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The effect of investor attention on fraud discovery and value loss in securities class action litigation

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Abstract

We examine the effect of investor attention on value loss due to securities class action lawsuits and litigation-based fraud discovery. We find that investor attention is positively associated with damage to corporate reputation and the magnitude of the value losses suffered by defendant firms. The reputational damage to defendant firms with higher investor attention is evident from poor operational performance and lower institutional ownership after filing. Investor attention is positively associated with the diffusion of information regarding fraud and it accelerates lawsuit filing. The effects of investor attention, however, are not subsumed by the severity of the fraud. Our results are robust to a battery of tests that addresses selection and endogeneity concerns.

JEL CLASSIFICATION
G3, G30, K2

1 | INTRODUCTION

A securities class action is a complex event that can serve as a discovery process for shareholders regarding previously unknown actions within the firm. During a litigation event, investor attention can help disseminate information regarding fraudulent activity and shape the market's reaction to the lawsuit filing. In an environment where investor attention is a cognitive resource in limited supply, greater investor attention improves learning

about fraudulent activity while exacerbating litigation's negative effects. As more investors learn about the fraudulent activity, the adverse effect of litigation on a firm's reputational capital increases.[1]

In this article, we examine investor attention in a specialized corporate setting and investigate the role it plays in shaping the market's response to a securities class action event. We find that investor attention is a new factor in determining equity and reputation losses during litigation. The effect of investor attention on the equity market's response to a securities class action has not been examined in the literature. A more complete understanding of the true costs of litigation is important for reasons of public policy formation, investor portfolio decisions, and corporate strategies for reputation restoration.

A major challenge in testing the effect of investor attention on firm value is to find a nonendogenous measure of attention. The common measures of investor attention such as abnormal volume, abnormal return, or media coverage suffer from various econometric and measurement challenges. Consequently, we follow Da et al. (2011) and Drake et al. (2012) by using the number of times investors search a firm on Google.com as our proxy for investor attention. Google provides a normalized search index referred to as Google Search Activity (GSA) that captures the search hits a particular firm generates on Google.com. We estimate our attention proxy by calculating abnormal changes in GSA or the log increase over the median number of searches a particular company receives over a specific period.

Using GSA, we obtain several important results regarding the effect of investor attention on a firm's litigation losses. We discover that higher abnormal investor attention before the lawsuit filing exacerbates the negative response of investors to litigation news. A 10% increase in GSA is associated with an additional 4.0% loss in firm value upon the announcement of the lawsuit filing. This equates to $52 million, on average, for our sample firms. We further report that abnormal investor attention has a similar negative effect on lawsuit-based reputational losses. To capture the long-term decrease in firm value due to litigation, we calculate the change in Tobin's Q before and after the filing. A 10% increase in GSA before lawsuit filing is associated with a further 2.1% reduction in Q. We attribute the permanent reduction in Tobin's Q to reputational losses in the form of reduced earnings per share (EPS) growth and poor accounting performance following the lawsuit filing. Finally, we discover that higher abnormal investor attention affects the institutional ownership of a defendant firm's stock. A 10% increase in GSA before lawsuit filing leads to a 1.5% decrease in the percentage of shares held by institutional investors after the filing.

We also conduct several robustness tests. First, we use placebo tests to validate the effect of investor attention on value losses. The objective of these tests is to confirm that the negative effect of investor attention on returns is specific to the lawsuit filing. Thus, we reestimate the regression of cumulative abnormal returns (CARs) against GSA during the week before and after the filing. In these regressions, we fail to document a statistically significant relation between investor attention and abnormal returns before or after filing. This indicates that the effect of GSA is exclusive to the actual lawsuit filing.

Second, we examine the explanatory power of GSA in the presence of other measures of investor attention. We compare GSA against abnormal volume, abnormal returns, and media coverage. We show that the effect of GSA on reputational losses in the context of corporate litigation is not subsumed by these other measures. Thus, we conclude that GSA provides information regarding investor attention beyond that contained in these measures.

Third, we address the possibility that omitted variables might influence our results. An alternative explanation is that we capture the effect of short trading caused by information leakage rather than investor attention. Our empirical tests, however, fail to link changes in short interest to the market's response to the lawsuit filing. We conclude that our results reflect the negative effect of investor attention on firm value incurred during litigation.

Fourth, we address the possibility that the severity of the alleged violation drives our findings. The severity of a firm's wrongdoing encourages investors to search for additional information about the firm, estimate the future

[1]The impact of limited investor attention on asset prices and governance is well documented. For example, in a survey of institutional investors, McCahery et al. (2016) find that limited resources and the number of firms in a portfolio are important impediments to shareholder activism. Liu et al. (2020) report that distracted investors are inferior monitors. Kacperczyk et al. (2016) show that the attention of mutual fund managers is a limited resource and managers optimally choose to allocate their limited attention to information depending on the business cycle.

costs associated with a lawsuit, and reassess their portfolio holdings of the stock. Thus, the severity of a lawsuit might negatively affect announcement returns but not investor attention. We use the ex post settlement amount to control for the severity of the violation in our main regression specifications. We discover from our testing that the effect of GSA on corporate value loss is robust to the inclusion of lawsuit severity measures.

Furthermore, we explore the variation in GSA using the change in the Google Search Engine protocol. We use the introduction of the Caffeine indexing system by Google as an exogenous shock to investor attention. Therefore, a difference-in-difference research design allows us to identify the causal effect of GSA on firm value during litigation. Our results show the negative effect of greater investor attention on share value regardless of search infrastructure. Thus, we confirm that investor attention represents an important factor affecting the losses suffered by defendant firms during corporate litigation.

Finally, we address possible selection bias in our sample. The availability of GSA data limits our sample to firms with an established search history. We use the Heckman (1979) two-stage procedure to examine whether our results are influenced by GSA availability. We fail to find evidence suggesting selection bias while continuing to confirm the robustness of our findings.

2 | NATURE OF SECURITIES CLASS ACTION LITIGATION

Historically, the class action process originated from the desire to obtain economies of scale in litigation.[2] By consolidating similar claims for small amounts from different individuals into a single lawsuit, the class action process was expected to achieve greater economic efficiency by reducing the costs of litigation for each plaintiff. Although this theoretically implies efficiency, class action litigations are notorious in terms of case complexity, protracted timeline, increased outcome uncertainty, information asymmetry, and agency conflicts (Alexander, 1996; Bajaj et al., 2014; Zingales, 2007). Because of the limitations of cognitive processing, all of these factors can influence the amount of investor attention that is directed to any specific class action.

2.1 | Timeline

Figure 1 presents the typical timeline for a class action lawsuit. The beginning and completion of the alleged fraudulent activity are referred to as the "class action start" and the "class action end," respectively.[3] We define "class length" as the number of days that elapse between the start and end dates of the class actions. The day when such a class action complaint is filed with the court is referred to as the "filing date" or "filing event." The number of days that elapse between the end of an alleged fraud (i.e., the class action end date) and the filing date is defined as the "filing delay." After the filing date, the class action complaint is subject to a certification process by the judge. A judge decides whether the suit can be certified as a class action based on four criteria listed in Rule 23 of the Federal Rules of Civil Procedure.[4] As part of the certification process, the judge "defines the class" (i.e., identifies the individuals or institutions that are affected by the alleged fraudulent activity) and decides the scope and characteristics of the class action lawsuit. The judge also approves the class action start and end dates.

[2]The history of class action lawsuits can be dated to the 17th century when the English Court of Chancery adopted the "Bill of Piece" to allow a single representative to defend on behalf of an entire group.

[3]In cases where multiple plaintiffs file the class action complaint, the class action start date typically is estimated using the complaint that yields the longest class action period.

[4]These criteria are: (1) numerosity, which implies that the class has to be so numerous that the joinder of all members becomes impractical; (2) commonality, which refers to the existence of questions of law common to the class; (4) typicality, which means that the representative member is typical of the class; and (4) adequacy, which requires the named plaintiff to fairly and adequately represent all members of the class.

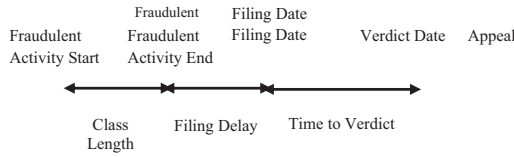

FIGURE 1 Typical securities class action timeline. This figure shows the typical timeline for a securities class action lawsuit. Class length is the period between the start and end of the alleged fraudulent activity. Filing delay is measured as the period between the end of the alleged fraudulent activity and the filing date. Time to verdict is defined as the period between the filing date and the verdict date

Once a class action lawsuit receives a certified status, the judge orders the lead plaintiff to notify all potential plaintiffs. At this point, potential plaintiffs have the option to either opt out or remain unnamed and participate in the class action process. Once a set of "class members" and "plaintiffs participating in the proceedings" is defined, the judge selects a counsel of attorneys for all class members.[5] On the final verdict date, the lawsuits are either dismissed or settled. We define the "time to verdict" as the number of days that elapse between the filing and verdict dates.[6]

2.2 | Losses associated with class action litigation

Cumulative losses experienced by firms in litigation have both direct and indirect components. In this section, we model the direct and indirect losses suffered by defendant firms and identify their main drivers.

2.2.1 | Direct losses

The direct losses of class action litigation include legal fees such as settlement disbursements, attorney's fees, financial penalties imposed by the judicial system, and litigation insurance premiums. Some of these costs are offset by litigation insurance coverage. Most publicly traded firms in the United States buy personal coverage insurance, corporate reimbursement coverage, and optional entity securities coverage. Although such insurance typically has coverage limits, it mitigates at least 50% of the direct costs attributable to the lawsuit (Alexander, 1991).

The magnitude of the direct costs is a function of the severity of the alleged violation, plaintiff type, industry litigiousness, and firm size. The verdict time, quantity and quality of presented evidence, and size of the monetary penalties increase with litigation severity. Institutional investors have more resources and expertise than individual investors (Cheng et al., 2010). Hence, the probability of an adverse verdict for the defendant firm is greatly affected by the identity of the lead plaintiff. Industry litigiousness also increases a firm's probability of being sued and positively influences the direct costs of litigation (Gande & Lewis, 2009). Firm size should positively affect the cost of litigation because larger firms have more resources to pay settlements and penalties. Larger firms hold higher cash balances and have more tangible assets that can be liquidated to pay damages or settlements. Thus, we model the direct costs associated with securities class actions as follows:

$$\text{Direct Costs} = f(\text{Severity, Plaintiff Type, Industry Litigiousness, Size}). \quad (1)$$

[5]In most cases, this counsel of attorneys is same as the attorneys who file the class action complaint originally.

[6]We note that most securities class action lawsuits are dismissed because they are not certified as an action as per Rule 23. If the case is certified as a class action, it almost certainly generates a monetary settlement.

2.2.2 | Indirect losses

In addition to direct losses, firms can sustain significant indirect losses imposed by the market. They are measured by the market response to litigation and primarily represent the damage to a firm's reputational capital during a securities class action. In most circumstances, these indirect costs are more damaging to shareholder wealth than the direct costs of litigation. The indirect costs include the loss of a firm's credibility, increase in uncertainty about the firm's financial and product market prospects, loss of customers and suppliers, and diversion of managers' time and resources (Jarrell & Peltzman, 1985; Johnson et al., 1999; Karpoff & Lott, 1993; Klein & Leffler, 1981; Phillips & Miller, 1996).

Engelmann and Cornell (1988) suggest that when these indirect costs are joined with direct costs, the total litigation costs often exceed the projected benefits to plaintiffs. Terming these indirect costs as "reputational losses," Karpoff et al. (2008) find that reputational losses exceed the direct costs of litigation in excess of 7.5 times. They conclude that the disclosure of corporate misconduct significantly increases a firm's operating costs, which is consistent with the arguments of Klein and Leffler (1981), Jarrell and Peltzman (1985), and Landes and Posner (1987).

The nature of indirect costs makes them more difficult to measure. Indirect costs can be broadly viewed as the opportunity costs due to the litigation event. Managers must spend considerable time preparing for a case defense that would otherwise be used to supervise the firm's operations. Furthermore, litigation affects the firm's credibility among its customers, suppliers, partners, and financial stakeholders. Reputational capital serves as an implicit incentive for the agent to fulfill its contractual obligations. Damaged reputations, however, increase contracting costs and reduce overall transactional profitability.

We estimate these indirect costs as a function of two components: (1) severity of the alleged fraudulent activity and (2) likelihood of discovery by investor attention. Fraud severity is defined as the intensity of the alleged violation. The likelihood of discovery is captured by investor attention. Greater investor attention to a firm produces a higher probability of fraud detection because more investors are reviewing corporate activities, reports, and disclosures. As more information about the lawsuit-revealed wrongdoing is disseminated through the investor community, the effect of a lawsuit on corporate reputations grows stronger. More stakeholders become aware of the alleged wrongdoing and alter their view of the firm's reputation and its value. This can lead to a more negative market response to the lawsuit announcement and weakened relations with stakeholders. Greater investor attention affects corporate reputation during litigation, leading to higher total indirect costs. Thus, we model indirect costs as:

$$\text{Indirect Costs} = f(\text{Investor Attention, Severity}). \tag{2}$$

3 | HYPOTHESES DEVELOPMENT

In this section, we develop our primary hypotheses that relate investor attention to announcement-period returns, firm value, and speed of the litigation process.

3.1 | Filing CARs and investor attention

Considerable evidence reported in the literature suggests a greater change in firm value at the time of a lawsuit filing (Bhagat et al., 1994, 1998; Bizjak & Coles, 1995; Pritchard & Ferris, 2001) and not at the verdict or settlement dates. Pritchard and Ferris (2001) find a stronger market response to the filing-based revelation of fraud than to other disclosure events. They report that before lawsuit filing, investors exhibit uncertainty about the incidence of litigation and its costs. The probability of a negative verdict and possible settlement costs are captured in the market's reaction at the time of the filing date. Karpoff and Lott (1993) and Karpoff et al. (2008) argue that it is difficult to reconcile the share value loss with direct litigation costs. They attribute the majority of the negative reactions to lawsuit-based and other revelation announcements to the presence of indirect costs.

Greater investor attention is associated with faster dissemination of information about the lawsuit and alleged fraudulent activity. Upon receiving such information, investors assess the probability of the unfavorable verdict and potential damages from the litigation. They also learn about the firm's alleged wrongdoing and update their beliefs regarding the credibility of the firm. Consequently, as a primary driver of indirect costs, investor attention determines the magnitude of the market reaction at the filing date. Therefore, we hypothesize the following:

H1: *Increased investor attention before lawsuit filing leads to more negative announcement-period abnormal returns.*

3.2 | Investor attention and Tobin's Q

CARs around the filing date represent a short-term value loss and can be attributed to market overreaction. The other possibility is that these negative returns represent a long-term value loss due to permanent damage to the firm's reputation. If investor attention affects the magnitude of the damage to the firm's reputational capital, it necessarily influences the firm's long-term value loss. Using Tobin's Q as our measure of long-term value, we contend that investor attention levels influence changes in the long-term value surrounding a filing event. Thus, we hypothesize:

H2: *Increased investor attention before lawsuit filing leads to a greater decrease in Tobin's Q following the lawsuit's announcement.*

3.3 | Filing delay and investor attention

Delay in the filing of a lawsuit postpones the direct costs incurred by the defendant firm and hence affects the total costs of litigation. In addition, until a formal lawsuit against the firm is filed, not all investors are aware of the alleged fraudulent activity. Hence, filing delay also postpones the lawsuit-based discovery of the wrongdoing and possible indirect losses. Therefore, by shifting the negative cash flows further into the future, a filing delay reduces the present value of costs associated with litigation and is an important aspect of class action lawsuits.

The timeline of litigation presented in Section 2 explains that before filing the lawsuit, plaintiffs must collect sufficient evidence to prove an intent to fraud and the existence of damages due to corporate wrongdoing. If there are a large number of investors paying attention to the firm's activities during the class action period, investors discover the alleged fraud more quickly. They are also able to collect and analyze evidence needed to file a lawsuit faster, leading to an accelerated filing of the lawsuit. Consequently, we hypothesize:

H3: *Increased investor attention during the class action period accelerates lawsuit filing.*

4 | DATA AND SAMPLE

4.1 | Sample construction

Our sample is limited to securities class action lawsuits filed for reasons of corporate fraud between January 1, 2004 and December 31, 2019.[7] To construct the sample, we select all class-action-lawsuit-related data, including fraud type, industry classification, class action start date, class action end date, filing date, verdict date, and lead

[7]We begin our sample in 2004 because our measure of investor attention is available only in 2004 and onward.

plaintiff and counselor from the Securities Class Action Clearinghouse Database. The Clearinghouse database provides a brief description of each case and the documents filed with the court.

The section on jurisdiction in the original complaint typically identifies the sections of the 1934 Securities Exchange Act that the plaintiff contends the firm has violated. Violation of §§10(b) of the Act is the most common violation in our sample. It refers to the provision of materially false and/or misleading statements or the failure to disclose important material information. One such example of a §§10(b) violation is a misstated financial report. Other sources of complaints are alleged violations of §§14(a), which refers to mergers and acquisitions (M&As), and violations of §§20(a), which relates to securities offerings. The nondisclosure of material information to obtain an initial public offering (IPO) or merger approval exemplifies violations of these sections. Because of the need for financial and accounting data to complete our empirical analysis, we eliminate those lawsuits where the defendant firm is unlisted on either the Compustat or Center for Research in Security Prices (CRSP) databases.

Some securities class actions can be considered frivolous. Such complaints are not granted the status of class action and are quickly dismissed by the court. The sample of filed lawsuits contains a significant number of dismissed cases, which could indicate they are frivolous. Consequently, we exclude dismissed cases and lawsuits with settlements under $3 million from our analysis. This process ensures our analysis is limited to only meritorious cases.

It is possible that securities class actions are filed following announcements that already reveal fraudulent activity. Thus, investor attention and a class action complaint follow a triggering announcement. To address this possibility, we conduct a search of US Securities and Exchange and US Department of Justice investigations announced before the lawsuit filing. We exclude the class action lawsuits of these investigated firms from our final sample, which now consists of 480 lawsuits.

4.2 | Proxies for investor attention

There is no direct measure of investor attention in the literature. Consequently, researchers use several indirect measures to proxy for investor attention: (1) abnormal returns (Barber & Odean, 2008), (2) abnormal trading volume (Barber & Odean, 2008), and (3) media coverage (Ahern & Sosyura, 2014; Barber & Odean, 2008; Chan, 2003; Vega, 2006; Yuan, 2015). More recently, Da et al. (2011) and Drake et al. (2012) propose GSA as a measure of investor attention. GSA is a normalized index that represents the number of times a particular term, such as a firm's ticker, has been searched on Google. This index is available through a service called Google Trends (https://www.google.com/trends/). Using Google Trends, we obtain an index of the number of times a particular firm's ticker is searched on Google.com.[8]

To capture the exogenous effects of investor attention, our proxy cannot be contemporaneously dependent on firm value. The first proposed proxy of investor attention, abnormal returns, however, fails to pass this filter. This leaves us with three remaining measures: abnormal volume, media attention, and GSA. We contend, however, that abnormal volume also fails to pass this filter (Chordia et al., 2007).

The abnormal volume proxy relies on the critical assumption that if a stock's return or volume is abnormal, investors must be paying attention to it (Da et al., 2011; Drake et al., 2012). An abnormal volume event, however, can be associated with factors unrelated to investor attention. Simple changes in the systematic risk of a firm or

[8]To identify whether the search on google.com is associated with a firm's stock or some other word, Da et al. (2011) advocate the use of firm tickers instead of firm names. For example, instead of getting an index of how many times "Apple" is searched, they use an index of number of times "AAPL" is searched Google.com:

> *A search engine user may search for a stock in Google using either its ticker or company name. Identifying search frequencies by company name may be problematic for two reasons. First, investors may search the company name for reasons unrelated to investing. For example, one may search "Best Buy" for online shopping rather than collect financial information about the firm. This problem is more severe if the company name has multiple meanings (e.g., "Apple" or "Amazon"). Second, different investors may search the same firm using several variations of its name. For example, American Airlines is given a company name of "AMR Corp." in CRSP. However, investors may search for the company in Google using any one of the following: "AMR Corp," "AMR," "AA," or "American Airlines." Searching for a stock using its ticker is less ambiguous.* (p. 1466)

shocks to the overall economy can generate abnormal returns and trading volume. In addition, other market events related to liquidity or releasing locked-up shares can generate abnormal volume.

There is another concern, however, with abnormal returns or volume as an investor attention proxy. We require that our attention proxy to be free from measurement error in the pre-lawsuit-filing period. This period, however, has a partial overlap with the class action period, which is when the firm was committing the alleged fraud. This, in turn, can affect the observed returns and volume, making abnormal volume a less reliable proxy for investor attention.

We are therefore left with two proxies for investor attention: media coverage and GSA. Media coverage is arguably exogenous of contemporaneous changes in firm value and does not suffer the same biases as abnormal volume or abnormal returns. This measure, however, has two significant limitations. First, it relies on a critical assumption that investors are reading all the news articles that are published in the media. If the *Wall Street Journal* publishes an article about a class action lawsuit on the back page, it does not guarantee attention from investors unless they actually read it. Second, media attention does not indicate the number of investors that are actually reading the news story. Media coverage does not allow us to measure the extent to which investors actually read or are otherwise aware of the news article. Hence, we contend that media attention is only a weak proxy for investor attention.

This leaves us with one remaining proxy for investor attention: GSA. Although noisy by construction, GSA appears to be the best proxy for our purposes. Because of its extensive availability and comprehensiveness, GSA is a research channel that can be used by a wide range of investors to obtain information about a firm. Similar to measures of institutional investor attention, GSA experiences a weekly seasonality and affects both institutional and retail trading volume (Ben-Rephael et al., 2017). Unlike media attention, GSA actually tracks the number of investors following a firm and is weakly driven by news coverage. Furthermore, it differs from abnormal volume as a measure of investor attention because it is independent of events such as changes in a firm's stock liquidity. Finally, unlike abnormal returns, GSA does not directly capture changes in a firm's value.

Figure 2 presents a comparison between the three nonnormalized weekly investor attention proxies for Macy's from January 2004 to December 2014: GSA, media coverage, and abnormal volume.[9] Panel (a) compares volume and GSA. We note that the correlation between the two proxies of investor attention is low (i.e., approximately 0.3%). This correlation is similar to that reported by Da et al. (2011). Furthermore, GSA appears to be a more stable proxy of investor attention than volume.

Panel (b) of Figure 2 compares media coverage and GSA. The advantage of using GSA over media as a proxy for investor attention is more apparent with this pairwise comparison. First, we note that the two proxies are largely uncorrelated. In addition, there are multiple weeks when there is no news about the firm in the media. Both GSA and abnormal volume, however, are greater than 0 during these weeks. It means that even though there is no news about the firm in the media, investors continue to search for information about it. This reaffirms our contention that media is a weak proxy for investor attention and does not capture the number of investors that are actively following the firm.

We use Google Trends to obtain a weekly search index of a firm's tickers. Weekly data, however, can be downloaded for 5 years at a time. To construct a time series of searches between 2004 and 2019, we follow the forward concatenation method developed by Bleher and Dimpfl (2019). This approach increases the search index accuracy compared to a direct concatenation of data obtained directly from Google Trends.

Because Google Trends provides only a normalized index, GSA cannot be converted into the actual number of Google searches. Higher GSA values, however, still indicate a larger number of searches and greater investor attention. Google Trends is normalized by scaling the number of searches by the highest weekly volume over the

[9]Macy's is one of the firms in the sample that we use to provide an illustrative example.

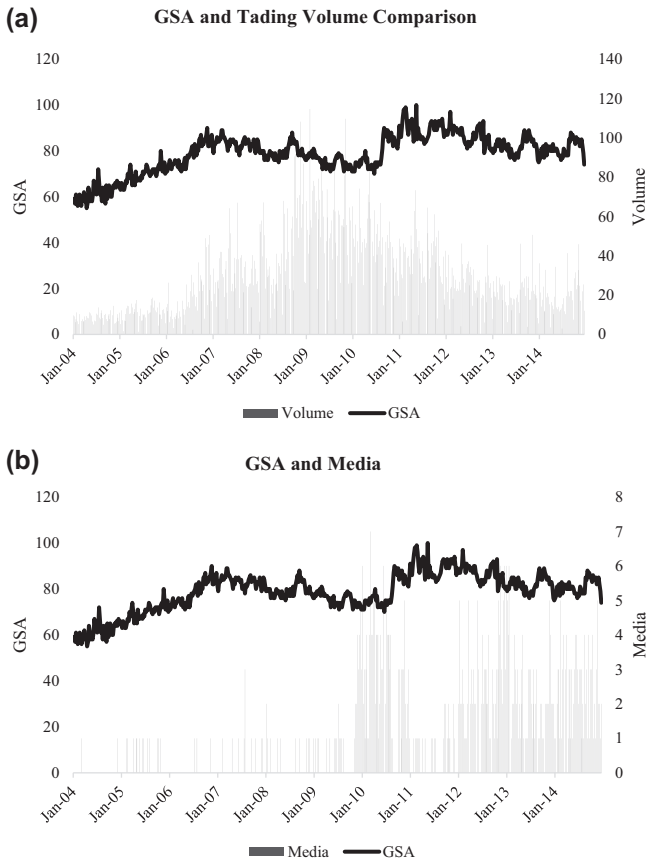

FIGURE 2 Comparison of investor attention proxies. This figure shows the comparison among three investor attention proxies for Macy's between January 2004 and December 2014. It compares (a) Google Search Activity (GSA) and trading volume and (b) media and GSA. GSA is measured from 0 to 100, trading volume is measured in millions of dollars, and media is measured as the number of articles published. All the proxies are measured on a weekly basis

sample period and then assigning a value between 0 and 100. For example, if investor searches for "AAPL" reach a historical maximum during the first week of January 2010, the index equals 100 that particular week. Furthermore, if the number of searches is not significant, GSA equals 0.

Following the log demeaning approach of Da et al. (2011) and Drake et al. (2012), we calculate abnormal GSA as follows:

$$\text{Abnormal GSA}_t = \log(\text{GSA}_t) - \log(\text{median}(\text{GSA}_{t-1}, \text{GSA}_{t-2}, \text{GSA}_{t-3}, \ldots, \text{GSA}_{t-n})). \quad (3)$$

In Equation (3), n represents the standardization period and GSA_{t-i} represents Google Search Activity lagged by i periods.[10] Subtracting a median from a longer window captures the "normal" level of attention in a way that is robust to recent jumps in investor attention. Whereas Da et al. (2011) and Drake et al. (2012) use a standardization

[10]One of the major issues with the data provided by Google Trends is that it does not provide the raw number of searches for a particular company. Google Trends divides the number of searches for a particular firm at any point in time by the highest number of searches that company has ever received. Our median adjusting nullifies this effect and produces a log percent increase in the search activity as compared to the standard level of search activity.

period of 10 weeks, we standardize over 12 weeks because litigation lasts longer than the events in these studies. Furthermore, litigation is a less frequent event than IPOs and earnings announcements. It is important to note, however, that our results are robust to alternative standardization periods of 10, 26, and 52 weeks.

5 | EMPIRICAL FINDINGS

5.1 | Summary statistics

Our investor attention proxy, GSA, is not available for every firm in our sample. Google Trends does not provide weekly attention data in cases where the firm ticker is insufficiently searched. This limitation reduces our sample to 349 litigation events. Panel A of Table 1 presents the financial and accounting characteristics for our sample firms. As expected, Google provides weekly investor attention data more frequently for larger firms. The average value of total assets for the firms in our final sample is $54.5 billion with a median return on assets (ROA)

TABLE 1 Sample summary statistics

	Full sample		Secondary		Other	
	Mean	Median	Mean	Median	Mean	Median
Panel A: Financial and accounting characteristics						
TA	54,446	1060	60,915	1061	10,185	1034
Tobin's Q	2.10	1.61	2.09	1.57	2.15	1.75
Leverage	1.67	0.45	1.75	0.44	1.06	0.67
log(Market Cap)	7.17	7.01	7.16	7.01	7.23	6.79
ROA (%)	−2.23	0.09	−2.31	0.06	−1.65	0.25
ROE (%)	−3.10	0.18	−3.43	0.08	−0.63	0.36
Forecast Stdev	0.09	0.04	0.10	0.05	0.06	0.00
Analyst Following	4.95	4.05	5.15	4.23	3.57	0.67
Panel B: Lawsuit characteristics						
Class Length	488	365	512	381	319	228
Filing Delay	73	17	77	18	49	9
Time to Verdict	1164	1116	1174	1138	1101	1043
N	480	480	420	420	60	60

Note: This table presents summary statistics of our sample firms. Panel A provides summary statistics on financial and accounting characteristics of our sample firms, and Panel B provides summary statistics on lawsuit related variables. TA represents total assets and is in thousands of US dollars. Tobin's Q is calculated as a ratio of market value of equity and book value of debt to book value of total assets. Leverage is calculated as the ratio of total debt to market equity. Log(Market Cap) is calculated as the natural log of market equity. ROA (return on assets) is calculated as the ratio of net income to total book assets. ROE (return on equity) is calculated as the ratio of net income to market equity. Forecast Stdev is the standard deviation of the earnings per share forecasts for each firm. Analyst Following represents the average number of analysts covering the firm. Class Action Length is the number of days between the beginning and end of alleged fraudulent activity. Filing Delay is the number of days between the end of the class action period and the filing of a lawsuit. Time to Verdict is the number of days between filing and verdict. All variables in Panel A are calculated 1 quarter before the lawsuit filing. Secondary refers to sample of lawsuits related to secondary market violation, and Other refers to all other lawsuits in our sample.

of 0.09%. Our sample firms have a high level of transparency, with the average firm followed by 5.0 analysts. Our firms are moderately levered with an average debt-to-equity ratio of 1.7.

We also compare our sample firms based on the type of alleged fraud. We classify fraud as either secondary market fraud or other. We find that the characteristics between the two groups of firms are statistically different. Firms accused of secondary market violations are generally larger in size and have a lower ROA during the pre-lawsuit-filing year. The average size of these firms is $60.9 billion whereas the firms in the other fraud group have an average size of $10.2 billion. An average firm in our secondary market violations group has a mean ROA of −1.65% in the year before the lawsuit filing. Firms that are allegedly committing secondary market violations are also more widely covered. These firms are followed by an average of 5.2 analysts whereas the other firms are followed by only 3.57 analysts. The forecast standard deviation for the secondary market violations group is 8.7%, whereas for the other group it is 5.7%. Both of these differences are statistically significant.

Panel B of Table 1 provides descriptive statistics concerning the timeline of the litigation. We focus our analysis on class length, filing delay, and the time to verdict. We believe that class length can serve as an indicator of the severity of the violation and a defendant's likely guilt. Intuitively, a longer class action period suggests a prolonged period of fraudulent activity or even multiple violations. A median class length of 365 days or more implies a violation committed by the firm's managers over a prolonged period. The median class length is 381 days for secondary market violations, but only 228 days for all other lawsuits.

The plaintiffs are encouraged to file lawsuits as soon as possible after the end of the class action period. The median filing delay of 17 days seems reasonable, considering the standard litigation process of seeking a representative and processing a formal complaint through the court administrative process. This period is much higher for secondary market violations (18 days) compared to all other types of violations (9 days). The median time to verdict for all types of lawsuits is 1116 days.

Panel A of Table 2 presents a time-series distribution of our sample lawsuits by fraud type. We find that lawsuit filings might be related to the performance of the stock market and the overall economy. The total number of lawsuits in the sample spikes in 2004 (40 firms) and in 2008 (39 firms), which is likely explained by the financial crisis of the same year. Our sample starts in 2004, but if we examine Clearinghouse statistics since 1996 we observe a local increase in the number of filings in 1998 (242 firms) and in 2001 (498 firms). These dates correspond with the stock market crashes at the same time.

We also compare the distribution of the sample between the two types of fraud. IPO- and M&A-related class action complaints, which we classify as other types of violation, usually describe alleged actions of directors in addition to those of chief executive officers (CEOs). Although the number of secondary market filings remains relatively constant across the sample period, the number of other violations increases to a peak of 8 in 2016. On average, secondary market filings represent 82.4% of all class action lawsuits during our sample period. The χ^2 test for a difference in ratios between the two fraud types is significant with a *p*-value near 0. This indicates that the sample distribution changes significantly over time for these two groups.

Panel B of Table 2 presents the distribution of our sample cases by industry and fraud type. We use the FTSE International/Dow Jones industry classification benchmark (ICB) to construct an industry classification.[11] The industries are identified by Clearinghouse for each of our sample firms. The largest number of lawsuits for both fraud types (60%) is filed against firms in the technology (105), healthcare (101), and services (84) industries. We also find that secondary market lawsuits are filed more frequently than any other violation type. The number of secondary market violations as a percentage of total filings ranges from 75% in utilities to 100% in energy. The χ^2 test for the distribution of proportions in the two groups is significant with a *p*-value of almost 0, suggesting that the proportion of secondary market violations is different across industries.

[11]ICB is a private industry classification system maintained by FTSE. It consists of 10 industries that are further dissected into 19 super sectors, 41 sectors, and 114 subsectors. Each firm in the database is assigned a subsector based on its primary revenue-generating activity.

TABLE 2 Distribution of lawsuits by year and industry

Panel A: Sample summary by year					
	Secondary		Others		
Year	*N*	%	*N*	%	Total
2004	40	88.89	3	11.11	43
2005	39	92.11	4	7.89	43
2006	26	92.11	3	7.89	29
2007	29	78.57	5	21.43	34
2008	39	86.36	5	13.64	44
2009	27	90.00	4	10.00	31
2010	23	81.82	5	18.18	28
2011	28	61.76	3	38.24	31
2012	26	80.00	6	20.00	32
2013	29	86.59	3	13.41	32
2014	35	86.59	4	13.41	39
2015	30	86.59	2	13.41	32
2016	22	86.59	8	13.41	30
2017	18	86.59	3	13.41	21
2018	9	86.59	2	13.41	11
Total	420	82.41	60	17.59	480
χ^2 test *p*-value		<0.0001***			
Panel B: Class action filings by sector and violation					
	Secondary market violations		Others		
Sector	*N*	%	*N*	%	Total
Basic materials	20	90.91	2	18.52	22
Capital goods	15	78.95	4	15.38	19
Conglomerates	0	0.00	0	0.00	0
Consumer cyclical	21	91.30	2	5.71	23
Consumer noncyclical	12	85.71	2	25.00	14
Energy	15	100.00	0	20.00	15
Financial	68	89.47	8	12.50	76
Healthcare	92	91.09	9	12.33	101
Services	73	86.90	11	18.26	84
Technology	88	83.81	17	24.24	105
Transportation	4	80.00	1	28.57	5
Utilities	3	75.00	1	55.56	4
Other	9	75.00	3	10.00	12

TABLE 2 (Continued)

Panel B: Class action filings by sector and violation					
	Secondary market violations		Others		
Sector	*N*	%	*N*	%	Total
Total	420	87.50	60	17.59	480
χ^2 test *p*-value		<0.0001***			

Note: This table presents distributional characteristics of our sample firms. Panel A provides a distribution of the sample firms by year and alleged violation type. Panel B provides a distribution of the sample firms by industry and alleged violation type. Secondary refers to sample of lawsuits related to secondary market violation and Other refers to all other lawsuits in our sample. The χ^2 test *p*-value represents the *p*-value from a test of equality of distribution between secondary market violation and other categories.

***$p < 0.01$.

5.2 | Investor attention proxies

In this section, we compare our measure of investor attention (GSA) with the two other commonly used measures of investor attention: media attention and abnormal volume. To measure media attention, we search for press releases using the firm's ticker in the LexisNexis database. We limit our searches to the newswire services: PR Newswire, Business Newswire, and Canada Newswire. Finally, we estimate the log transformation of the number of news articles in a given week. For abnormal trading volume, we follow the method of Chordia et al. (2007).

Table 3 presents the results using all three measures of investor attention. Panel A presents summary statistics for the three measures. Because GSA is constructed from a normalized index between 0 and 100, it has a higher standard deviation than the other two measures. Panel B presents the correlations between the three measures. We observe that none of the measures is significantly correlated with each other. We find that GSA is correlated with abnormal volume, but the correlation coefficient is less than 1%. The correlation between GSA and media is 3.44%. These results are similar to those obtained by Da et al. (2011). Hence, we conclude that GSA is a distinct measure of investor attention.

5.3 | Value loss in litigation and investor attention

Investors generally view the filing of a lawsuit as negative news about the future cash flows of the defendant firm (Romano, 1991). Therefore, lawsuit filing events are generally associated with negative CARs surrounding the filing date. The literature attributes the majority of negative returns around fraud discovery to the loss of reputational capital (Karpoff & Lott, 1993; Karpoff et al., 2008).

Table 4 presents our univariate analysis of the announcement-period effects of lawsuit filing. Panel A presents our sample's CARs for multiple windows around the filing. Our findings are consistent with studies such as Bhagat et al. (1994, 1998), Bizjak and Coles (1995), and Pritchard and Ferris (2001). On average, over the 2 days surrounding the filing date, the firms in our sample lose 3.3% of their value.[12] This CAR has a *t*-statistic of −15.13 and is both economically and statistically significant. Similarly, the change in Tobin's Q is also economically and statistically significant surrounding the filing date.[13] This implies that the value loss is permanent, which is consistent with reputational loss theory.

[12]We calculate CARs using the Fama–French five-factor model (Fama & French, 2015). We use an estimation period of 250 trading days and a gap of 20 trading days before the CAR window.

[13]We calculate Tobin's Q as the ratio of the market value of equity and the book value of debt to the book value of assets. The change in Tobin's Q is calculated as the percentage change in Tobin's Q 1 calendar quarter before and after the lawsuit filing.

TABLE 3 Measures of investor attention

Panel A: Summary of attention measures						
	N	25th pctl	Mean	Median	75th pctl	*SD*
GSA	349	0.00	22.98	12.00	34.00	35.84
Media	349	1.00	4.07	2.00	4.00	5.39
Trading volume	349	19.79	20.78	20.75	21.87	1.17
Panel B: Correlation between attention measures						
		GSA		**Media**		**Trading volume**
GSA		1				
Media		3.44%		1		
Trading volume		0.32%		20.13%		1

Note: This table provides a comparison of attention measures in our sample. Panel A presents the statistical summary of attention measures. Panel B presents correlations between attention measures. GSA represents Google Search Activity, the average number of weekly searches for each firm. Media is the number of weekly press mentions of each firm. Abnormal trading volume (in millions) is a weekly abnormal trading volume of each firm.

TABLE 4 Comparative CARs and changes in Tobin's Q at filing announcement

Panel A: Firm value around the filing event			
	N	Mean	Median
CAR (−2, +2)	295	−3.31% (−15.13***)	−1.09%
CAR (−1, +1)	295	−1.88% (−12.10***)	−0.62%
Change in Tobin's Q	295	−4.42% (−3.59***)	−5.53%
Panel B: Comparison by GSA			
	GSA		
	Below median	**Above median**	**Difference (*t*-stat.)**
CAR (−2, +2)	−2.83%	−4.36%	1.54% (3.08***)
CAR (−1, +1)	−1.55%	−2.20%	0.65% (1.93*)
Change in Tobin's Q	−2.42%	−8.85%	6.42% (2.47**)

Note: This table presents the univariate results of the effect of investor attention on short- and long-term losses from lawsuit filing. Panel A presents the cumulative abnormal returns (CARs) for various windows surrounding the filing event and the change in Tobin's Q surrounding the filing. Panel B compares the average CARs and change in Tobin's Q for below- and above-median Google Search Activity (GSA).

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Panel B of Table 4 further examines the market's response and value loss based on GSA intensity. We divide firms into two groups based on their investor attention levels over the prefiling week. The "high-investor-attention" group contains firms with an above-median GSA and the "low-investor-attention" group contains firms with a below-median GSA over the week before the lawsuit filing. We observe that firms in the high-investor-attention group have

more negative CARs and a greater reduction in Tobin's Q. The CAR over the 2 days surrounding the filing event for the low-attentio group is −2.8%, whereas the corresponding value is −4.4% for the high-attention group. The difference is statistically significant.

The difference is even more striking for the change in Tobin's Q. The average losses suffered by the low-investor-attention group are 2.4%. This result is consistent with Romano (1991) who states that the value lost due to a litigation event is a temporary market response. For the high-investor-attention group, however, the average change in Tobin's Q is −8.9%. This implies that in our sample, the firms involved in securities class action litigation do not lose value in the long term unless they are also subject to high levels of investor attention.

Next, we undertake a multivariate analysis. First, we test whether greater investor attention during in the weeks before a filing has any effect on the CARs surrounding the filing date. Consequently, we regress the filing CARs on lagged GSA and a set of control variables. Specifically, we use $GSA_{lag\ i}$ or the abnormal Google Search Activity for 1–10 weeks before the class action end date. Our discussion in Section 2.2 suggests that the losses incurred because of a litigation event are also a function of fraud severity. Hence, we include the ex post settlement amount divided by the total assets of the firm to proxy for the severity of the alleged violation.[14] In addition, we use the length of the filing delay control for fraud severity.

Panel A of Table 5 presents the results. Consistent with H1 and the univariate results in Table 4, we find that greater investor attention before the lawsuit filing increases the reputation losses incurred at the time of the lawsuit filing. Furthermore, we discover that $GSA_{lag\ i}$ is negative and significant from 1 to 10 weeks before the filing date. The filing CARs are less negative when there is a longer filing delay. This is partly because of the amount of surprise associated with the litigation. A longer filing delay generates less surprise for the market. We also observe that the CARs are more negative for secondary market fraud cases compared to other cases. This suggests the severity with which secondary market fraud cases are perceived by investors.

These results are also economically significant. As stated previously, a unit increase in GSA represents a 1% increase in investor attention. We find that a 10% increase in investor attention during the week before the filing date is associated with a corresponding CAR whose magnitude is reduced by an additional 4.0%. Recall from Table 4 that the average CAR surrounding the filing date in our sample is −3.3%. This means that a 10% increase in investor attention is associated, on average, with a CAR that is over 100% more negative.

Furthermore, we examine the effect of investor attention on adjusted reputational losses. Consistent with Karpoff et al. (2008), we adjust the change in firm value at the time of case filing for litigation settlement and the readjustment effect. Panel B of Table 5 presents the empirical results. We observe that the GSA coefficients remain negative and significant. We also find the economic significance of GSA to be similar to that reported in Panel A. We report that a 10% increase in investor attention before the filing date is associated with an additional 4.0% increase in reputational losses.

We next conduct a multivariate test of H2 to test the effect of investor attention on long-term value loss as measured by the change in Tobin's Q surrounding the filing date. We regress the change in Tobin's Q on lagged GSA and the same set of controls from Table 6. Specifically, we use $GSA_{lag\ i}$ or the abnormal Google Search Activity for 1–10 weeks before the class action end date. Panel A of Table 6 presents the results of this regression. Consistent with the univariate results in Table 4, we find that higher investor attention leads to a greater decrease in Tobin's Q surrounding the filing. Similar to the CARs estimated over the filing event, the change in Tobin's Q is more negative for firms receiving greater investor attention during the weeks before the filing. Specifically, a 10% increase in GSA before the lawsuit filing is associated with an additional 2.1% reduction in Tobin's Q.

We recalculate the change in Tobin's Q resulting from reputational losses only and regress it on lagged investor attention. Panel B of Table 6 presents the results of this regression. We observe that increased report that higher investor attention before the lawsuit filing is associated with a greater decrease in Tobin's Q. We determine

[14]In unreported results, we also proxy severity using the abnormal accruals measure of Kothari et al. (2005). Our results remain qualitatively unchanged.

TABLE 5 Effect of investor attention on filing announcement-period CARs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: CAR (−2, +2) around the filing event										
Intercept	−0.1386**	−0.1386**	−0.1385**	−0.1339**	−0.1336**	−0.1335**	−0.1334**	−0.1332**	−0.1331**	−0.1331**
	(−2.19)	(−2.20)	(−2.19)	(−2.12)	(−2.12)	(−2.11)	(−2.11)	(−2.11)	(−2.11)	(−2.10)
$GSA_{lag\ i}$	−0.0401**	−0.0395**	−0.0396**	−0.0388**	−0.0388**	−0.0384**	−0.0382**	−0.0394**	−0.0389**	−0.0377**
	(−2.32)	(−2.30)	(−2.31)	(−2.26)	(−2.28)	(−2.27)	(−2.27)	(−2.33)	(−2.32)	(−2.28)
Filing Delay	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(5.13)	(5.13)	(5.13)	(5.11)	(5.09)	(5.09)	(5.08)	(5.08)	(5.08)	(5.08)
Class Length	0.0061	0.0060	0.0060	0.0066	0.0065	0.0065	0.0064	0.0063	0.0063	0.0063
	(0.32)	(0.32)	(0.32)	(0.36)	(0.35)	(0.35)	(0.34)	(0.34)	(0.34)	(0.34)
log(Market Cap)	0.0007	0.0007	0.0007	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.15)	(0.15)	(0.15)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
Leverage	0.0011	0.0012	0.0012	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009
	(0.44)	(0.45)	(0.45)	(0.35)	(0.35)	(0.35)	(0.35)	(0.35)	(0.35)	(0.35)
Sector Violations	0.0144*	0.0144*	0.0144*	0.0148*	0.0148*	0.0148*	0.0148*	0.0148*	0.0148*	0.0148*
	(1.88)	(1.88)	(1.87)	(1.93)	(1.94)	(1.94)	(1.94)	(1.93)	(1.93)	(1.93)
Analyst Following	−0.0014	−0.0014	−0.0014	−0.0014	−0.0014	−0.0014	−0.0014	−0.0014	−0.0014	−0.0014
	(−0.86)	(−0.86)	(−0.86)	(−0.86)	(−0.86)	(−0.86)	(−0.86)	(−0.87)	(−0.87)	(−0.87)
Forecast Stdev	0.0208	0.0208	0.0207	0.0114	0.0112	0.0110	0.0109	0.0109	0.0107	0.0104
	(0.32)	(0.32)	(0.32)	(0.17)	(0.17)	(0.17)	(0.16)	(0.16)	(0.16)	(0.16)
ROA	0.0283	0.0282	0.0280	0.0087	0.0089	0.0083	0.0076	0.0066	0.0058	0.0048
	(0.16)	(0.16)	(0.16)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)

TABLE 5 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Settlement/TA	−0.4231***	−0.4209***	−0.4207***	−0.5369***	−0.5390***	−0.5400***	−0.5410***	−0.5418***	−0.5426***	−0.5434***
	(−2.71)	(−2.70)	(−2.69)	(−2.72)	(−2.73)	(−2.74)	(−2.74)	(−2.75)	(−2.75)	(−2.75)
N	281	281	281	281	280	280	280	280	280	280
Adj R^2	6.4%	6.4%	6.4%	6.9%	6.8%	6.8%	6.8%	6.9%	6.9%	6.8%
Panel B: Reputational losses around the filing event										
Intercept	−0.1158*	−0.1158*	−0.1157*	−0.1108*	−0.1106*	−0.1105*	−0.1103*	−0.1101*	−0.1100*	−0.1100*
	(−1.81)	(−1.81)	(−1.81)	(−1.74)	(−1.73)	(−1.73)	(−1.73)	(−1.73)	(−1.72)	(−1.72)
$GSA_{lag\ i}$	−0.0397**	−0.0392**	−0.0393**	−0.0385**	−0.0386**	−0.0382**	−0.0380**	−0.0392**	−0.0387**	−0.0377**
	(−2.30)	(−2.29)	(−2.31)	(−2.26)	(−2.27)	(−2.26)	(−2.27)	(−2.33)	(−2.32)	(−2.28)
Filing Delay	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(5.05)	(5.05)	(5.06)	(5.04)	(5.02)	(5.01)	(5.01)	(5.01)	(5.01)	(5.00)
Class Length	0.0068	0.0068	0.0067	0.0073	0.0072	0.0072	0.0071	0.0070	0.0070	0.0070
	(0.36)	(0.36)	(0.36)	(0.39)	(0.39)	(0.38)	(0.38)	(0.38)	(0.37)	(0.38)
log(Market Cap)	−0.0018	−0.0018	−0.0018	−0.0024	−0.0024	−0.0024	−0.0024	−0.0024	−0.0024	−0.0024
	(−0.38)	(−0.38)	(−0.38)	(−0.50)	(−0.51)	(−0.51)	(−0.51)	(−0.51)	(−0.51)	(−0.51)
Leverage	0.0020	0.0020	0.0021	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018
	(0.75)	(0.75)	(0.75)	(0.66)	(0.65)	(0.65)	(0.66)	(0.65)	(0.66)	(0.66)
Sector Violations	0.0144*	0.0144*	0.0144*	0.0148*	0.0149*	0.0149*	0.0149*	0.0148*	0.0148*	0.0148*
	(1.88)	(1.88)	(1.88)	(1.94)	(1.95)	(1.95)	(1.94)	(1.94)	(1.94)	(1.94)
Analyst Following	−0.0015	−0.0015	−0.0015	−0.0015	−0.0015	−0.0015	−0.0015	−0.0015	−0.0015	−0.0015
	(−0.93)	(−0.93)	(−0.93)	(−0.94)	(−0.94)	(−0.94)	(−0.94)	(−0.95)	(−0.95)	(−0.94)

(Continues)

TABLE 5 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Forecast Stdev	0.0208	0.0207	0.0207	0.0114	0.0111	0.0110	0.0108	0.0108	0.0107	0.0104
	(0.32)	(0.32)	(0.32)	(0.17)	(0.17)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
ROA	0.0231	0.0230	0.0228	0.0032	0.0035	0.0029	0.0023	0.0013	0.0005	−0.0005
	(0.13)	(0.13)	(0.13)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)
Settlement/TA	−0.3971**	−0.3950**	−0.3948**	−0.5125***	−0.5146***	−0.5156***	−0.5166***	−0.5174***	−0.5182***	−0.5189***
	(−2.55)	(−2.53)	(−2.53)	(−2.66)	(−2.67)	(−2.68)	(−2.69)	(−2.69)	(−2.70)	(−2.70)
N	279	279	279	279	278	278	278	278	278	278
Adj R^2	6.3%	6.3%	6.3%	6.8%	6.8%	6.7%	6.7%	6.8%	6.8%	6.7%

Note: This table presents the effect of investor attention on the short-term losses due to lawsuit filing. The dependent variable in Panel A, cumulative abnormal returns (CARs), are calculated over the window (−2, 2) days around the filing event. The dependent variable in Panel B, reputational loss, is calculated by adjusting firm value loss for settlement and readjustment effect. Columns 1–10 use $GSA_{lag\ 1}$ to $GSA_{lag\ 10}$ data. $GSA_{lag\ i}$ is the abnormal Google Search Activity estimated *i* week before the filing date. Sector Violations is calculated as the natural log of lawsuits previously filed against firms in the same sector. Settlement/TA is calculated as the ratio of lawsuit settlement amount to firm total assets. GSA coefficients are multiplied by 100. Class Length coefficients are multiplied by 1000. See Table 1 for definitions of the control variables. The *t*-statistics are presented in parentheses.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

TABLE 6 Effect of investor attention on Tobin's Q around filing announcement

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Change in Tobin's Q before and after filing										
Intercept	−0.1299	−0.1301	−0.1299	−0.1193	−0.1192	−0.1186	−0.1182	−0.1176	−0.1159	−0.1155
	(−1.55)	(−1.55)	(−1.55)	(−1.44)	(−1.44)	(−1.43)	(−1.42)	(−1.42)	(−1.40)	(−1.39)
$GSA_{lag\ i}$	−0.0205***	−0.0198***	−0.0197***	−0.0189***	−0.0189***	−0.0189***	−0.0188***	−0.0190***	−0.0189***	−0.0185***
	(−5.01)	(−5.05)	(−5.00)	(−5.15)	(−5.09)	(−5.04)	(−4.99)	(−4.92)	(−4.92)	(−4.87)
Filing Delay	0.0002**	0.0002**	0.0002**	0.0002**	0.0002**	0.0002**	0.0002**	0.0002**	0.0002*	0.0002*
	(2.13)	(2.13)	(2.13)	(2.16)	(2.13)	(2.12)	(2.12)	(2.12)	(1.93)	(1.93)
Class Length	0.0968***	0.0967***	0.0966***	0.1067***	0.1061***	0.1059***	0.1057***	0.1054***	0.0983***	0.0983***
	(3.07)	(3.07)	(3.07)	(3.67)	(3.65)	(3.65)	(3.64)	(3.63)	(3.41)	(3.41)
Sector Violations	−0.0153	−0.0153	−0.0153	−0.0180	−0.0177	−0.0178	−0.0178	−0.0179	−0.0179	−0.0179
	(−1.13)	(−1.13)	(−1.13)	(−1.36)	(−1.33)	(−1.34)	(−1.34)	(−1.35)	(−1.34)	(−1.35)
Forecast Stdev	0.0106	0.0102	0.0101	−0.0898	−0.0925	−0.0929	−0.0934	−0.0940	−0.0929	−0.0938
	(0.08)	(0.08)	(0.08)	(−1.04)	(−1.07)	(−1.07)	(−1.08)	(−1.09)	(−1.07)	(−1.08)
Analyst Following	0.0007	0.0007	0.0007	0.0020	0.0021	0.0020	0.0021	0.0021	0.0023	0.0023
	(0.27)	(0.27)	(0.27)	(0.81)	(0.84)	(0.84)	(0.84)	(0.84)	(0.95)	(0.95)
Leverage	0.0218***	0.0218***	0.0219***	0.0226***	0.0224***	0.0225***	0.0225***	0.0225***	0.0226***	0.0226***
	(7.27)	(7.28)	(7.30)	(7.88)	(7.82)	(7.83)	(7.84)	(7.85)	(7.94)	(7.94)
ROA	0.4972*	0.4944*	0.4939*	0.4845*	0.4909*	0.4896*	0.4879*	0.4845*	0.4767*	0.4740*
	(1.95)	(1.94)	(1.94)	(1.88)	(1.90)	(1.89)	(1.89)	(1.88)	(1.84)	(1.83)
Settlement/TA	0.0765**	0.0769**	0.0769**	0.0476*	0.0468	0.0466	0.0464	0.0462	0.0462	0.0460
	(2.32)	(2.31)	(2.31)	(1.67)	(1.63)	(1.62)	(1.61)	(1.60)	(1.60)	(1.59)

(Continues)

TABLE 6 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
N	273	273	272	272	271	271	271	271	270	270
Adj R^2	14.4%	14.3%	14.3%	17.4%	17.3%	17.3%	17.3%	17.4%	16.6%	16.6%
Panel B: Change in adjusted Tobin's Q before and after filing										
Intercept	−0.0833	−0.0827	−0.0819	−0.0829	−0.0827	−0.0817	−0.0808	−0.0793	−0.0780	−0.0771
	(−0.79)	(−0.79)	(−0.78)	(−0.80)	(−0.79)	(−0.78)	(−0.77)	(−0.75)	(−0.74)	(−0.73)
$GSA_{lag\ i}$	−0.0427***	−0.0421***	−0.0419***	−0.0406***	−0.0405***	−0.0402***	−0.0399***	−0.0397***	−0.0392***	−0.0384***
	(−2.76)	(−2.74)	(−2.72)	(−2.71)	(−2.70)	(−2.70)	(−2.69)	(−2.70)	(−2.70)	(−2.70)
Filing Delay	0.0004**	0.0004**	0.0004**	0.0004**	0.0004**	0.0004**	0.0004**	0.0003**	0.0003**	0.0003**
	(2.53)	(2.53)	(2.53)	(2.52)	(2.49)	(2.49)	(2.48)	(2.48)	(2.47)	(2.47)
Class Length	0.0914**	0.0912**	0.0909**	0.0975**	0.0964**	0.0960**	0.0954**	0.0949**	0.0947**	0.0947**
	(2.26)	(2.26)	(2.25)	(2.47)	(2.45)	(2.43)	(2.42)	(2.41)	(2.40)	(2.40)
Sector Violations	−0.0206	−0.0208	−0.0210	−0.0173	−0.0168	−0.0169	−0.0170	−0.0171	−0.0173	−0.0174
	(−1.25)	(−1.26)	(−1.27)	(−1.06)	(−1.03)	(−1.03)	(−1.04)	(−1.04)	(−1.05)	(−1.06)
Forecast Stdev	−0.1174	−0.1180	−0.1186	−0.1889**	−0.1923**	−0.1935**	−0.1953**	−0.1980**	−0.1999**	−0.2023**
	(−1.15)	(−1.15)	(−1.15)	(−2.16)	(−2.19)	(−2.20)	(−2.21)	(−2.23)	(−2.24)	(−2.25)
Analyst Following	0.0012	0.0013	0.0012	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
	(0.37)	(0.37)	(0.37)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)
Leverage	0.0207***	0.0208***	0.0209***	0.0190***	0.0187***	0.0187***	0.0188***	0.0188***	0.0188***	0.0188***
	(5.49)	(5.52)	(5.54)	(5.03)	(4.97)	(4.98)	(4.99)	(4.99)	(5.00)	(4.99)
ROA	0.5903	0.5899	0.5870	0.4080	0.4087	0.4010	0.3928	0.3785	0.3693	0.3592
	(1.61)	(1.60)	(1.59)	(1.15)	(1.14)	(1.12)	(1.09)	(1.05)	(1.02)	(0.99)

TABLE 6 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Settlement/TA	0.7180	0.7413	0.7433	−0.0590	−0.0787	−0.0903	−0.1004	−0.1093	−0.1183	−0.1268
	(1.16)	(1.19)	(1.19)	(−0.09)	(−0.12)	(−0.14)	(−0.15)	(−0.17)	(−0.18)	(−0.19)
N	264	264	264	264	263	263	263	263	263	263
Adj R^2	13.2%	13.0%	12.9%	14.1%	14.0%	14.0%	13.9%	13.9%	13.8%	13.7%

Note: This table presents the effect of investor attention on long-term losses due to lawsuit filing. The dependent variable in Panel A is the change in Tobin's Q from 1 quarter before and after the filing event. The dependent variable in Panel B is the change in Tobin's Q adjusted for litigation settlement and readjustment effect from 1 quarter before and after the filing event. Columns 1–10 use $GSA_{lag\ 1}$ to $GSA_{lag\ 10}$ data. $GSA_{lag\ i}$ is the abnormal Google Search Activity estimated *i* weeks before the filing date. Sector Violations is calculated as the natural log of lawsuits previously filed against firms in the same sector. Settlement/TA is calculated as the ratio of lawsuit settlement amount to firm total assets. GSA coefficients are multiplied by 100. Class Length coefficients are multiplied by 1000. Definitions of control variables are presented in Table 1. The *t*-statistics are presented in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

that, similar to he results presented in Panel A, a 10% increase in GSA results in an additional 4.3% reduction in adjusted Tobin's Q.

Consistent with H1 and H2, we find that investor attention plays an important role in explaining the losses suffered by a firm because of the filing of a class action lawsuit. We discover that investor attention exacerbates the short-term losses experienced by a defendant firm, measured as the CARs to filing. We also find that investor attention magnifies the long-term value losses as measured by the change in Tobin's Q.

5.4 | Reputational losses and investor attention

In Section 2.2, we model the indirect costs of litigation as a function of investor attention. That is, reputational loss increases with investor scrutiny and attention during litigation. This loss in corporate reputation is likely to be associated with weakened relations with customers, suppliers, lenders, and other stakeholders (Jarrell & Peltzman, 1985; Karpoff et al., 2008). This deterioration in key corporate relationships, in turn, is likely to result in reduced operating efficiencies and overall firm profitability.

The filing of a securities class action lawsuit also serves as a signal to the firm's investors. It indicates the existence of internal problems and affects investor interest in the firm's equity. The more investors become aware of possible wrongdoing by a firm, the less likely they will want to hold its equity. Thus, we expect investor attention surrounding a lawsuit filing to be inversely related to subsequent institutional ownership.

We conduct tests to analyze the relation between investor attention and changes in a firm's industry-adjusted EPS growth, return on assets (ROA), return on equity (ROE), and institutional ownership before and after filing.[15] We adjust EPS growth, ROA, and ROE for lawsuit settlement and readjustment to isolate the effect of reputational losses only. We regress these measures on GSA lagged before lawsuit filing and the same set of control variables. Table 7 presents the regression results. Consistent with our model of reputational losses, we find that greater investor attention is associated with a negative change in firm performance. Specifically, a 10% increase in GSA before the lawsuit filing is associated with a 32.7% decrease in EPS growth (Panel A), 1.29% decrease in ROA (Panel B), and 2.2% decrease in ROE (Panel C).

We believe that GSA is not limited to retail investors. Not all institutional investors sell their positions in defendant firms after a lawsuit announcement. Cheng et al. (2010) describe how only short-term blockholders have an incentive to liquidate their positions or short sell a defendant's stock. Long-term institutional shareholders, such as pension funds, stay invested in defendant firms in the expectation of receiving benefits from positive governance changes following litigation. Such benefits are expected to exceed settlement and other litigation costs. These expectations of benefits create an incentive for both retail and institutional investors to purchase shares of the defendant firms at discounted prices immediately after a lawsuit filing. Indeed, we observe a negative effect of abnormal GSA on institutional holdings of the defendant firm's stock in Panel D of Table 7. An increase in GSA before the lawsuit filing leads to a 1.5% decrease in the percentage of shares held by institutional investors.

We conclude that GSA has a negative effect on postlitigation performance as measured by reputation-driven EPS growth, ROA, and ROE. Additionally, we find that higher abnormal investor attention before filing is associated with a reduced level of institutional equity ownership. The evidence presented in this section provides additional information about the types of reputational losses suffered by firms and how they contribute to a permanent decrease in Tobin's Q.[16]

[15]We follow Barber and Lyon (1996) to estimate industry-adjusted EPS growth, ROA, and ROE.

[16]We present a series of alternative results in the Online Appendix. First, to further control for endogeneity between investor attention and lawsuit severity, we add their interaction to our main regression. Second, we reestimate the main results using a larger sample of settled and dismissed lawsuits filed between 2004 and 2019. Finally, we use company names instead of tickers to calculate an alternative proxy for GSA. The regression results are similar to those reported in the main section of our article. We confirm the negative effect of investor attention on short- and long-term value losses around the lawsuit filing.

TABLE 7 Effect of investor attention on firm performance and institutional ownership

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Change in EPS growth										
Intercept	−3.8633	−3.8642	−3.8660	−3.8657	−3.8943	−3.8826	−3.8109	−3.7441	−3.5549	−3.5460
	(−0.68)	(−0.68)	(−0.68)	(−0.68)	(−0.68)	(−0.69)	(−0.68)	(−0.66)	(−0.64)	(−0.63)
$GSA_{lag\ i}$	−0.3270**	−0.3510**	−0.3490**	−0.4390**	−0.2850*	−0.3061*	−0.4540*	−0.6860	−0.7220	−0.7190
	(−2.32)	(−2.25)	(−2.14)	(−2.05)	(−1.98)	(−1.91)	(−1.94)	(−1.64)	(−1.59)	(−1.63)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	266	266	266	266	266	266	262	262	258	258
Adj R^2	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.3%	3.3%	3.4%	3.4%
Panel B: Change in ROA										
Intercept	0.0050	0.0050	0.0050	0.0050	0.0071	0.0089	0.0085	0.0064	0.0045	0.0033
	(0.31)	(0.31)	(0.31)	(0.31)	(0.44)	(0.56)	(0.53)	(0.40)	(0.28)	(0.20)
$GSA_{lag\ i}$	−0.0129***	−0.0140***	−0.0161***	−0.0191***	−0.0235***	−0.0218**	−0.0135**	−0.0036**	−0.0031*	−0.0072**
	(−5.92)	(−5.88)	(−5.80)	(−5.84)	(−4.41)	(−2.32)	(−2.40)	(−2.14)	(−1.99)	(−2.01)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	242	242	242	242	242	242	240	240	240	240
Adj R^2	6.1%	6.1%	6.1%	6.1%	6.1%	5.9%	5.7%	5.5%	5.4%	5.5%
Panel C: Change in ROE										
Intercept	−4.6241	−4.6244	−4.6247	−4.6250	−4.6237	−4.6209	−4.8794	−4.8829	−5.1031*	−5.1062*
	(−1.63)	(−1.63)	(−1.63)	(−1.63)	(−1.63)	(−1.63)	(−1.64)	(−1.64)	(−1.65)	(−1.65)
$GSA_{lag\ i}$	−0.2240**	−0.2610**	−0.3380**	−0.3970**	−0.4950**	−0.5890**	−0.5640*	−0.4430	−0.4600	−0.4840*
	(−2.04)	(−2.07)	(−2.11)	(−2.10)	(−2.09)	(−2.02)	(−1.66)	(−1.63)	(−1.56)	(1.65)

(Continues)

TABLE 7 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	270	270	270	270	270	270	266	266	262	262
Adj R^2	11.0%	11.1%	11.1%	11.1%	11.1%	11.0%	11.0%	11.2%	10.9%	10.9%
Panel D: Change in institutional ownership										
Intercept	0.0661	0.0662	0.0664	0.0493	0.0509	0.0519	0.0527	0.0537	0.0544	0.0550
	(1.16)	(1.16)	(1.16)	(1.17)	(1.17)	(1.17)	(1.17)	(1.17)	(1.17)	(1.17)
$GSA_{lag\ i}$	−0.0150**	−0.0156**	−0.0156**	−0.0155**	−0.0173**	−0.0181**	−0.0185**	−0.0193*	−0.0195*	−0.0197*
	(−2.06)	(−2.06)	(−2.05)	(−2.05)	(−2.11)	(−2.10)	(−2.10)	(−1.92)	(−1.93)	(−1.93)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	263	263	263	262	261	261	261	261	261	261
Adj R^2	3.5%	3.5%	3.5%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%

Note: This table presents the effect of investor attention on reputational losses due to lawsuit filing. Panel A presents an ordinary least squares (OLS) regression of a change in earnings per share (EPS) growth on Google Search Activity (GSA). Panel B presents a regression of a change in return on assets (ROA) on GSA. Panel C presents a regression of a change in return on equity (ROE) on GSA. Panel D presents a regression of a change in institutional ownership on GSA. Changes in variables are calculated as a difference before and after the filing. Dependent variables EPS growth and change in ROA and ROE are adjusted for settlement and readjustment effect. Columns 1–10 use $GSA_{lag\ 1}$ to $GSA_{lag\ 10}$ data. $GSA_{lag\ i}$ is the abnormal GSA estimated *i* weeks before the filing date. GSA coefficients are multiplied by 100. The *t*-statisticss are presented in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

5.5 | Filing delay and investor attention

Following H3 in Section 3.1, we use GSA as our measure of investor attention to test its effect on the filing delay. To test this hypothesis, we regress the filing delay on lagged GSA and a set of control variables. Specifically, we use $GSA_{lag\ i}$ or the abnormal Google Search Activity (as defined in Section 4.2) for 1–10 weeks before the class action end date.

Table 8 presents our empirical results.[17] We find that higher investor attention during the class action period reduces the filing delay. In addition, we discover that investor attention becomes significant only as we approach the end of the class action period. Lagged GSA has a negative coefficient that is strongly significant in weeks 1 through 10 before the class action end date. Filing delay also increases with firm size and settlement amount, but does not appear to be affected by leverage, analyst following, or industry litigiousness.[18]

We find that investor attention affects the speed of lawsuit filing. When more investors pay attention to the firm's daily activities during the class action period, they discover the alleged fraud more quickly. This can be due to the easier collection of evidence or the more rapid discovery of the fraudulent activity itself. Regardless of the mechanism, we conclude that investor attention significantly affects the speed with which a class action is filed.

6 | ROBUSTNESS AND ALTERNATIVE TESTS

6.1 | GSA and weekly returns

In this section, we examine whether the effect of GSA on CARs to the filing is robust to including additional control variables. A significant relation between stock performance and an investor's reaction to the announcement of a lawsuit must exist if investors incorporate stock returns when estimating filing losses. To address this possibility, we add weekly returns as a control variable and reestimate the regression presented in Table 5. Table 9 presents these new regression results. We find that the weekly return variable to be both statistically and economically insignificant in all model specifications. The sign and magnitude of the GSA regressions coefficients remain similar to those reported in Table 5. These results suggest that the effect of GSA on the value loss observed at the time of filing is not affected by other factors potentially correlated with the filing-period announcement returns.

6.2 | Placebo tests

We also conduct a series of placebo tests to confirm that GSA is not simply associated with changes in stock returns. To test the effect of investor attention solely on the filing announcement returns, we regress the CARs before and after the filing on GSA. If there is a relation between lagged investor attention and abnormal returns, we expect the GSA regression coefficients to be statistically significant. Panels A and B of Table 10 present the results for the CAR regressions before and after the filing, respectively.[19]

[17]We use a 12-week period to estimate abnormal GSA as described in Section 3, with the first available GSA measure occurring during the first week of 2004. This results in a decrease in the number of observations as we increase the lag length in Table 8.

[18]These results are robust to the inclusion of industry and year fixed effects.

[19]For brevity, we do not report the regression coefficients for the control variables in Tables 10 and 11. We use, however, the same control variables as regressors, as in Table 5.

TABLE 8 Effect of investor attention on filing delay

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	234.0379***	236.6880***	223.3094***	250.3582***	237.1026***	240.9040***	248.3330***	258.9356***	271.3886***	265.7970***
	(3.17)	(3.24)	(3.09)	(3.25)	(3.18)	(3.43)	(3.49)	(3.47)	(3.49)	(3.47)
$GSA_{lag\ i}$	−2.3192***	−2.0639***	−1.8327***	−2.8783***	−2.3028***	−1.8811***	−0.9989**	−0.9030***	−1.7849***	−1.0814**
	(−4.03)	(−3.77)	(−3.74)	(−3.55)	(−4.41)	(−2.93)	(−2.28)	(−2.91)	(−2.97)	(−2.56)
Class Length	−0.0392**	−0.0465***	−0.0426**	−0.0487***	−0.0489***	−0.0479***	−0.0508***	−0.0542***	−0.0531***	−0.0651***
	(−2.24)	(−2.65)	(−2.44)	(−2.65)	(−2.68)	(−2.90)	(−3.10)	(−3.27)	(−2.91)	(−3.40)
Sector Violations	−8719.9200	−6804.8600	−7148.4100	−7651.9000	−6821.5000	−8435.4500	−9286.5600	−11019.4900	−12407.3900	−10587.3300
	(−0.83)	(−0.67)	(−0.70)	(−0.74)	(−0.66)	(−0.84)	(−0.92)	(−1.05)	(−1.14)	(−0.97)
Leverage	−0.2120	−0.0226	−0.1785	−0.2871	−0.2552	−0.3131	−0.3480	−0.3075	−0.3109	−0.3678
	(−0.38)	(−0.03)	(−0.31)	(−0.50)	(−0.45)	(−0.61)	(−0.69)	(−0.59)	(−0.60)	(−0.70)
log(Market Cap)	−9.1568**	−10.3463**	−9.0196*	−10.9990**	−10.3298**	−10.6558**	−10.6123**	−10.5130**	−10.6894**	−10.0594**
	(−1.99)	(−2.19)	(−1.89)	(−2.25)	(−2.17)	(−2.50)	(−2.50)	(−2.45)	(−2.50)	(−2.29)
Forecast Stdev	8.0317	10.1934	3.7538	15.3710	11.3702	9.9371	12.6631	18.7709	2.2850	5.0778
	(0.12)	(0.15)	(0.06)	(0.23)	(0.17)	(0.15)	(0.19)	(0.28)	(0.03)	(0.07)
Analyst Following	0.0262	0.0767	0.3776	0.3004	0.3387	1.2268	1.2129	0.8888	1.1584	0.7301
	(0.01)	(0.03)	(0.17)	(0.13)	(0.15)	(0.56)	(0.55)	(0.41)	(0.53)	(0.32)
ROA	64.9512	106.4520	72.4385	59.3443	71.2253	63.9558	61.3282	71.4617	58.5788	68.0708
	(0.65)	(0.95)	(0.73)	(0.58)	(0.70)	(0.65)	(0.62)	(0.70)	(0.58)	(0.46)

TABLE 8 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Settlement/TA	−659.9477**	−783.4240**	−608.2627*	−703.4680**	−638.4740*	−617.8128*	−615.8568*	−520.1497	−643.9752*	−622.3472
	(−2.04)	(−2.39)	(−1.87)	(−2.08)	(−1.83)	(−1.93)	(−1.93)	(−1.46)	(−1.95)	(−1.59)
N	287	287	287	286	287	281	278	274	274	264
Adj. R^2	4.5%	4.5%	4.6%	5.7%	5.7%	5.9%	6.1%	6.2%	6.8%	7.2%

Note: This table reports the effect of investor attention on the filing delay. The dependent variable, Filing Delay, is estimated as the number of days between the class action end date and filing of the lawsuit. $GSA_{lag\ i}$ represents the abnormal Google Search Activity estimated *i* weeks before the class action end date. Columns 1–10 use $GSA_{lag\ 1}$ to $GSA_{lag\ 10}$ data. Sector Violations is calculated as the natural log of lawsuits previously filed against firms in the same sector. Settlement/TA is calculated as the ratio of lawsuit settlement amount to firm total assets. See Table 1 for definitions of the control variables. The *t*-statistics are presented in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

TABLE 9 GSA and weekly returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	−0.1019*	−0.0862	−0.0482	−0.1003*	−0.0676	−0.0930	−0.1243**	−0.0551	−0.1256**	−0.0734
	(−1.90)	(−1.48)	(−0.82)	(−1.72)	(−1.18)	(−1.63)	(−2.07)	(−0.93)	(−2.25)	(−1.24)
$GSA_{lag\ i}$	−0.0411**	−0.0414**	−0.0398**	−0.0341**	−0.0399**	−0.0402**	−0.0216**	−0.0367**	−0.0399**	−0.0359**
	(−2.37)	(−2.28)	(−2.10)	(−2.02)	(−2.25)	(−2.29)	(−2.19)	(−2.04)	(−2.25)	(−2.06)
Return (week)	−0.0641	−0.0833	−0.0236	−0.2319	−0.0182	−0.0029	0.0602	−0.0178	0.0777	0.0058
	(−0.83)	(−1.34)	(−0.32)	(−0.51)	(−0.29)	(−0.05)	(0.75)	(−0.30)	(0.82)	(0.06)
Filing Delay	0.0173***	0.0207***	0.0189***	0.0236***	0.0208***	0.0212***	0.0199***	0.0182***	0.0208***	0.0192***
	(4.57)	(4.46)	(4.71)	(5.21)	(5.65)	(5.11)	(4.80)	(4.22)	(5.44)	(5.14)
Class Length	−0.0098	0.0038	0.0006	−0.0002	0.0194	−0.0015	0.0065	−0.0129	−0.0018	−0.0083
	(−0.55)	(0.21)	(0.03)	(−0.01)	(1.11)	(−0.08)	(0.37)	(−0.70)	(−0.10)	(−0.42)
log(Market Cap)	3.7100	1.4700	1.8600	4.3800	0.2674	0.7238	1.6000	1.5300	2.6900	2.6700
	(0.87)	(0.31)	(0.38)	(1.03)	(0.06)	(0.16)	(0.35)	(0.36)	(0.63)	(0.59)
Leverage	0.0031	0.0020	0.0004	0.0026	0.0019	0.0020	−0.0003	0.0031	0.0002	0.0016
	(1.45)	(0.76)	(0.16)	(1.13)	(0.80)	(0.77)	(−0.12)	(1.41)	(0.07)	(0.59)
Sector Violations	0.0070	0.0027	−0.0012	0.0020	0.0002	0.0050	0.0100	0.0008	0.0102	0.0033
	(0.94)	(0.37)	(−0.17)	(0.28)	(0.02)	(0.69)	(1.32)	(0.10)	(1.42)	(0.44)
Analyst Following	−0.0017	−0.0007	−0.0003	0.0003	0.0002	−0.0002	−0.0001	−0.0001	0.0002	−0.0017
	(−1.09)	(−0.42)	(−0.18)	(0.19)	(0.15)	(−0.09)	(−0.08)	(−0.04)	(0.10)	(−1.07)
Forecast Stdev	0.0284	0.0130	−0.0384	−0.0678	−0.0016	0.0290	−0.0021	−0.0614	−0.0081	0.0254
	(0.53)	(0.23)	(−0.61)	(−1.13)	(−0.03)	(0.50)	(−0.04)	(−1.00)	(−0.13)	(0.41)

TABLE 9 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ROA	0.0735	0.1529	−0.0546	−0.0344	0.1770	0.2125	−0.0218	−0.0462	0.0186	0.1049
	(0.45)	(0.87)	(−0.29)	(−0.21)	(1.04)	(1.19)	(−0.14)	(−0.26)	(0.10)	(0.60)
N	268	267	267	267	265	265	262	262	262	262
Adj R^2	6.4%	6.0%	6.9%	6.0%	6.9%	6.5%	6.2%	5.8%	6.6%	5.8%

Note: The dependent variable in this regression is cumulative abnormal returns (CARs) calculated over the window of (−2, 2) days around the filing event. The results are from an ordinary least squares (OLS) regression of filing CARs on abnormal Google Search Activity (GSA) and weekly returns. $GSA_{lag\ i}$ represents the abnormal GSA estimated *i* weeks before the filing date. Columns 1–10 use $GSA_{lag\ 1}$ to $GSA_{lag\ 10}$ data. Return represents stock return estimated *i* weeks before the filing date. Sector Violations is calculated as the natural log of lawsuits previously filed against firms in the same sector. Settlement/TA is calculated as the ratio of lawsuit settlement amount to firm total assets.GSA coefficients are multiplied by 100. Class Length coefficients are multiplied by 1000. See Table 1 for definitions of the control variables. The *t*-statistics are presented in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

TABLE 10 Placebo tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Filing CARs (−2, −5)										
Intercept	−0.1310**	−0.1311**	−0.1308**	−0.1307**	−0.1306**	−0.1306**	−0.1304**	−0.1305**	−0.1307**	−0.1305**
	(−2.03)	(−2.03)	(−2.06)	(−2.06)	(−2.06)	(−2.06)	(−2.05)	(−2.06)	(−2.06)	(−2.06)
$GSA_{lag\ i}$	0.0018	0.0020	0.0018	0.0015	0.0014	0.0013	0.0009	0.0011	0.0013	0.0010
	(0.44)	(0.47)	(0.44)	(0.38)	(0.36)	(0.35)	(0.25)	(0.29)	(0.34)	(0.27)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	277	277	277	276	276	276	276	276	276	276
Adj R^2	2.5%	2.5%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Panel B: Filing CARs (2, 5)										
Intercept	−0.0398	−0.0351	−0.0350	−0.0351	−0.0351	−0.0352	−0.0350	−0.0348	−0.0349	−0.0117
	(−0.92)	(−0.82)	(−0.82)	(−0.82)	(−0.82)	(−0.82)	(−0.82)	(−0.81)	(−0.81)	(−0.28)
$GSA_{lag\ i}$	−0.0015	−0.0013	−0.0012	−0.0011	−0.0010	−0.0009	−0.0011	−0.0013	−0.0011	−0.0014
	(−1.40)	(−1.08)	(−1.07)	(−0.96)	(−0.90)	(−0.79)	(−0.99)	(−1.19)	(−1.03)	(−1.23)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	277	277	277	276	276	276	276	276	276	276
Adj R^2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Note: The dependent variables in these regressions are cumulative abnormal returns (CARs) calculated before and after the filing announcement. The results are from an ordinary least squares (OLS) regression of filing CARs on abnormal Google Search Activity (GSA). $GSA_{lag\ i}$ represents the abnormal GSA estimated *i* weeks before the filing date. Columns 1–10 use $GSA_{lag\ 1}$ to $GSA_{lag\ 10}$ data. The *t*-statistics are presented in parentheses.

**$p < .05$.

We find that the GSA coefficients are negative but statistically insignificant in all regressions. This suggests that investor attention affects the filing CARs exclusively. Additionally, the R^2s of these regressions are low. This result confirms that there is no significant relation between GSA and abnormal returns before and after the lawsuit filing.

6.3 | Short interest and filing CARs

In this section, we examine whether the market's short interest is related to the negative announcement-filing-period returns observed for the defendant firms. There are several reasons why short interest might be linked to these negative CARs. If investors anticipate the lawsuit filing and the market's subsequent negative response, they might short sell the defendant firm's equity. Short interest could also capture the effect of information leakage initiated by parties involved in a lawsuit. Finally, short interest might proxy for the ex ante beliefs regarding the severity of the alleged violation.

Panel A of Table 11 presents the statistical summary for our short interest variables. Instead of nominal short interest, we use the ratio of the cumulative volume of short contracts to the market capitalization of a defendant firm to proxy for investor expectations. The mean (median) adjusted short interest in our sample equals 2.34% (1.45%) of a firm's market value. Short interest before and after lawsuit filing remains unchanged. The mean change in short interest is 0.82% and the median change is 0.14%. Such small median change indicates that at least half of the investors do not increase short sell positions before the lawsuit filing. This could suggest that not all

TABLE 11 Effect of short interest on filing-announcement-period CARs

Panel A: Short interest around the filing event							
			N		Mean		Median
Short interest/market cap			296		2.34%		1.45%
Change in short interest			287		0.82%		0.14%
Correlation with GSA			−5.81%				
Panel B: Short interest, GSA, and filing announcement CARs							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	−0.0914	−0.0741	−0.0751	−0.0751	−0.0751	−0.0751	−0.0751
	(−1.33)	(−1.09)	(−1.10)	(−1.10)	(−1.10)	(−1.10)	(−1.10)
Short interest/market cap	0.7314	0.7679*	0.7681*	0.7681*	0.7681*	0.7681*	0.7681*
	(1.29)	(1.92)	(1.92)	(1.92)	(1.92)	(1.92)	(1.92)
$GSA_{lag\ i}$		−0.0071***	−0.0070***	−0.0070***	−0.0069***	−0.0069***	−0.0068***
		(−8.81)	(−8.81)	(−8.81)	(−8.81)	(−8.81)	(−8.81)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	266	266	266	266	265	265	265
Adj R^2	8.2%	9.0%	8.7%	8.7%	8.7%	8.7%	8.7%

Note: This table presents the univariate and multivariate results of the effect of short interest on the filing event. Panel A shows the univariate statistics of short interest adjusted by market capitalization, change in short interest surrounding the filing, and the correlation between Google Search Activity (GSA) and adjusted short interest. Panel B presents an ordinary least squares (OLS) regression of filing cumulative abnormal returns (CARs) on short interest adjusted by market capitalization and GSA. Class Length coefficients are multiplied by 1000. The *t*-statistics are presented in parentheses.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

investors able to short sell have information about the lawsuit before filing. These univariate results are consistent with Daske et al. (2005) who fail to find that short sale transactions occur before the public release of bad news. Additionally, we cannot exclude the possibility that retail investors are also involved in short selling. Indeed, the literature suggests that between 5% and 10% of short-selling transactions are done on behalf of individual investors (Asquith et al., 2005; D'Avolio, 2002; Kelley & Tetlock, 2017).

Panel B of Table 11 presents the results of filing CAR regressions on the adjusted short interest. The regression coefficients for the adjusted short interest are positive but marginally statistically insignificant. This result suggests the absence of significant anticipation or leakage of information concerning an upcoming lawsuit. Columns 2–7 report the results of regressions including both the adjusted short interest and GSA. We report a negative and significant effect of investor attention on filing CARs even in the presence of the short interest variable. We conclude that the effect of investor attention in the market reaction to a lawsuit announcement remains robust to including short interest. Additionally, short interest alone does not explain the negative market reaction to the filing announcement.

6.4 | GSA and other measures of investor attention

In this section, we test whether the relation between GSA and equity value losses incurred by defendant firms is robust to the inclusion of media coverage and abnormal volume. To reexamine H1, we add these measures of investor attention to determine whether GSA possesses explanatory power beyond these traditional attention proxies. We regress the CARs estimated over the filing period against lagged GSA, media, and trading volume in the same model.

Table 12 presents our results. We discover that only the GSA regression coefficients are statistically and economically significant. As expected, the sign of the GSA regression coefficients and their statistical significance mimic those reported in Section 5. As expected, we conclude that GSA contains meaningful new information about investor attention in litigation even after controlling for media coverage and abnormal trading volume.

6.5 | Selection bias

Our final sample consists only of sued firms whenever GSA data are available on Google Trends. As we mention in Section 4.2, if a firm is insufficiently searched on Google, Google Trends fails to generate a corresponding search index. Therefore, our investor attention measure, GSA, becomes unavailable and this observation is not included in our sample. Thus, our results in Section 5 might be subject to selection bias.

To address this potential selection bias, we estimate a two-stage Heckman (1979) selection model. In this model, the first stage involves a probit regression to estimate the probability that GSA occurs. This regression involves all 480 lawsuit observations with available Compustat and CRSP data and is not limited to whether a GSA estimate exists. To estimate the probability of GSA availability, we refer to Da et al. (2011) for a set of possible explanatory variables.

Table 13 presents our results. Columns 1–10 use lagged values of GSA before the filing event. Panel A reports the results for the first-stage probit regression. Consistent with the results in Da et al. (2011), we find that a firm's market capitalization and media mentions are positively related to the probability of firm searches and, consequently, GSA.

Panel B of Table 13 presents the results of the second-stage ordinary least squares (OLS) regression. In this regression, the dependent variable is the CARs surrounding the filing date and the main independent variable is σ, which represents the predicted probability of GSA occurring from the first stage. The model specification allows us

TABLE 12 GSA and other measures of attention

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	−0.1845	−0.1946	−0.2752*	−0.1546	−0.2439*	−0.2538	−0.2766	−0.2943*	−0.3262	−0.2438*
	(−0.73)	(−1.14)	(−1.97)	(−0.61)	(−1.81)	(−0.97)	(−1.10)	(−1.89)	(−1.28)	(−1.72)
$GSA_{lag\ i}$	−0.0309***	−0.0227**	−0.0521***	−0.0458**	−0.0381**	−0.0441**	−0.0617**	−0.0459**	−0.0314*	−0.0208*
	(−2.79)	(−2.58)	(−2.97)	(−2.34)	(−2.16)	(−2.23)	(−1.99)	(−2.02)	(−1.96)	(−1.66)
$Media_{lag\ i}$	0.0063	0.0011	0.0115	0.0200*	0.0041	0.0057	0.0281	0.0022	0.0060	0.0200
	(0.43)	(0.07)	(1.24)	(1.81)	(0.32)	(0.33)	(1.06)	(0.18)	(0.38)	(1.40)
$Volume_{lag\ i}$	0.0044	0.0090	0.0137	0.0044	0.0150	0.0030	0.0055	0.0165	0.0108	0.0156
	(0.41)	(0.87)	(1.39)	(0.42)	(1.53)	(0.26)	(0.52)	(1.49)	(1.06)	(1.49)
Filing Delay	0.0002***	0.0002**	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(2.71)	(2.44)	(3.50)	(3.06)	(3.31)	(2.75)	(3.05)	(3.44)	(3.23)	(2.97)
Class Length	−0.0114	−0.0143	−0.0018	−0.0246	−0.0148	−0.0121	−0.0124	−0.0019	−0.0176	−0.0020
	(−0.38)	(−0.46)	(−0.06)	(−0.83)	(−0.50)	(−0.37)	(−0.41)	(−0.06)	(−0.55)	(−0.07)
log(Market Cap)	0.0001	0.0005	0.0046	0.0000	0.0021	0.0005	0.0012	0.0011	0.0017	0.0017
	(0.02)	(0.08)	(0.60)	(0.00)	(0.26)	(0.06)	(0.15)	(0.15)	(0.22)	(0.21)
Leverage	−0.0015	−0.0010	−0.0020	−0.0038	−0.0040	−0.0022	−0.0017	−0.0008	−0.0006	−0.0036
	(−0.43)	(−0.28)	(−0.56)	(−1.07)	(−1.02)	(−0.42)	(−0.41)	(−0.21)	(−0.15)	(−0.72)
Sector Violations	0.0107	0.0142	0.0211**	0.0069	0.0175*	0.0277**	0.0191*	0.0197*	0.0165	0.0199*
	(1.02)	(1.26)	(2.06)	(0.68)	(1.70)	(2.37)	(1.76)	(1.79)	(1.48)	(1.94)
Analyst Following	−0.0008	−0.0009	−0.0032	−0.0005	−0.0023	−0.0023	−0.0025	−0.0018	−0.0024	−0.0020
	(−0.33)	(−0.36)	(−1.32)	(−0.23)	(−0.95)	(−0.87)	(−0.95)	(−0.70)	(−0.91)	(−0.83)

(Continues)

TABLE 12 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Forecast Stdev	−0.0392	−0.0064	−0.0394	−0.0543	−0.0177	−0.0027	−0.0052	−0.0192	−0.0584	−0.0023
	(−0.42)	(−0.06)	(−0.44)	(−0.58)	(−0.17)	(−0.02)	(−0.05)	(−0.18)	(−0.52)	(−0.02)
ROA	−0.3939*	−0.1225	−0.1979	−0.4098**	−0.4975**	−0.1239	−0.1373	−0.1156	−0.1029	−0.1683
	(−1.97)	(−0.42)	(−0.80)	(−2.04)	(−2.24)	(−0.48)	(−0.51)	(−0.42)	(−0.36)	(−0.64)
Settlement/TA	−0.4576***	−0.3738***	−0.6018***	−0.6420***	−0.8769	−0.4238	−0.5768	−0.9647*	−0.9280	−1.2024**
	(−3.03)	(−2.78)	(−4.07)	(−4.48)	(−1.41)	(−0.80)	(−1.02)	(−1.80)	(−1.60)	(−2.61)
N	227	227	225	223	222	222	219	219	214	214
Adj R^2	1.6%	1.6%	1.6%	1.5%	1.5%	1.6%	1.6%	1.5%	1.6%	1.6%

Note: The dependent variable in this regression is cumulative abnormal returns (CARs) calculated over the window of (−2, 2) days around the filing event. The results are from an ordinary least squares (OLS) regression of filing CARs on Google Search Activity (GSA), abnormal media coverage, and abnormal trading volume. $GSA_{lag\ i}$ represents the abnormal GSA estimated *i* weeks before the filing date. $Media_{lag\ i}$ is the abnormal media coverage estimated *i* weeks before the filing date. $Volume_{lag\ i}$ is the abnormal trading volume estimated *i* weeks before the filing date. Sector Violations is calculated as the natural log of lawsuits previously filed against firms in the same sector. Settlement/TA is calculated as the ratio of lawsuit settlement amount to firm total assets. Class Length coefficients are multiplied by 1000. GSA coefficients are multiplied by 100. See Table 1 for definitions of the control variables. The *t*-statistics are presented in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

TABLE 13 Selection bias

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: First-stage probit										
Intercept	−4.1753***	−3.4847**	−3.9636**	−3.7105**	−3.7720***	−3.3205**	−3.4337**	−3.4757**	−3.8038***	−2.6552*
	(−2.76)	(−2.44)	(−2.56)	(−2.53)	(−2.64)	(−2.37)	(−2.42)	(−2.47)	(−2.67)	(−1.89)
log(Market Cap)	0.3527***	0.3450***	0.3474***	0.3422***	0.3461***	0.3402***	0.3401***	0.3368***	0.3331***	0.3365***
	(6.53)	(6.39)	(6.42)	(6.34)	(6.37)	(6.27)	(6.23)	(6.20)	(6.12)	(6.11)
News_Dummy	0.1043	0.0883	0.0405	0.0878	0.2147	0.1407	0.3594**	0.1083	0.1203	0.3550**
	(0.69)	(0.58)	(0.25)	(0.59)	(1.40)	(0.92)	(2.42)	(0.72)	(0.77)	(2.34)
Abnormal Volume	0.0997	0.0686	0.0876	0.0794	0.0846	0.0634	0.0736	0.0720	0.0830	0.0375
	(1.47)	(1.08)	(1.27)	(1.20)	(1.32)	(1.01)	(1.15)	(1.14)	(1.29)	(0.60)
Analyst Following	0.0031	0.0030	0.0044	0.0049	0.0042	0.0024	0.0027	0.0030	0.0061	0.0038
	(0.16)	(0.16)	(0.23)	(0.26)	(0.22)	(0.13)	(0.14)	(0.16)	(0.32)	(0.20)
Adj R^2	16.3%	15.7%	15.7%	15.5%	15.8%	15.1%	16.1%	15.1%	15.2%	16.0%
Panel B: Second stage OLS										
σ	0.1028***	0.1025***	0.1024***	0.1023***	0.1029***	0.1028***	0.1026***	0.1026***	0.1025***	0.1038***
	(21.25)	(20.66)	(21.16)	(21.18)	(19.93)	(20.23)	(20.80)	(20.89)	(21.04)	(18.56)
N	352	351	351	350	348	347	346	344	343	343
ρ	0.0053	0.0742	−0.0212	−0.0136	0.1246	0.0992	0.0613	0.0488	−0.0197	0.2281
	(0.01)	(0.24)	(−0.05)	(−0.03)	(0.46)	(0.34)	(0.20)	(0.15)	(−0.05)	(1.04)

Note: This table presents the results from a two-stage Heckman (1979) selection model. Panel A presets the results of the first-stage probit regression where the dependent variable is a dummy that equals 1 if Google Search Activity ($GSA_{lag\ i}$) data are available for the firm under consideration, and 0 otherwise. $GSA_{lag\ i}$ is the abnormal GSA estimated *i* week before the filing date. Columns 1–10 use $GSA_{lag\ 1}$ to $GSA_{lag\ 10}$ data. Log(Market Cap) is calculated as the natural log of market equity. Abnormal Volume is a weekly abnormal trading volume of each firm. News_Dummy is a dummy variable that equals 1 if there is news in *i* week. Analyst Following represents the average number of analysts covering the firm. Panel B presents the second-stage ordinary least squares (OLS) regression where the dependent variable is cumulative abnormal returns (CARs) calculated over the window of (−2, 2) days around the filing event. The independent variables consist of σ, which represents the predicted probability from the first stage, and all other control variables from Table 5. For brevity, we do not present the coefficients on control variables in the second stage. ρ represents the selection bias coefficient. The *t*-statistics are presented in parentheses.

**$p < 0.05$; ***$p < 0.01$.

to estimate only the effect of investor attention occurring, but not its magnitude. The coefficient for σ is positive and significant across all 10 model specifications. This shows that GSA activity is positively related to reputational losses suffered by the defendant firms at filing. The ρ coefficient from the second-stage regression indicates the severity and direction of any selection bias. This coefficient is statistically insignificant in all model specifications, which indicates that the findings in Table 5 do not suffer from selection bias. We conclude that our results are robust, and selection bias does not drive the main findings of this article.

6.6 | Changes in Google search index

To further address the robustness of our results, we conduct a test following an exogenous shock to investor attention. In June 2010, Google announced the completion of its new indexing system called Caffeine. The introduction of this indexing system is associated with increases in the amount of content available to users as well as search speed.[20] We find that this technology upgrade is positively related to the number of Google searches. We observe an increase in the average search index from 25 to 33 following the introduction of Caffeine. Therefore, we treat Caffeine's introduction as an exogenous shock to investor attention and use it to test the stability of the effect of GSA on the lawsuit losses before and after the technological change.

To test H1 before and after Caffeine, we regress the CARs estimated at the filing date against lagged GSA, a Caffeine indicator variable, and their interaction. Table 14 presents these results. The sign and magnitude of the GSA coefficients are similar to those reported in Table 5. This implies a negative and significant relation between abnormal investor attention and the filing-announcement CARs, regardless of the infrastructure used to generate GSA. The interaction between GSA and the Caffeine indicator variable is negative, suggesting a more severe market response to filing announcements after 2010. Therefore, the results of this test confirm our previous results of a negative relation between investor attention and abnormal returns at the time of the lawsuit filing.

7 | SUMMARY AND DISCUSSION

Securities class action litigation represents a challenging corporate event for any defendant firm. The literature shows that these events negatively affect a firm's reputation and are associated with large value losses, regardless of the lawsuit's outcome (Bhagat et al., 1998; Bizjak & Coles, 1995). We extend this stream of research and examine how shareholder attention can influence the effect of securities class action lawsuits. Our results show that investor attention plays a key role in determining the magnitude of damages suffered by defendant firms and the speed of the underlying litigation process.

The results reported in this article provide three important contributions. First, our findings identify an important determinant of the value losses observed at a lawsuit filing that has been ignored in the literature. We provide evidence that investor attention before the lawsuit filing is extremely important in determining a firm's value loss and reputational damages due to corporate scrutiny. In fact, we find that investor attention is more important in explaining value losses at the time of a lawsuit filing than the severity of the lawsuit itself.

Second, our results offer insight into the process of information diffusion within a securities class action lawsuit. Our results explain how investors receive and process information about the lawsuit filing. We find that information about litigation is either inferred or leaked to the public as early as 2 months before the actual filing.

[20] https://searchengineland.com/googles-new-indexing-infrastructure-caffeine-now-live-43891

TABLE 14 GSA infrastructure and filing-announcement-period CARs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	−0.1408**	−0.1409**	−0.1409**	−0.1361**	−0.1358**	−0.1359**	−0.1360**	−0.1372**	−0.1376**	−0.1371**
	(−2.22)	(−2.22)	(−2.22)	(−2.15)	(−2.14)	(−2.14)	(−2.14)	(−2.16)	(−2.17)	(−2.16)
$GSA_{lag\ i}$	−0.0754**	−0.0797**	−0.0716**	−0.0743**	−0.0805**	−0.0521**	−0.0414**	−0.0428**	−0.0743**	−0.0788***
	(−2.48)	(−2.47)	(−2.38)	(−2.36)	(−2.33)	(−2.19)	(−2.05)	(−2.22)	(−2.59)	(2.61)
Caffeine	0.0110	0.0110	0.0109	0.0105	0.0101	0.0099	0.0097	0.0087	0.0086	0.0091
	(0.72)	(0.72)	(0.71)	(0.69)	(0.66)	(0.65)	(0.64)	(0.57)	(0.57)	(0.61)
Interaction	−0.0120	−0.0123	−0.0115	−0.0116	−0.0122	−0.0093	−0.0026	−0.0039	−0.0170	−0.0175**
	(−0.74)	(−0.70)	(−0.60)	(−0.56)	(−0.50)	(−0.34)	(−0.09)	(1.09)	(1.50)	(2.45)
Filing Delay	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(5.13)	(5.13)	(5.13)	(5.12)	(5.08)	(5.08)	(5.07)	(5.09)	(5.11)	(5.12)
Class Length	0.0067	0.0067	0.0067	0.0073	0.0071	0.0071	0.0072	0.0075	0.0077	0.0078
	(0.36)	(0.36)	(0.36)	(0.39)	(0.39)	(0.39)	(0.39)	(0.40)	(0.41)	(0.42)
log(Market Cap)	0.0006	0.0006	0.0007	0.0001	0.0001	0.0001	0.0001	0.0003	0.0004	0.0004
	(0.13)	(0.14)	(0.14)	(0.02)	(0.02)	(0.02)	(0.02)	(0.06)	(0.09)	(0.10)
Leverage	0.0013	0.0013	0.0013	0.0010	0.0010	0.0010	0.0010	0.0009	0.0009	0.0009
	(0.51)	(0.51)	(0.51)	(0.41)	(0.40)	(0.39)	(0.38)	(0.35)	(0.34)	(0.36)
Sector Violations	0.0136*	0.0136*	0.0136*	0.0141*	0.0141*	0.0142*	0.0142*	0.0142*	0.0140*	0.0139*
	(1.77)	(1.76)	(1.76)	(1.83)	(1.83)	(1.84)	(1.84)	(1.84)	(1.82)	(1.80)
Analyst Following	−0.0016	−0.0016	−0.0016	−0.0016	−0.0015	−0.0015	−0.0015	−0.0014	−0.0013	−0.0014
	(−0.96)	(−0.95)	(−0.95)	(−0.95)	(−0.94)	(−0.93)	(−0.91)	(−0.84)	(−0.84)	(−0.88)

(Continues)

TABLE 14 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Forecast Stdev	0.0215	0.0214	0.0212	0.0120	0.0117	0.0113	0.0109	0.0092	0.0083	0.0081
	(0.33)	(0.33)	(0.32)	(0.18)	(0.18)	(0.17)	(0.16)	(0.14)	(0.12)	(0.12)
ROA	0.0411	0.0410	0.0408	0.0212	0.0209	0.0203	0.0199	0.0166	0.0139	0.0123
	(0.24)	(0.24)	(0.23)	(0.12)	(0.12)	(0.12)	(0.11)	(0.09)	(0.08)	(0.07)
Settlement/TA	−0.4263***	−0.4238***	−0.4234***	−0.5387***	−0.5408***	−0.5416***	−0.5419***	−0.5393***	−0.5376***	−0.5379***
	(−2.76)	(−2.73)	(−2.73)	(−2.75)	(−2.76)	(−2.76)	(−2.77)	(−2.76)	(−2.76)	(−2.77)
N	276	276	276	276	275	275	275	275	275	275
Adj R^2	5.8%	5.8%	5.8%	6.2%	6.2%	6.2%	6.1%	6.2%	6.4%	6.4%

Note: This table presents the results of an ordinary least squares (OLS) regression of filing cumulative abnormal returns (CARs) on Google Search Activity (GSA), Caffeine, and their interaction. The dependent variable in this regression is CARs calculated over the window of (−2, 2) days around the filing event. $GSA_{lag\ i}$ represents the abnormal GSA estimated *i* weeks before the filing date. Caffeine is an indicator variable that equals 1 if GSA is calculated after the introduction of Caffeine, the indexing system by Google. Sector Violations is calculated as the natural log of lawsuits previously filed against firms in the same sector. Settlement/TA is calculated as the ratio of lawsuit settlement amount to firm total assets. Class Length coefficients are multiplied by 1000. GSA and Interaction coefficients are multiplied by 100. See Table 1 for definitions of the control variables. The *t*-statistics are presented in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Finally, the evidence presented in this article contributes to the broader literature on investor behavior and information processing. We test the effect of GSA and traditional attention proxies such as media coverage and abnormal volume. We find that GSA provides explanatory power regarding fraud discovery and litigation loss even after controlling for traditional measures of investor attention.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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