOTHESES

Evidence of traders trading on private information cannot be directly observed. Class action settlements are a viable proxy for private information because they are inherently private until the date of the Form 8-K disclosures. We therefore test: 1) whether traders actually have access to private information, as manifested through timely front-running of disclosures; and 2) whether traders profit from front-running.

Disclosures of class action settlements should cause the respective firm stock prices to decline. If traders have knowledge of the impending settlement disclosures (private information), then they will front-run the negative news by selling short.

H1: There is abnormal front-running short selling volume before Form 8-K disclosures of class action lawsuit settlements.

Upon Form 8-K disclosures of class action lawsuit settlements, firm stock prices are affected upon announcement. Markets react negatively to class action settlements because their disclosures are the first instances of the negative private information coming to light. Their disclosures lead to negative abnormal returns – size-adjusted returns (Bradshaw et al. 2006) – in firm stock prices. Traders who front-run Form 8-K disclosures should profit from the endeavor.

H2: Traders capture cumulative abnormal return from front-running Form 8-K disclosures.

DATA

The paper gathers Form 8-K disclosures of class action settlements events from the 10-year period of January 1, 2012 to December 31, 2021. Daily short selling volume data is publicly available for NYSE and NASDAQ-listed stocks through the Financial Industry Regulatory Authority (FINRA) at FINRA.org. Daily stock prices, returns, volume, and shares outstanding are obtained from the Center for Research in Security Prices (CRSP).

We searched Form 8-K disclosures on the SEC EDGAR database as well as the Wharton Research Data Services (WRDS) database for "class action," "settlement," and "material definitive agreement." The SEC defines a "material definitive agreement" as an agreement that creates obligations material to and enforceable against the firm, or rights that are material to the firm and enforceable by the firm against counterparties to the agreement.

Traders with knowledge of private information would front-run the disclosure date to maximize abnormal returns. Because the estimation window is 6 months prior to the 30-day test window, for multiple Form 8-K disclosures within 7 months for the same firm, we use the earliest announcement of a settlement because that is the first public notice. Subsequent notices could be anticipated from the already public information. I include ancillary settlements, such as settlements with opt-out class members. Likewise, we choose the date of disclosure of a proposed settlement even if the court approves the settlement at a later date. In rare cases where the court rejects a proposed settlement, we also include the date of disclosure of the subsequently accepted settlement. Some disclosures specify reserves established in anticipation of settlement or reveal amounts associated with previously disclosed settlements. They are treated like a settlement disclosure due to the information revealed.

Some disclosures have unspecified settlement amounts, only state that a settlement has been reached "in principle," or only contain partial non-monetary settlement terms. Nevertheless, they may still induce short selling due to anticipated negative effects to the firms. The unspecified or "in principle" settlement disclosures provide even better tests of whether short sellers possess private information because the traders are trading on underlying terms that are still undisclosed to the public.

Over 6,000 EDGAR and WRDS search results for Form 8-K disclosures of class action settlements for the 10 years, 2012 to 2021. We obtained 349 potential events. The initial dataset was curtailed to 327 Form 8-K filings by publicly traded firms with short seller volume data disclosing class action settlements without obvious confounding events, such as quarterly earnings announcements. We then manually reviewed for any negative news during the disclosure windows that may confound short sales results. Upon further examination, other confounding events were found to exclude more firms. For multiple events, the subsequent events were discarded. Last, events were culled to provide equal numbers among the disclosure windows for comparison. We ultimately ended up with 253 events to test.

EVENT STUDY

We followed the methodology delineated by MacKinlay (1997) and Campbell et al. (1997, Ch. 4) and used by Khan and Luu (2013). We used the event studies methodology with ordinary least squares (OLS) regressions to analyze the daily short sales volume surrounding Form 8-K disclosures of class action lawsuit settlements. The variables are: 1) events of the dates of Form 8-K disclosures of class action settlements, 2) daily short selling volume, 3) daily stock prices, and 4) controls. The event – day 0 – is the day that the Form 8-K announcement is disclosed. That is the day of public dissemination of the previously private information.

Because we test for front-running, the pre-disclosure window is the 1 month [-30, -1] trading day window before the Form 8-K disclosure of class action lawsuit settlements. We chose a larger number of days for the pre-disclosure window [-30, -1] to capture possible early information leaks. The estimation window [-130, -31] – the benchmark level used to estimate the normal or expected level of daily short sales

– is based on the approximately half-year period preceding Form 8-K announcements but excluding the 30 trading days [-30] directly prior to the event day [0]. We winsorized daily short sales at the 1% and 99% levels to remove undue influence by any extreme values on the benchmark levels.

For a particular firm event, short sales is denoted on any day in the event window as $SS_{i,n}$, where i marks the day and possesses any value in [-30, -1] and n marks the firm event. Multiple days are included in the test window because informed short sellers may spread their trades over multiple days to conceal their short position (Christophe et al. 2004; Kyle 1985). Traders may try to conceal their access to private information. Short sales on any day in the estimation window is denoted as $SS_{d,n}$, where d marks the day and possesses any value in [-130, -31]. D is the number of days in the estimation window. The normal or expected level of daily short sales for any firm event, $E(SS_n)$, is calculated as the mean daily short sales in the estimation window:

$$E(SS_n) = \frac{1}{D}\sum_{d-130}^{d-31} SS_{d,n} \tag{1}$$

The variance of abnormal short sales for a given firm event is calculated as:

$$\sigma^2 e_n = \frac{1}{D-1}\sum_{d-130}^{d-31}\{SS_{d,n} - E(SS_n)\}^2 \tag{2}$$

From the above estimates in the estimation window, the abnormal short sales for a given firm event on any day in the event window is calculated as:

$$e_{i,n} = SS_{i,n} - E(SS_n), \qquad i \in [-30,-1] \tag{3}$$

For inferential statistics, abnormal short sales across all firm events for each day in the estimation window is aggregated as:

$$ABNSHORT(e_i) = \frac{1}{N}\sum_{n=1}^{N} e_{i,n}, \qquad i \in [-30,-1] \tag{4}$$

N is the number of firm events (253 class action settlement events for the full sample) and $E_N(e_i)$ is the average abnormal short sales on event day i.

The variance of the average abnormal short sale for day i is calculated as:

$$\sigma[ABNSHORT_N(e_i)] = (\frac{1}{N^2})\sum_{n=1}^{N}\sigma^2(e_n) \tag{5}$$

The equations are estimated for each firm event. Each firm serves as its own control when abnormal short sales are calculated.

Equations (4) and (5) are used to calculate the t-statistic. If abnormal short sales increase before the Form 8-K disclosure of class action settlements and peak on or before the day of the disclosure, then that would evidence that traders have advance knowledge of private information.

Front-Running and Knowledge of Private Information

The dates of Form 8-K disclosures and amounts of settlements should be unknown pre-announcement. In the absence of private information, traders are not able to consistently choose which firms will suffer stock price declines and take speculative positions in the days leading up to the disclosures. Furthermore, traders who possess private information regarding the impending settlements would close their short positions upon disclosure – to fulfill the adage of "buy on the rumor, sell on the news." Short sellers closing their short positions upon Form 8-K disclosures would further support the inference that short sellers are front-running based on that private information, rather than taking speculative short positions for alternative

reasons. Therefore, short sales increase before disclosures but fall below the normal level during the disclosure [0, 1] and post-disclosure [2, 10] event windows.

Front-Running and Capturing Abnormal Return

We examined abnormal stock returns surrounding announcements of class action settlements to assess the profitability, if any, of front-running. We used the Eventus market model to calculate CAR. We examined average cumulative abnormal return (CAR) and the t-statistics in the [-30, -1], [0, 1], and [2, 10] trading day windows around Form 8-K disclosures of class action lawsuit settlements. Abnormal return is size-adjusted. The capital asset pricing model (CAPM) provides daily expected returns as:

$$E\left(R_{i,t}\right) = \alpha_1 + \beta_1 r_{m,t} + \varepsilon_{i,t} \tag{6}$$

α_1 and β_1 are estimated from OLS. $r_{m,t}$ is the daily market return on day t. The event study methodology explores abnormal returns for firms in the event window.

Abnormal return ($AR_{i,t}$) is the difference between actual returns and predicted returns:

$$AR_{i,t} = R_{i,t} - E\left(R_{i,t}\right) \tag{7}$$

CAR is computed by aggregating AR for the relevant periods. For an event period T_1 to T_2:

$$CAR_{i,t} = \sum_{t=T_1}^{T_2} AR_{i,t} \tag{8}$$

We performed a t-test on averaged abnormal return – that averaged abnormal return is different from zero – controlling for firm characteristics. The equation to test H2$_o$ – that there is no CAR – is:

$$\mu_{CAR} = 0 \tag{9}$$

We controlled for the following firm characteristics that may affect CAR:
1. Abnormal volume (ABNVOLUME) – Average daily trading volume in test window divided by the average daily trading volume in estimation window. Stocks with increases in volume may be easier to short.
2. Earnings volatility (EARNINGSVOLATILITY) – The standard deviation of 5 years of net income beginning with the quarter prior to the Form 8-K disclosure. A control for risk in financial returns (Kothari et al. 2002; Prokofieva 2015).
3. Size (SIZE) – Log of market capitalization. External investors are better informed about large firms than small firms (Rajan and Zingales 1995). The market has more information about larger firms (Botosan 1997).
4. Tobin's Q (TOBINQ) – Ratio of equity market value divided by equity book value. A measure of whether the firm stock price (market value) is over or under valued in relation to the replacement value of its assets. A control for growth opportunities (Hope et al. 2009; Kothari et al. 2009; Lee 2012; Blankespoor et al. 2014; Huang et al. 2014).
5. Free cash flow (CASHFLOW) – Net operating profit after taxes minus investment in the quarter.
6. Leverage (LEVERAGE) – Ratio of long-term debt divided by equity. A higher debt ratio may be a good signal that management is positively increasing shareholder wealth or a bad signal of bankruptcy risks (Zmijewski and Hagerman 1981; Leftwisch 1981; McKinlay 1997; Rahman and Debreceny 2010).
7. Profitability (PROFIT) – Ratio of net income over total assets (Hatem 2015).

8. Financial analyst following (ANALYSTS) – The number of analysts following the firm at the end of the quarter of the Form 8-K filing. Financial analysts are intermediaries of information (Hope et al. 2009; Lee 2012). They provide information upon which traders rely on to act.

$$CAR = \alpha_0 + \alpha_1\ ABNVOLUME + \alpha_2\ EARNINGSVOLATILITY + \alpha_3\ SIZE + \alpha_4\ TOBINQ + \alpha_5\ CASHFLOW + \alpha_6\ LEVERAGE + \alpha_7\ PROFIT + \alpha_8\ ANALYSTS + \varepsilon_{i,t} \qquad (10)$$

Pre-disclosure CAR was expected to be significantly negative in the [-30, -1] window for announcements of class action settlements.

RESULTS AND DISCUSSION

We obtained unexpected results. There is no front-running of Form 8-K disclosures of class action lawsuit settlements. Therefore, traders exhibit no knowledge of private information upon which to front-run. Furthermore, there is no profiting during the disclosure windows.

TABLE 1
SUMMARY STATISTICS

	N	Mean	Q1	Median	Q3	Std Dev
CAR	253	.0005	-.0009	.0005	.0017	.0030
ABNVOLUME	253	-.2509	-.7725	-.2471	.1784	.8884
EARNINGSVOLATILITY	253	.1623	.0205	.0488	.1546	.3201
SIZE	253	6.9265	5.4032	6.8432	8.5900	2.4547
TOBINQ	253	1.2153	.4236	.8410	1.5386	1.2657
CASHFLOW	253	-.1039	-.1026	-.0022	.0549	.3215
LEVERAGE	253	.8025	0	.3414	.9052	3.5553
PROFIT	253	-.1253	-.1639	.0060	.0444	.3388
ANALYST	253	8.6047	2	6	13	8.7425
ABNSHORT [-30, -1]	253	.0003	-.0429	-.0007	.0506	.0691
ABNSHORT [0, 1]	253	.1442	-.0831	.0008	.1142	.1523
ABNSHORT [2, 10]	253	.0077	-.0705	.0079	.0807	.1084

Notes: This table presents the summary statistics for variables used in the regression analysis for CAR. All continuous variables are winsorized at the 1st and 99th percentiles. The variables are defined above.

Front-Running and Knowledge of Private Information

Different from what we expected to find, there is no statistically significant evidence of front-running prior to Form 8-K disclosures of class action lawsuit settlements. As a corollary, it may be concluded that there is no access to private information upon which traders acted. Surprisingly, we also found no statistically significant trading during the disclosure or post-disclosure windows. There is movement towards significance in the disclosure ABNSHORT [0, 1] window, but it does not rise above significance. Regardless, any trading post-disclosure are just from traders acting on public information.

The ratio of short sales to total volume do not statistically significantly change in the Form 8-K disclosure windows: ABNSHORT [-30, -1] (pre-disclosure), ABNSHORT [0, 1] (disclosure), and ABNSHORT [2, 10] (post-disclosure).

TABLE 2
ABNORMAL DAILY SHORT SALES AROUND FORM 8-K DISCLOSURES

Event Window	Mean Short Selling	t-stat	p-value
ABNSHORT [-30, -1]	0.0002	0.07	0.947
ABNSHORT [0, 1]	0.0144	1.51	0.133
ABNSHORT [2, 10]	0.0076	1.13	0.261

Notes: This table presents the abnormal daily short sales (as a percentage of total volume) in the ABNSHORT [-30, -1], ABNSHORT [0, 1], and ABNSHORT [2, 10] event windows. Abnormal daily short sales are daily short sales minus the expected daily short sales from the estimation window [-130, -31]. Number of observations: 253.

The results reject the conclusion that short sellers trade on private information during the pre-disclosure, disclosure, or post-disclosure windows.

Front-Running and Capturing Abnormal Return

We also expected that traders capture outsized negative cumulative abnormal return (CAR) from front-running. However, there is no statistically significance evidence of CAR surrounding the Form 8-K disclosures – for market-adjusted returns and market-model abnormal returns on both an equally weighted and value weighted bases.

TABLE 3
REGRESSION ANANLYSIS FOR CUMULATIVE ABNORMAL RETURN (CAR)
AROUND FORM 8-K DISCLOSURES

	Coefficient
ABNVOLUME	-.00034
	(-1.48)
EARNINGSVOLATILITY	-.00005
	(-0.07)
SIZE	.00009
	(0.70)
TOBINQ	.00033**
	(2.09)
CASHFLOW	.00309***
	(3.36)
LEVERAGE	.00006
	(1.07)
PROFIT	-.00289***
	(-3.01)
ANALYSTS	-.00002
	(-0.71)
INTERCEPT	-.00046
	(-0.58)
N	253
R-SQUARED	0.0750

Notes: This table presents the results of estimating Equation (10). T-statistics are in parentheses. *, **, *** indicate significance at less than 10%, 5%, and 1%, respectively. All continuous variables are winsorized at the 1st and 99th percentiles. The variables are defined above.

Cash flow and profitability are statistically significant control variables at the 1% level. Investors seek to optimize their investments. Higher cash flow and profitability provide an alternative reason for investors to purchase firm shares. Conversely, lower cash flow and profitability provide an alternative reason for investors to sell firm shares.

Tobin's Q is a statistically significant control variable at the 5% level. Tobin's Q significance provides a possible alternative reason for traders to sell firm shares on the firm's perceived overvaluation.

R-Squared is the statistical measure of the variance showing the level of the dependent variable (CAR) that is explained by the independent variables in a regression model. The 0.0750 R-Squared finding is very low. The result shows that the intercept, abnormal volume, and control variables explain very little of the CAR.

A surprising finding is that there is consistently a near even split between long and short positions in volume and positive and negative gains in stock prices in the event windows. Possibly, traders with different abilities for processing information may come to different conclusions (positive or negative) about the settlement news and trade in conflicting directions (long or short). Further research could discern the differences.

Limitations and Future Research

Other confounding events that may distort front-running data – such as insider sales, expirations of IPO lockups, expirations of vesting periods, good/bad news announcements, and good/bad social media propagation – are beyond the scope of this of study. Research could further examine differences between monetary and non-monetary settlements. Other types of lawsuits and settlements – more crucial to firm survivability – may lead to front-running. In addition, although settlements are bad news for firms, settlements are agreements to end lawsuits (a greater evil). Settlements allow firms to record a financial hit but then put the lawsuits behind them. There should be no lingering negative stock drifts. We would anticipate that, on average, returns should quickly regress to normal levels once the disclosures of settlement are absorbed by investors. Further research should test for such posited reactions.

The paper engenders further extensions for future research. Settlements may be iteratively priced into stocks from the initiation of the lawsuits. By the time of the eventual settlements, the stocks are accurately priced. That is an entirely different perspective to the analysis.

CONCLUSION

This study sought to answer the question: do traders gain access to private information upon which to exploit through front-running? We used a novel dataset of Form 8-K disclosures of class action lawsuit settlements as a proxy for the announcement of private information. We found that 1) traders do not front-run Form 8-K disclosures of class action lawsuit settlements and 2) traders do not capture CAR surrounding the Form 8-K disclosures. Previous research found that short sellers are informed traders (e.g., Boehmer et al. 2008 and Asquith et al. 2005). Because no front-running was shown, therefore, inferentially, my research provides evidence to reject the conclusion that private information is the source of informed trading activity.

Even though the study finds that there is no exploitation of private information – no short seller front-running and no CAR – the findings still contribute to the field of study. They contribute to the contrary – albeit less popular – position that traders do not have access to private information upon which to exploit through front-running to capture CAR.

Studies concede that even though evidence is more consistent with information leakage, definitive proof is still out of reach (Khan and Lu 2013). This paper contributes to the literature by providing further evidence from a new dataset of class action litigation settlements that there is no front-running of news. The market may not need to react to the settlement events. Rather the market may anticipate the eventual stock price effect to accurately price the settlement events. Nevertheless, the SEC may continually need to review regulation to combat against gaining access of private information for front-running.

REFERENCES

Anderson, R., Reeb, D., & Zhao, W. (2012). Family-controlled firms and informed trading: Evidence from short sells. *Journal of Finance*, *67*(1), 351–385.

Asquith, P., Pathak, P., & Ritter, J. (2005). Short Interest, Institutional Ownership, and Stock Returns. *Journal of Financial Economics*, *78*, 243–276.

Bebchuk, L. (1984). Litigation and settlement under imperfect information. *RAND Journal of Economics*, *15*(3), 404–415.

Ben-Rephael, A., Da, Z., Easton, P., & Israelsen, R. (2019). *Who pays attention to SEC Form 8-K?* Working paper.

Berkman, H., & Eugster, M. (2017). Short on drugs: Short selling during the drug development Beyer process. *Journal of Financial Markets*, *33*, 102–123.

Berkman, H., McKenzie, M., & Verwijmeren, P. (2016). Hole in the wall: Informed short selling ahead of private placements. *Review of Finance*, *21*(3), 1047–1091.

Beyer, A., Cohen, D., Lys, T., & Walther, B. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics*, *50*(2), 296–343.

Blankespoor, E., deHaan, E., & Marinovic., I. (2020). Disclosure processing costs, investors' information choice, and equity market outcomes: A review. *Journal of Accounting and Economics*.

Blankespoor, E., Miller, G., & White, H. (2014). The role of dissemination in market liquidity: Evidence from firms' use of Twitter. *The Accounting Review*, *89*(1), 79–112.

Boehmer, E., Jones, C., & Zhang, X. (2008). Which shorts are informed? *Journal of Finance*, *63*(2), 491–527.

Boehmer, E., Jones, C., Wu, J., & Zhang, X. (2020). What do short sellers know? *Review of Finance*, *24*(6), 1203–1235.

Bosch, J., & Lee, I. (1994). Wealth effects of food and drug administration (FDA) decisions. *Managerial and Decision Economics*, *15*(6), 589–599.

Botosan, C. (1997). Disclosure level and the cost of equity capital. *The Accounting Review*, *72*(3), 323–349.

Bradshaw, M., Richardson, S., & Sloan, R. (2006). The relation between corporate financing activities, analysts' forecasts and stock returns. *Journal of Accounting and Economics*, *42*(1), 53–85.

Campbell, J., Lo, A., & MacKinlay, C. (1997). *The Econometrics of Financial Markets.* New York, NY: Princeton University Press.

Campbell, J., Twedt, B., & Whipple, B. (2021). Trading prior to the disclosure of material information: Evidence from Regulation Fair Disclosure Form 8-K. *Contemporary Accounting Research*, *38*(1), 412–442.

Chakravarty, S., & Li, K. (2003). An examination of own account trading by dual traders in futures markets. *Journal of Financial Economics*, *69*(2), 375–397.

Chen, J., Hanson, S., Hong, H., & Stein, J. (2008). *Do hedge funds profit from mutual fund distress?* [Working paper, University of California at Davis, Princeton, Harvard and NBER].

Christophe, S., & Hsieh, J. (2020). *Information percolation and informed short selling: Evidence from earnings announcements*. Retrieved from http://ssrn.com/abstract=3588949

Christophe, S., Ferri, M., & Angel, J. (2004). Short-selling prior to earnings announcements. *Journal of Finance*, *59*(4), 1845–1875.

Christophe, S., Ferri, M., & Hsieh, J. (2010). Informed trading before analyst downgrades: Evidence from short sellers. *Journal of Financial Economics*, *95*, 85–106.

Cohen, A., Jackson, R., & Mitts, J. (2015). The 8-K trading gap. *Columbia Law and Economics Working Paper No. 524*.

Daske, H., Richardson, S., & Tuma, I. (2005). *Do short sale transactions precede bad news events?* Retrieved from http://ssrn.com/abstract=722242

Daske, H., Richardson, S., & Tuma, I. (2006). *Do short sale transactions precede bad news events? New evidence from NYSE daily data* [Working paper, University of Pennsylvania].

Desai, H., Krishnamurthy, S., & Venkataraman, K. (2006). Do short sellers target firms with poor earnings quality? Evidence from earnings restatements. *Review of Accounting Studies*, *11*(1), 71–90.

Desai, H., Ramesh, K., & Thiagarajan, R., & Balachandran, B. (2002). An investigation of the informational role of short interest in the Nasdaq market. *Journal of Finance*, *57*(5), 2263–2287.

Drake, M., Myers, L., Scholz, S., & Sharp, N. (2015). Short selling around restatement announcements: When do bears pounce? *Journal of Accounting, Auditing & Finance*, *30*(2), 218–245.

Drake, M., Rees, L., & Swanson, E. (2011). Should investors follow the prophets or the bears? Evidence on the use of public information by analysts and short sellers. *The Accounting Review*, *86*(1), 101–130.

Engelberg, J., Reed, A., & Ringgenberg, M. (2012). How are shorts informed?: Short sellers, news, and information processing. *Journal of Financial Economics*, *105*, 260–278.

Harris, L. (2003). *Trading and exchanges.* New York, NY: Oxford University Press.

Hatem, B. (2015). What determines cumulative abnormal return? An empirical validation in the French market. *International Business Research*, *8*(12), 89–95.

Henry, T., Kisgen, J., & Wu, J. (2015). Equity short selling and bond rating downgrades. *Journal of Financial Intermediation*, *24*, 89–111.

Hope, O., Thomas, W., & Winterbotham, G. (2009). Geographic earnings disclosure and trading volume. *Journal of Accounting and Public Policy*, *28*(3), 167–188.

Huang, A., Zang, A., & Zheng, R. (2014). Evidence on the information content of text in analyst reports. *The Accounting Review*, *89*(6), 2151–2180.

Huang, J., Wang, L., Yu, H., & Zhang, Z. (2021). Short selling prior to going concern disclosures. *Accounting and Business Research*, *51*(4), 390–420.

Karpoff, J., & Lou, X. (2010). Short sellers and financial misconduct. *Journal of Finance*, *65*, 1879–1913.

Khan, M., & Lu, H. (2013). Do short sellers front-run insider sales? *The Accounting Review*, *88*(5), 1743–1768.

Kothari, S., Laguerre, T., & Leone, J. (2002). Capitalization versus expensing: Evidence on the uncertainty of future earnings from capital expenditures versus R&D outlays. *Review of Accounting Studies*, *7*(4), 355–382.

Kothari, S., Li, X., & Short, J. (2009). The effect of disclosures by management, analysts, and business press on cost of capital, return volatility, and analyst forecasts: A study using content analysis. *The Accounting Review*, *84*(5), 1639–1670.

Kyle, A. (1985). Continuous auctions and insider trading. *Econometrica*, *53*, 1315–1335.

Lee, Y. (2012). The effect of quarterly report readability on information efficiency of stock prices. *Contemporary Accounting Research*, *29*(4), 1137–1170.

Leftwich, R. (1981). Evidence on the impact of mandatory changes in accounting principles on corporate loan agreements. *Journal of Accounting and Economics*, *3*(1), 3–36.

Lerman, A., & Livnat, J. (2010). The new form 8-K disclosures. *Review of Accounting Disclosures*, *15*, 752–778.

Lerman, A., Nandy, D., Saunders, A., & Song, K. (2011). Do hedge funds trade on private information? Evidence from syndicated lending and short-selling. *Journal of Financial Economics*, *99*(3), 477–499.

London, M. (2013). Resolving the civil litigant's discovery dilemma. *26 Georgia Journal of Legal Ethics 837*.

MacKinlay, A. (1997). Event studies in economics and finance. *Journal of Economic Literature*, *35*(1), 13–39.

McMullin, J., Miller, B., & Twedt, B. (2019). Increased mandatory disclosure frequency and price formation: Evidence from the 8-K expansion regulation. *Review of Accounting Studies*, *24*(1), 1–33.

Pinker, R. (2006). *Has firms' Form 8-K filing behavior changed since Section 409 of the Sarbanes-Oxley Act became effective?* [Working paper, Florida Atlantic University].

Priest, G., & Klein, B. (1984). The selection of disputes of litigation. *Journal of Legal Studies*, *13*, 1–56.

Prokofieva, M. (2015). Twitter-based dissemination of corporate disclosure and the intervening effects of firms' visibility: Evidence from Australian-listed companies. *Journal of Information Systems*, *29*(2), 107–136.

Rahman, A., & Debreceny, R. (2010). Frequency of corporate announcements via stock exchange web sites and market efficiency. *Journal of Accounting, Auditing & Finance*, *25*(3), 457–490.

Rajan, S., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance*, *50*, 1421–1460.

Rawson, C., Twedt, B., & Watkins, J. (2020). *Managers' strategic use of concurrent disclosure: Evidence from 8-K filings and press releases* [Working paper, University of Arkansas, University of Oregon and University of Notre Dame].

Reeb, D., Zhang, M., & Zhao, W. (2014). Insider trading in supervised industries. *Journal of Law and Economics*, *57*(3), 529–559.

Shavell, S. (1989). Sharing of information prior to settlement or litigation. *RAND Journal of Economics*, *20*(2), 183–195.

Zmijewski, E., & Hagerman, R. (1981). An income strategy approach to the positive theory of accounting standard setting/choice. *Journal of Accounting and Economics*, *3*(2), 129–149.