Shareholder litigation risk and real earnings management: a causal inference

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Abstract

Purpose – The authors study how shareholder litigation risk impacts a firm's decision of real earnings management (REM). This paper aims to shed light on how shareholder litigation risk impacts REM. The authors further explore how the intensifying effect varies systematically conditioning on the degree of information asymmetry and the strength of internal corporate governance.

Design/methodology/approach – In this study, the authors use the 1999 Ninth Circuit Court ruling as a quasi-experiment that reduces shareholder litigation risk to address endogeneity and establish a causal inference.

Findings – The difference-in-difference tests suggest lower shareholder litigation risk intensifies REM. In other words, higher litigation risk mitigates REM. Cross-sectional test results suggest the negative effect of decreased shareholder litigation is more pronounced when monitoring difficulty is higher, when information environment is more impoverished and when internal corporate governance is weaker. The negative effect is also stronger in firms with higher sensitivity to legal threats.

Originality/value – Protection of investors' interest is the focus of corporate governance. Designed as an important corporate governance mechanism, shareholder litigation enables investors to pursue legal actions to recover their losses in the event of corporate misbehaviors. However, whether shareholder litigation is an effective corporate governance tool and beneficial to shareholders and firms is not without controversy. The authors contribute to the debate by providing evidence that supports the argument that shareholder litigation threat significantly disciplines REM, a form of costlier earnings management technique and myopic investment behavior.

Keywords Litigation risk, Information asymmetry, Real earnings management, Internal corporate governance

Paper type Research paper

1. Introduction

Ex ante shareholder litigation threat[1] significantly raises the cost of managerial opportunism and creates a unique disincentive for managers to engage in opportunistic behaviors and is thus considered an important external corporate governance tool (Kim and Skinner, 2012). In this study, we explore the research question of whether shareholder

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litigation risk can constrain real earnings management (REM)[2]. Empirical evidence to answer this question is crucial. REM has become a primary earnings management choice[3] and is costlier to firms and investors than accrual-based earnings management (AEM). As a result, understanding the causes and constraining forces of REM is important given its direct adverse impact on firms' cash flows and firm value.

Although class action shareholder litigations are primarily related to the integrity of firm disclosures, we argue that REM can be both, directly and indirectly, related to higher likelihood of shareholder litigations, which, in turn, increases the cost of REM and creates strong disincentives for REM. REM can be directly associated with higher litigation risk, as some REM activities clearly violate generally accepted accounting principles (GAAP). One such example is channel stuffing or trade loading, a myopic business practice to meet short-term sales goal by coercively shipping more products to distributors than a firm is able to sell. One recent shareholder litigation involving channel stuffing is the case of a 2016 class-action lawsuit against MiMedx Group (NASDAQ: MDXG). Shareholders claimed MiMedx had a coercive distribution agreement to "stuff the shelves" of the distributors[4].

REM can also be indirectly associated with higher shareholder litigation risk because of significant deterioration of long-term firm performance due to the long-term detrimental impact of aggressive REM on firm performance and stock price (Cohen *et al.*, 2008; Zang, 2012). Significant losses in the stock market constitute one pre-condition of shareholder class action lawsuits against corporations (Kim and Skinner, 2012). In fact, shareholders almost always swiftly litigate to recover their losses after negative financial events, which creates tremendous pressure for managers to make efforts to avoid operating loss and sudden stock price decline[5],[6].

There are several severe empirical challenges to identify the causal effect of shareholder litigation risk on REM. First, reverse causality complicates the interpretation of any significant empirical results of the effect. Opportunistic business decisions and subsequent drops in firm value associated with REM unavoidably drive shareholders' decisions to initiate legal actions. Second, it is difficult to rule out the impact of omitted variable bias, as some unobservable factors are correlated with both shareholder litigation risk and managers' REM decisions. Finally, empirical proxies of *ex ante* shareholder litigation risk mentioned in prior literature[7] are prone to backward-looking bias, as they are typically impacted by pre-existing firm-level and economy-level characteristics. Thus, those proxies "cannot completely capture shifts in the legal and regulatory regime" (Houston *et al.*, 2019). In this study, we use a natural experiment from an unanticipated change in the legal environment that reduces shareholder litigation risk to address endogeneity and establish causal inference.

On July 2, 1999, the Ninth Circuit Court of Appeals issued a ruling applicable only to shareholder class action litigation, stating that plaintiffs must present facts to infer the deliberate recklessness in alleged misconducts. In other circuits, plaintiffs require only evidence of recklessness. Thus, the 1999 Ninth Circuit Court ruling effectively reduces the shareholder litigation risk in those nine states affected[8]. Anecdotal evidence suggests that firms did not expect this ruling and it is unlikely that firms endogenously chose the locations of headquarters in anticipation of the ruling (Crane and Koch, 2016). It is also unlikely that any observable or unobservable firm characteristics influenced this ruling. Three randomly-selected and tenured judges made the ruling, eliminating the possibility that external factors or the views of other stakeholders tainted the ruling. Therefore, the unexpected 1999 Ninth Circuit Court ruling constitutes an ideal exogenous shock to causally examine the impact of shareholder litigation risk on firm behavior (Crane and Koch, 2016; Cazier *et al.*, 2017; Hopkins, 2018; Houston *et al.*, 2019).

Our sample consists of 1,094 firms (5,953 firm-years) spanning four years around the 1999 Ninth Circuit Court ruling adoption date (July 2, 1999). We find treatment firms engage in significantly higher REM after the Ninth Circuit Court ruling took effect. Because the litigation risk has been decreased in the post-ruling period for the treatment firms, this result suggests a negative association between expected litigation risk and REM[9]. Our treatment group is comprised of firms headquartered in the Ninth Circuit Court of Appeals, including Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon and Washington. To obtain a control sample, we follow prior research (Crane and Koch, 2016; Houston *et al.*, 2019) and use nearest neighbor matching to pair each of the treated firms to a non-treated firm, which is in the same two-digit Standard Industry Classification (SIC) industry and has the closest average logarithm total assets, average book-to-market, and average leverage ratio in the four-year period before the issuance of the ruling. Our difference-in-difference (DiD) tests suggest lower shareholder litigation risk intensifies REM. In other words, higher litigation risk mitigates REM.

To shed light on how shareholder litigation risk impacts REM, we explore how the intensifying effect varies systematically based on the degree of information asymmetry. We proxy the degree of information asymmetry with bid-ask spread, analysts' following, analysts' forecast errors and research and development (R&D) intensity. Consistent with the notion that an impoverished information environment facilitates managers' opportunistic behavior, our results suggest that the aggregating effect is more pronounced when monitoring difficulty, i.e. information asymmetry is higher.

We also explore the mitigating role of internal corporate governance. Prior research suggests a strong disciplinary effect of internal corporate governance on managerial opportunism (Shleifer and Vishny, 1997; Denis and McConnell, 2003; Aggarwal *et al.*, 2009; Frankel *et al.*, 2011). Noticeably, Cheng *et al.* (2016) find managers are less likely to manage opportunistic REM when internal corporate governance is strong. Using the proportion of board independence and the proportion of female directors as proxies for internal corporate governance quality, we find a complementary relationship between internal corporate governance and shareholder litigation risk in curbing REM: the constraining effect of shareholder litigation risk on REM is more salient for firms with stronger internal corporate governance.

To further ensure that the observed intensifying effect is attributable to the change in shareholder litigation threat, not to some other confounding cause, we take measures to validate the causal effect. Particularly, we examine the causal effect in firms with various degrees of sensitivity to litigation risk. If changes in litigation risk truly lead to the response of REM, we expect the effect is more pronounced in firms that are more vulnerable to private litigations or firms with higher legal exposure. Following prior literature (Francis *et al.*, 1994; Chen *et al.*, 2002; Cazier *et al.*, 2017), we use industry membership, firm age and firm leverage as proxies of firms' sensitivity to litigation risk. Our results suggest the aggregating effect of reduced shareholder litigation is stronger in firms that are more sensitive to litigation risk.

We conduct a series of robustness tests. First, we trace the dynamic effect of the ruling decision on managers' REM actions. The evidence suggests that when the litigation environment became less friendly for plaintiffs in the Ninth Circuit Court, the intensity of REM sustained a significant and continuous increase. Second, we examine whether REM decreases in another setting, i.e. the initial public offering (IPO), which poses higher litigation risk in the pre-IPO period. Third, we conduct simulations that randomly assign treatment firms in our sample to rule out the possibility that chance could drive our DiD results. The simulations suggest the DiD estimators are close to zero, on average. Fourth, we run bootstrap tests to address the concern that an over-rejection problem could affect our

DiD results. The bootstrap tests indicate that the DiD estimators are still statistically significant. Fifth, we conduct a placebo test to address the issue that unobservable shocks could cause our DiD results. We artificially pick July 2006 as the "pseudo-event" month and assume that the shareholder litigation risk has been reduced after that. We find there is no significant difference in REM between treatment and control firms around such a placebo-event. Sixth, we use Gunny's (2010) alternative measures of REM and our conclusion remains the same. Seventh, our findings are not sensitive to alternative cutoff periods. Finally, our results hold after removing Nevada firms.

Our study makes several important contributions. First, we contribute to the literature on the effects of shareholder litigation risk on firm behavior. A widely accepted view regards shareholder litigation as a powerful corporate governance tool to monitor and deter corporate misbehaviors (Francis *et al.*, 1994; Cheng *et al.*, 2010). However, critics argue abusive shareholder lawsuits are value-destroying as they can disrupt and distract firm operations and resources (Lin *et al.*, 2016). We contribute to this divisive debate by investigating how shareholder litigation risk affects firms' financial reporting. Our evidence supports the argument that shareholder litigation threats significantly discipline REM, a form of costlier earnings management technique and myopic investment behavior[10]. In addition, our study documents an important channel through which legal institutions influence firm behavior. Second, we identify a new determinant of REM and demonstrate that shareholder litigation risk has a significant constraining effect on REM. Prior studies document that shareholder litigation risk significantly restrains AEM[11]. We expand the scope of those studies by integrating REM as an alternative earnings management choice and create a more complete picture of how shareholder litigation risk impacts financial reporting. Taken together, we provide corroborative evidence of the strong intensifying effect of lesser shareholder litigation threats on opportunistic financial reporting behavior. One contemporaneous study (Huang *et al.*, 2017) also examines a research question similar to ours. Our study is different from theirs in the following dimensions: first, we test all three individual REM and two aggregate REM measures. The cash flow REM measure and its related aggregated REM measure are excluded in Huang *et al.* (2017); second, we use nearest neighbor matching to pair each of the treated firms to a control firm, making the number of firms equal in both groups to deal with any bias introduced by the unbalanced number of firms in each group; third, our study introduces a hypothesis to test the important moderating effect of internal corporate governance. We also test our primary result in another environment with high litigation risk: the pre-IPO period (Lowry and Shu, 2002; Venkataraman *et al.*, 2008)[12]. Finally, our research also has strong policy implications. Although regulators have long embraced the remedial nature of private litigation and its role in restraining managerial opportunism, the general trend in the legal environment over the past decades limits frivolous lawsuits by restricting shareholders' ability to seek relief under federal securities law (Ramirez, 2014). Our evidence suggests private actions may significantly curtail the damage of managerial myopia, contribute to the long-term success of public firms and capital market stability, and potentially reduce the need for heavy-handed regulations.

2. Literature and hypotheses

2.1 Real earnings management literature

Our hypothesis is built upon two strands of literature: REM and shareholder litigation. Prior literature suggests AEM and REM are the two primary tools managers use to boost the short-term performance of various incentives. Under AEM, managers manipulate accounting policies and accounting choices to overreport earnings. Under REM, however,

managers adjust economic activities to improve short-term performance at the expense of long-term firm value (Roychowdhury, 2006). For example, firms may opportunistically scale back marketing expenses or R&D expenditure to overreport the current period's earnings.

Unlike AEM, REM involves deliberate adjustments of economic activities to boost short-term performance. It departs from optimal business operations and thus directly imposes an adverse impact on a firm's cash flow and long-term firm value (Roychowdhury, 2006). For example, underinvestment in R&D in the current period may permanently sacrifice some time-sensitive profitable future investment opportunities. REM may also negatively impact long-term firm value indirectly by incurring higher transaction costs (e.g. cost of capital) with outside stakeholders as they may perceive REM firms as risky business partners and charge a risk-compensating premium (Kim and Sohn, 2013). Cohen and Zarowin (2010) suggest that REM often results in rapid reversal of operating performance and substantial stock price decline. Kothari *et al.* (2016) examine managers' earnings management behaviors around seasoned equity offerings (SEO), a period when managers are especially motivated to inflate earnings. Their results indicate that REM is more likely to be associated with SEO overvaluation and subsequent post-SEO stock market underperformance than AEM.

Despite the detrimental effect of REM on long-term firm value, one stream of research argues that REM is much less costly and more attractive to managers than AEM because REM is within the domain of professional business judgment, is more difficult for outsiders to understand and detect, and is less vulnerable to scrutiny by regulators (Kothari *et al.*, 2016). Because of those obvious advantages, studies suggest REM has recently become the primary earnings management choice, particularly when the stringent regulatory environment or external monitoring curtails AEM opportunities. For example, Cohen *et al.* (2008) investigate the impact of the Sarbanes–Oxley Act (SOX) on managers' earnings management choices. These authors document that corporate governance regulation significantly constrains AEM. Interestingly, their findings also suggest managers were more inclined to use REM after the passage of SOX. Zang (2012) provides empirical evidence of the sequential and substitution nature of those two earnings management alternatives. Her results suggest managers favor REM throughout the whole fiscal year and subsequently consider accrual choices toward the fiscal year-end. Chan *et al.* (2015) also indicate managers substitute AEM with REM under higher regulatory and monitoring pressure. Finally, Irani and Oesch (2016) find managers switch to REM from AEM when they face strong monitoring pressure from financial analysts.

We extend the prior studies of earnings management choices by examining how managers respond to the increased pressure of shareholder litigations, an important external monitoring force.

2.2 Shareholder litigations

The Securities Act of 1933 and the Securities Exchange Act of 1934 levy strong risk of security class action lawsuits on all US public firms. Firms subject to shareholder litigations experience a significant loss of firm value[13]. Despite subsequent legislative efforts such as the passing of the Private Securities Litigation Reform Act of 1995 to alleviate the pressure of frivolous lawsuits, the number of shareholder class action filings has increased and related corporate legal costs have remained high over the past decades[14]. In addition to those direct costs to corporate defendants, firms also incur indirect costs from shareholder litigations that range from transaction costs to reputational punishment. For example, Karpoff *et al.* (2008) find that a firm's reputational loss can be over 7.5 times the sum of all penalties incurred in shareholder litigation. On a manager's personal level, shareholder litigations also impose significant costs, including reputational costs (Karpoff *et al.*, 2008),

early termination of employment (Dechow *et al.*, 1995), opportunity cost of taking managers' time for lawsuits and the stress arising from lawsuits[15]. These costs motivate managers to revise their beliefs about the costs/rewards relationship of their current financial reporting strategy and deter managers from managerial opportunism (Cao and Narayanamoorthy, 2011; Cazier *et al.*, 2017).

There is a small stream of literature that examines the impact of shareholder litigation risk on AEM. Tong and Miao (2011) find that firms with higher litigation risk demonstrate better earnings quality. Chang *et al.* (2012) show that litigation risk improves the informational content of discretionary accruals. Frankel *et al.* (2002) document a significantly positive impact of shareholder litigation risk on income-decreasing discretionary accruals, but no effect on income-increasing discretionary accruals. Taken together, these studies demonstrate a negative relationship between shareholder litigation risk and opportunistic accruals management.

2.3 Hypothesis development

Although REM generally is difficult to identify, REM can be both directly and indirectly related to a higher likelihood of shareholder litigation, which, in turn, increases the cost of REM and is a strong disincentive for REM. REM can directly increase litigation risk because some REM activities clearly violate GAAP and are more likely to attract legal counsels', shareholders' and regulators' attention. One such example is channel stuffing or trade loading, a myopic business practice to meet short-term sales goals by coercively shipping more products to distributors in excess of their demand or capability to sell. Channel stuffing is illegal as firms artificially inflate their performance by recording unsustainable or phantom sales at the expense of long-term firm value, usually through undisclosed agreements with distributors. Channel stuffing can be disruptive and destructive to a firm's normal business operations, as short-term inflated sales will lead to long-term revenue reversal, distribution channel disorder and tainted firm reputation. There are many shareholder class action lawsuits involving channel stuffing. Some high-profile shareholder litigations of channel stuffing include Coca-Cola, Bristol-Myers Squibb Company and General Motors. Shareholder class action lawsuits involving channel stuffing have imposed significant legal costs to corporations[16].

REM can also indirectly increase shareholder litigation risk because of REM's long-term detrimental impact on firm performance and stock price (Cohen *et al.*, 2008; Zang, 2012). By definition, REM represents abnormal business decisions that hurt long-term firm value and stock price. Investor stock market loss can easily trigger shareholder class action lawsuits as it can be legal evidence of economic loss, which is required in such lawsuits. In fact, shareholders almost always swiftly litigate to recover their losses after negative financial events, which creates tremendous pressure for managers to make efforts to avoid operating losses and sudden stock price decline.

Prior literature generally recognizes the deterring effect of shareholder litigations, which tempers managers' inclination of self-dealing at the expense of shareholders' wealth and ameliorates the agency problem. Firm behaviors impacted by the strong corporate governance effect of *ex ante* shareholder legal threat include corporate disclosure (Skinner, 1994; Francis *et al.*, 1994; Rogers and Buskirk, 2009), management earnings forecast (Cao and Narayanamoorthy, 2011), non-GAAP reporting (Cazier *et al.*, 2017), insider selling (Billings and Cedergren, 2015), AEM (Venkataraman *et al.*, 2008) and accounting conservatism (Donelson *et al.*, 2012).

Therefore, our first hypothesis is:

H1. There is a negative relationship between shareholder litigation risk and REM.

In an environment of high information asymmetry, shareholders lack sufficient information to detect managed earnings. Dechow *et al.* (1995) argue that earnings management can occur when shareholders do not have the necessary information to monitor managers' activities. Therefore, we expect managers to have higher motivations to engage in REM when the information environment is more opaque and the mitigating effect of shareholder litigation is weaker. Thus, we propose a second hypothesis about the moderating effect of information asymmetry:

H2. The constraining effect of shareholder litigation risk is weaker when there is a high information asymmetry.

We next investigate whether internal corporate governance moderates the relationship between shareholder litigation risk and REM. Prior studies show that an independent board is effective in curbing managers' opportunistic activities (Denis and McConnell, 2003; Aggarwal *et al.*, 2009; Frankel *et al.*, 2011). In particular, Cheng *et al.* (2016) provide evidence of a direct curbing impact of internal corporate governance on REM. *A priori*, however, it is not clear whether there is a substitutionary or a complementary relationship between internal corporate governance and shareholder litigation risk. Prior studies suggest the relationship between two corporate governance mechanisms can be either (Shleifer and Vishny, 1997). Thus, our third hypothesis is non-directional.

H3. There is no relationship between shareholder litigation risk and the strength of a firm's internal corporate governance.

3. Research design and data

3.1 Measurement of real earnings management

We follow Roychowdhury (2006), Cohen and Zarowin (2010) and Kothari *et al.* (2016) to develop our proxies for REM. Specifically, we derive three individual metrics, abnormal levels of cash flows (*REM_CFO*), abnormal production costs (*REM_PROD*), and abnormal discretionary expenses (*REM_DISX*) and two aggregate metrics (*REM1* and *REM2*) as proxies for REM.

We use the following models to estimate the normal levels of cash flows, production costs, and discretionary expenses:

$$\frac{CFO_{jt}}{TA_{jt-1}} = \alpha_0 \frac{1}{TA_{jt-1}} + \alpha_1 \frac{SALE_{jt}}{TA_{jt-1}} + \alpha_2 \frac{\Delta SALE_{jt}}{TA_{jt-1}} + \varepsilon_{jt} \quad (1)$$

$$\frac{PROD_{it}}{TA_{it-1}} = \alpha_0 \frac{1}{TA_{jt-1}} + \alpha_1 \frac{SALE_{jt}}{TA_{jt-1}} + \alpha_2 \frac{\Delta SALE_{it}}{TA_{it-1}} + \alpha_3 \frac{\Delta SALE_{it-1}}{TA_{it-1}} + \varepsilon_{jt} \quad (2)$$

$$\frac{DISX_{jt}}{TA_{jt-1}} = \alpha_0 \frac{1}{TA_{jt-1}} + \alpha_1 \frac{SALE_{jt-1}}{TA_{jt-1}} + \varepsilon_{jt} \quad (3)$$

where

CFO_{jt} = cash flows from operating activities adjusted for extraordinary items and discontinued operations for firm i in year t (#OANCF − #XIDOC); $TA_{jt\text{-}1}$ = total assets for firm i in year $t-1$ (#AT); $SALE_{jt}$ = total sales revenue for firm i in year t (#SALE); Δ

$SALE_{jt}$ = change in sales revenue for firm i in year t;$PROD_{jt}$ = production costs for firm i in year t, defined as the sum of cost of goods sold (#COGS) and the change in inventories (#INVCH);$DISX_{jt}$ = discretionary expenditures for firm i in year t, defined as the sum of advertising expenses (#XAD), R&D expenses (#XRD) and Selling, General, & Administrative (SG&A) expenses (#XSGA)[17].

For each firm-year, we estimate the cross-sectional regressions of Models 1-3 for each two-digit industry and require at least 20 firms in a particular industry for model estimation[18]. The residuals from the above models are defined as abnormal CFO, abnormal PROD and abnormal DISX. REM activities are likely to result in lower than expected cash flow from operations and lower than expected discretionary expenses, but higher than expected production costs. Therefore, consistent with Cohen and Zarowin (2010) and Zang (2012), we multiply abnormal CFO and abnormal DISX by negative one such that they have a positive relationship with REM activities. In other words, *REM_CFO* = (−1) × abnormal CFO, *REM_PROD* = abnormal PROD and *REM_DISX* = (−1) × abnormal DISX. To capture the total effects of REM, we aggregate the three individual measures to compute two aggregate measures of REM activities. In particular, following Cohen and Zarowin (2010) and Kothari *et al.* (2016), we compute *REM1* as the sum of *REM_CFO* and *REM_DISX*, and *REM2* as the sum of *REM_PROD* and *REM_DISX*[19].

3.2 Empirical model examining the hypothesis

To establish a causality effect of shareholder litigation risk on REM, we examine the treatment effect of the 1999 Ninth Circuit Court ruling by estimating the following DiD model:

$$\begin{aligned} REM_{it} = {} & \beta_0 + \beta_1 NINTH_{it} + \beta_2 POST_{it} + \beta_3 NINTH_{it} \times POST_{it} + \beta_4 SOX_{it} \\ & + \beta_5 ANANO_{it} + \beta_6 MRT_{SHR}it + \beta_7 AEM_{jt} + \beta_8 ROA_{jt} + \beta_9 LAT_{it} \\ & + \beta_{10} BTM_{jt} + \beta_{11} LEV_{it} O_{it} + (\text{Year dummies}) + (\text{Industry dummies}) + \varepsilon_{it} \end{aligned} \tag{4}$$

Where REM denotes one of the REM measures: *REM_CFO*, *REM_PROD*, *REM_DISX*, *REM1* and *REM2*. *NINTH* is an indicator variable, which equals one if a firm is headquartered within the district of the Ninth Circuit Court and zero for the matched control sample. *POST* is a time indicator variable, which equals one if the fiscal year ends in the four years after the issuance of the Ninth Circuit Court ruling and zero otherwise. β_3, the DiD estimator, measures the change in REM around the issuance of the Ninth Circuit Court ruling and is our primary coefficient of interest.

We also control for a vector of firm characteristics, which prior literature shows associations with REM (Cohen and Zarowin, 2010; Zang, 2012; Irani and Oesch, 2016). First, we control for the effect of SOX and expect firms to engage in higher REM after the passage of SOX (Cohen *et al.*, 2008). Second, we include the number of analysts covering a particular firm (*ANANO*) because financial analysts play a monitoring role in constraining REM (Irani and Oesch, 2016). Therefore, we expect a negative coefficient on *ANANO*. Third, we control for a firm's market-leader status in the industry by including a ratio of a company's sales to the total sales of its industry (*MRT_SHR*). Zang (2012) argues that *MRT_SHR* captures the inverse of the REM costs. As a result, we predict that the coefficient on *MRT_SHR* is positive. Further, we add discretionary accruals as a proxy for *AEM* as changes in governance can change the mix of earnings management (Cohen *et al.*, 2008). In addition,

following Roychowdhury (2006) and Cohen and Zarowin (2010), we include several firm-level control variables to capture growth opportunities and capital structure that likely affect the level of a firm's REM: firm profitability (*ROA*), firm size (*LAT*), book-to-market ratio (*BTM*) and financial risk (*LEV*). We do not make any directional predictions for these variables. Finally, year fixed effects and industry fixed effects are included in all regressions. Consistent with Houston *et al.* (2019), we cluster standard errors at the operating state level.

3.3 Data sources and sample selection

We collect firms' financial data from Compustat for 1995-2003. Similar to Houston *et al.* (2019), we use eight years around the issuance of the Ninth Circuit Court ruling with equal years (four years) before and after the ruling took effect. The firms' headquarters data that we use is developed and provided by Bill McDonald[20]. In addition, we obtain analyst coverage information from I/B/E/S and stock price data from The Center for Research in Security Prices (CRSP).

Our initial sample includes 75,889 firm-years (13,264 firms) in the sample period of all Compustat firms. We eliminate 15,228 firm-years (2,527 firms) in regulated industries (SIC 6000-6999 for financial firms and SIC 4999 for utilities). Next, we remove 20,901 firm-years (1,964 firms) with missing headquarter information. We also require all firm-year observations to have sufficient information to calculate all REM measures. By imposing this constraint, we lose 9,801 firm-year observations (1,697 firms). We then exclude 13,149 firm-years (2,551 firms) that do not have the necessary data to calculate independent variables. Finally, following prior literature (Crane and Koch, 2016; Houston *et al.*, 2019), for each treatment firm, we use the nearest neighbor matching approach to find the nearest control neighbor based on two-digit SIC industry, average logarithm total assets (*LAT*), average book-to-market (*BTM*) and average leverage ratio (*LEV*) in the pre-ruling period, which is the four years before the issuance of the Ninth Circuit Court ruling[21]. Therefore, we match firms instead of firm-years on the average firm characteristics in the four-year period before the issuance of the ruling. We restrict our sample firms with data available for both the pre- and post-adoption periods, leaving 547 treatment firms (2,926 firm-years) and 547 control firms (3,027 firm-years). The sample selection process is summarized in Panel A of Table I.

3.4 Descriptive statistics

Panel B of Table I shows that our sample is well diversified with firms in 38 out of the 48 industries identified by Fama and French. It also shows that business services, electronic equipment, and computers are the three highest-ranking industries of our sample observations. Nevertheless, we control the influence of industry memberships in all regressions. In Panel C of Table I, we report the descriptive statistics for the key variables used in our study. All continuous variables are winsorized at 1 per cent and 99 per cent percentiles to mitigate the possible distortion by outliers. The mean of the indicator variable *NINTH* indicates that we have approximately the same number of firm-year observations pertain to the treatment sample and the control sample. The mean value of the indicator *POST* is 0.554, indicating our sample contains slightly more observations in the post-ruling period than in the pre-ruling period. Panel C also indicates that 16 per cent of firm-years belong to the post-SOX period, the average number of analysts following a firm is close to nine (*ANANO*), a firm's sales to the total sales of its industry is 4 per cent (*MRT_SHR*), the average *ROA* is 0.004, the average book-to-market ratio is 0.536 (*BTM*), and the short-term plus the long-term debt is on average 16.8 per cent of total assets (*LEV*). Panel D of Table I presents the balance tests of all variables in Model 4. We do not expect systematic differences in control variables between the treatment

	No. of firm-years	No. of firms
Panel A: sample development		
Initial Compustat companies in the sample period 1995-2003	75,889	13,264
Less:		
Observations in financial (SIC 6000-6999) and utilities (SIC 4999)	(15,228)	(2,527)
Observations with missing operating business locations	(20,901)	(1,964)
Observations with insufficient data to calculate REM proxies	(9,801)	(1,697)
Observations with insufficient data to calculate control variables	(13,149)	(2,551)
Observations without present in both the pre and post periods	(4,433)	(2,268)
Sample before matching	12,377	2,257
Treatment group (*NINTH* = 1)	2,976	549
Control group (*NINTH* = 0)	9,401	1,708
Final sample after matching		
Treatment group (*NINTH* = 1)	2,926	547
Control group (*NINTH* = 0)	3,027	547
Panel B: industry distribution		
Fama–French 48 industry	No. of firm-years	(%)
Food products	58	0.97
Candy and soda	9	0.15
Beer and liquor	34	0.57
Recreation	99	1.66
Entertainment	116	1.95
Printing and publishing	13	0.22
Consumer goods	110	1.85
Apparel	97	1.63
Healthcare	49	0.82
Medical equipment	406	6.82
Pharmaceutical products	219	3.68
Chemicals	82	1.38
Rubber and plastic products	40	0.67
Textiles	11	0.18
Construction materials	123	2.07
Construction	14	0.24
Steelworks, etc	49	0.82
Machinery	392	6.58
Electrical equipment	123	2.07
Automobiles and trucks	72	1.21
Aircraft	35	0.59
Shipbuilding and railroad equipment	1	0.02
Defense	13	0.22
Precious metals	23	0.39
Non-metallic and industrial metal mining	14	0.24
Petroleum and natural gas	110	1.85
Communication	63	1.06
Business services	993	16.68
Computers	550	9.24
Electronic equipment	889	14.93
Measuring and control equipment	311	5.22
Business supplies	61	1.02
Shipping containers	8	0.13

(*continued*)

Table I.
Sample development and descriptive statistics

Transportation	10	0.17
Wholesale	218	3.66
Retail	412	6.92
Restaurants, hotels and motels	58	0.97
Others	68	1.14
Total	5,953	100.00

Panel C: descriptive statistics

Variable	*N*	Mean	Median	SD	P25	P75
REM_CFO	5,953	−0.104	−0.094	0.174	−0.217	0.007
REM_PROD	5,953	−0.072	−0.063	0.208	−0.199	0.065
REM_DISX	5,953	0.121	0.118	0.309	−0.052	0.318
REM1	5,953	0.016	0.033	0.294	−0.150	0.200
REM2	5,953	0.051	0.077	0.442	−0.202	0.339
NINTH	5,953	0.492	0.000	0.500	0.000	1.000
POST	5,953	0.554	1.000	0.497	0.000	1.000
SOX	5,953	0.160	0.000	0.367	0.000	0.000
ANANO	5,953	8.936	6.000	9.337	3.000	11.000
MRT_SHR	5,953	0.040	0.004	0.098	0.001	0.026
ROA	5,953	0.004	0.051	0.214	−0.031	0.111
LAT	5,953	5.551	5.402	1.637	4.355	6.605
BTM	5,953	0.536	0.417	0.465	0.238	0.691
LEV	5,953	0.168	0.102	0.190	0.003	0.281
AEM	5,953	0.050	0.036	0.210	−0.038	0.128

Panel D: balance tests before Ninth Circuit

	Treatment group (*N* = 1,289)					Control group (N = 1,369)					Diff. in mean
Variable	Mean	Median	SD	P25	P75	Mean	Median	SD	P25	P75	*t*-statistic
REM_CFO	−0.076	−0.058	0.170	−0.177	0.033	−0.068	−0.066	0.156	−0.162	0.023	−1.309
REM_PROD	−0.097	−0.087	0.220	−0.243	0.044	−0.038	−0.035	0.198	−0.159	0.092	−4.583***
REM_DISX	0.021	0.036	0.280	−0.149	0.185	0.109	0.119	0.284	−0.044	0.290	−6.256***
REM1	−0.055	−0.034	0.291	−0.233	0.118	0.041	0.065	0.282	−0.113	0.219	−6.619***
REM2	−0.076	−0.051	0.441	−0.358	0.187	0.071	0.103	0.421	−0.169	0.337	−6.797***
SOX	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ANANO	8.276	6.000	9.460	3.000	10.000	7.579	5.000	8.018	2.000	9.000	1.599
MRT_SHR	0.039	0.005	0.088	0.001	0.027	0.042	0.006	0.095	0.001	0.029	−1.219
ROA	0.035	0.068	0.222	0.009	0.127	0.040	0.073	0.186	0.013	0.124	−1.089
LAT	5.360	5.110	1.660	4.119	6.444	5.344	5.166	1.585	4.171	6.399	0.243
BTM	0.454	0.379	0.346	0.213	0.596	0.465	0.395	0.326	0.250	0.597	−0.797
LEV	0.153	0.078	0.183	0.003	0.246	0.159	0.107	0.179	0.006	0.254	−0.932
AEM	0.020	0.014	0.169	−0.053	0.076	0.024	0.017	0.163	−0.042	0.080	−1.176

Notes: Panel A shows the sample selection procedure. Panel B presents the distribution of firm-year observations over the Fama–French 48 industries. Panel C presents descriptive statistics on REM, regulation experiment variables and control variables. Panel D presents univariate comparisons between treatment and control firms matched on pre-ruling characteristics. We use the nearest neighbor matching approach to find the nearest control neighbor based on two-digit SIC industry, average logarithm total assets (*LAT*), average book-to-market (*BTM*) and average leverage ratio (*LEV*) in the pre-ruling period. The matched sample comprises 1,289 treatment firm-years and 1,369 control firm-years in the four years before the Ninth Circuit Ruling. ***Indicate statistical significance at the 1% level (two-tailed). All variables are defined in Appendix 1

Table I.

and control groups. The *t*-statistics show that there are no significant differences between the treated and control groups for all control variables in the pre-ruling period. However, we notice significant differences of REM before the ruling came into effect. That is, treatment firms had slightly lower abnormal production costs (*REM_PROD*) and abnormal discretionary expenses (*REM_DISX*) than control firms[22].

In Table II, we present the correlations between REM, ruling variables and control variables. From the correlation table, we find that there is no high correlation between our variable of interest (*REM1* and *REM2*) and other control variables or between other control variables. In addition, to further ensure that our results are not driven by multicollinearity among the variables used in our regression, we check the variance inflation factors (VIFs) in each model. The highest VIF score is 3.32, well below the guideline of 10.

4. Results

4.1 Testing hypothesis 1

Table III presents the results of the DiD estimation of Model 4 that examines the influence of shareholder litigation risk on REM[23]. We find that the DiD estimator, $NINTH \times POST$, is significantly positive at the 1 per cent level (5 per cent in Column 1), indicating that treatment firms are significantly more likely to engage in income-increasing REM in the post-ruling period when the litigation risk is lessened. This result is consistent with the view that when shareholder litigations impose immaterial costs to firms and managers, managers are more likely to deviate from normal business operations to increase profit.

Moreover, the estimated coefficients of the control variables in Table III are consistent with the findings of prior literature. The coefficients on *SOX* are significantly positive in Columns 2-5, consistent with the notion that firms substitute AEM with REM in the post-SOX period (Cohen *et al.*, 2008). As shown in Columns 1-5, the coefficients on *ANANO* are negative and significant at the 1 per cent level, which is consistent with Cohen and Zarowin (2010) that the monitoring role played by financial analysts constrains REM. Under Columns 1, 2 and 4, the coefficients on *MRT_SHR* are significantly positive, indicating that market-leader status decreases the costs for REM and managers therefore manipulate operating activities to increase income to a larger extent.

The findings in Table III show that lesser shareholder litigation risk in the post-ruling period leads to significantly greater REM. This relationship is robust to different proxies of REM and holds after controlling for year and industry fixed effects, as well as other firm characteristics that prior studies have found to be associated with REM. Overall, the results suggest that shareholder litigation risk seems to discourage firms' opportunistic REM.

4.2 Testing hypothesis 2

The results so far are consistent with a negative causal association between shareholder litigation and managers' suboptimal real earnings manipulation. Next, we examine the underlying mechanisms through which lesser shareholder litigation promotes firms' suboptimal REM. Specifically, we examine the moderating effects of information asymmetry on the relation between litigation risk and REM.

To capture information asymmetry, we use several information environment measures previously used in the literature (Dechow and Sloan, 1991; Huddart and Ke, 2007): *BID-ASK SPREAD*, analyst coverage (*ANANO*), analyst forecast error (*FERROR*) and R&D intensity (*R&D*). We classify firms as having high information asymmetry if their *BID-ASK SPREAD* (*FERROR*, *R&D*) is above the sample median or *ANANO* is below the sample median. In Table IV[24], the coefficient of $NINTH \times POST$ is significantly positive only when firms are in an impoverished information environment. The DiD coefficients are significantly

Table II.
Correlation matrix

Variable		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
REM_CFO	A		0.309	−0.333	0.210	−0.095	−0.020	−0.165	−0.076	−0.198	0.094	−0.361	−0.171	0.137	0.155	−0.027
REM_PROD	B	0.316		0.378	0.576	0.734	−0.115	−0.020	0.004	−0.038	0.132	−0.104	0.115	0.226	0.148	−0.117
REM_DISX	C	−0.336	0.360		0.812	0.886	−0.118	0.162	0.068	0.052	−0.011	0.154	0.156	0.118	0.025	0.163
REM1	D	0.199	0.573	0.792		0.851	−0.134	0.067	0.030	−0.065	0.039	−0.067	0.056	0.202	0.124	0.174
REM2	E	−0.091	0.721	0.872	0.842		−0.138	0.103	0.046	0.024	0.055	0.080	0.168	0.192	0.081	0.072
NINTH	F	−0.011	−0.121	−0.126	−0.145	−0.149		0.012	0.014	0.118	−0.039	−0.058	0.022*	−0.063	−0.046	−0.042
POST	G	−0.168	−0.021	0.167	0.066	0.109	0.012		0.392	0.051	0.016	−0.100	0.109	0.148	0.054	0.139
SOX	H	−0.086	−0.001	0.076	0.027	0.050	0.014	0.392		0.061	0.031	−0.057	0.102	0.091	−0.008	0.029
ANANO	I	−0.194	−0.060	0.049	−0.071	0.010	0.117	0.036	0.050		0.266	0.119	0.712	−0.244	−0.003	−0.083
MRT_SHR	J	0.079	0.244	0.044	0.083	0.149	−0.068	0.011	0.045	0.384		0.107	0.439	−0.037	0.170	−0.023
ROA	K	−0.322	−0.192	0.009	−0.196	−0.076	−0.039	−0.150	−0.115	0.185	0.250		0.246	−0.040	−0.124	0.283
LAT	L	−0.153	0.106	0.150	0.055	0.155	0.015	0.116	0.108	0.688	0.721	0.175		−0.089	0.258	−0.061
BTM	M	0.176	0.274	0.128	0.242	0.221	−0.081	0.101	0.120	−0.286	0.080	−0.234	−0.064		0.047	−0.005
LEV	N	0.197	0.202	0.031	0.155	0.113	−0.068	0.037	−0.007	0.026	0.380	−0.165	0.327	0.081		−0.048
AEM	O	−0.002	−0.127	0.162	0.183	0.056	−0.042	0.187	0.074	−0.063	−0.060	0.214	−0.071	0.008	−0.045	

Notes: The table reports the correlations between REM, ruling variables and control variables. The Pearson (Spearman) correlations are above (below) the diagonal. Italic face indicates the 5 % significance level. All variables are defined in Appendix 1

Table III.
The impact of litigation risk on REM: baseline results

Variable	Pred. sign	*REM_CFO* (1)	*REM_PROD* (2)	*REM_DISX* (3)	*REM1* (4)	*REM2* (5)
NINTH	?	−0.018** (−2.04)	−0.047*** (−4.00)	−0.079*** (−3.97)	−0.086*** (−4.72)	−0.129*** (−4.21)
POST	?	−0.093*** (−5.25)	−0.085*** (−3.75)	0.059* (1.84)	−0.036 (−1.35)	−0.057 (−1.28)
NINTH × *POST*	+	0.020** (2.26)	0.020*** (3.11)	0.047*** (2.72)	0.051*** (3.64)	0.070*** (3.34)
SOX	+	−0.023 (−1.41)	0.037* (1.81)	0.066*** (3.33)	0.061** (2.36)	0.105*** (2.92)
ANANO	−	−0.002*** (−3.87)	−0.005*** (−8.91)	−0.003*** (−4.01)	−0.005*** (−8.06)	−0.007*** (−6.66)
MRT_SHR	+	0.219*** (5.54)	0.141*** (3.19)	−0.068 (−1.14)	0.132** (2.08)	0.060 (0.61)
AEM	?	0.133*** (3.87)	−0.009 (−1.23)	0.037* (1.91)	0.113*** (5.58)	0.040 (1.50)
ROA	?	−0.407*** (−16.95)	−0.175*** (−6.67)	0.254*** (8.78)	−0.136*** (−3.70)	0.123** (2.54)
LAT	?	−0.022*** (−6.18)	0.035*** (10.04)	0.053*** (7.24)	0.041*** (6.50)	0.087*** (8.38)
BTM	?	0.011** (2.37)	0.085*** (9.53)	0.126*** (11.44)	0.143*** (10.47)	0.216*** (10.77)
LEV	?	0.104*** (3.08)	0.088*** (4.77)	0.186*** (7.92)	0.240*** (11.02)	0.268*** (7.33)
Intercept		−0.016 (−0.39)	−0.216*** (−4.95)	−0.277*** (−4.20)	−0.310*** (−6.05)	−0.445*** (−5.32)
Year fixed-effects		Yes	Yes	Yes	Yes	Yes
Industry fixed-effects		Yes	Yes	Yes	Yes	Yes
No. of observations		5,953	5,953	5,953	5,953	5,953
Adj. R^2		0.387	0.216	0.287	0.188	0.204

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; *; **; and ***indicate statistical significance at the 10, 5 and 1 % levels (two-tailed), respectively. All variables are defined in Appendix 1

Variable	*REM1* Low (1)	*REM1* High (2)	*REM2* Low (3)	*REM2* High (4)
Panel A: information asymmetry = BID-ASK SPREAD				
NINTH	−0.063*** (−4.38)	−0.076*** (−3.69)	−0.108*** (−4.68)	−0.123*** (−3.16)
POST	−0.085*** (−4.48)	−0.057*** (−3.36)	−0.076** (−2.53)	−0.060 (−1.63)
NINTH × POST	0.018 (1.19)	0.057*** (3.51)	0.025 (1.25)	0.087*** (3.27)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	2,769	2,772	2,769	2,772
Adj. R^2	0.230	0.171	0.224	0.223
Subsample difference:				
NINTH × POST	$\chi^2 = 11.69$ ($p = 0.001$)		$\chi^2 = 17.67$ ($p = 0.000$)	
Panel B: information asymmetry = ANANO				
NINTH	−0.069** (−2.12)	−0.083** (−2.28)	−0.105** (−2.05)	−0.105** (−2.16)
POST	−0.226* (−2.00)	−0.143 (−1.26)	−0.366*** (−3.11)	−0.129 (−0.95)
NINTH × POST	0.137*** (4.85)	0.024 (0.42)	0.216*** (4.17)	0.031 (0.48)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	2,845	3,108	2,845	3,108
Adj. R^2	0.255	0.227	0.156	0.143
Subsample difference:				
NINTH × POST	$\chi^2 = 8.97$ ($p = 0.003$)		$\chi^2 = 10.13$ ($p = 0.001$)	
Panel C: information asymmetry = FERROR				
NINTH	−0.070** (−2.53)	−0.086*** (−4.29)	−0.092** (−2.13)	−0.135*** (−3.73)
POST	−0.148 (−1.38)	−0.038 (−0.74)	−0.207 (−1.05)	−0.031 (−0.31)
NINTH × POST	0.050 (1.36)	0.062*** (3.91)	0.033 (0.78)	0.089*** (3.24)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	2,604	3,284	2,604	3,284
Adj. R^2	0.256	0.176	0.204	0.210
Subsample difference:				
NINTH × POST	$\chi^2 = 1.55$ ($p = 0.213$)		$\chi^2 = 2.71$ ($p = 0.099$)	
Panel D: information asymmetry = R&D				
NINTH	−0.054*** (−2.90)	−0.079*** (−5.34)	−0.079** (−2.14)	−0.133*** (−6.23)
POST	−0.068 (−1.17)	−0.016 (−0.44)	−0.121** (−2.03)	−0.009 (−0.25)
NINTH × POST	0.010 (0.84)	0.068*** (3.67)	0.017 (0.78)	0.107*** (4.15)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	2,261	2,323	2,261	2,323
Adj. R^2	0.233	0.181	0.212	0.255
Subsample difference:				
NINTH × POST	$\chi^2 = 10.37$ ($p = 0.001$)		$\chi^2 = 11.18$ ($p = 0.001$)	

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; *; **; and ***indicate statistical significance at the 10, 5 and 1 %levels (two-tailed), respectively. All variables are defined in Appendix 1

Table IV.
The impact of litigation risk on REM: partitioned on information asymmetry

different in seven of the eight regressions between the two subsamples. The results are consistent with the notion that managers are likely to engage in opportunistic REM in impoverished information environments when shareholder litigation risk is curtailed.

4.3 Testing hypothesis 3

H3 predicts that the constraining effect of shareholder litigation on managers' REM is not affected by internal corporate governance mechanisms. Better internal corporate governance indicates more effective monitoring, and in turn, ensures that managers are less motivated to engage in sub-optimal operating activities to manipulate earnings (Cheng *et al.*, 2016). Therefore, we expect the relation between lessened litigation risk and increased REM will be weakened by strong internal corporate governance.

To capture internal corporate governance, we use two proxies:

(1) The percentage of independent boards (PCT_INDEP). Prior studies show that an independent board is effective in curbing managers' opportunistic activities (Shleifer and Vishny, 1997; Denis and McConnell, 2003; Aggarwal *et al.*, 2009; Frankel *et al.*, 2011).

(2) The percentage of female directors (PCT_FEMALE). Prior research finds that female directors play a more intensive monitoring role (Johnson and Powell, 1994; Erhardt *et al.*, 2003; Adams *et al.*, 2009).

We identify firms as having strong internal corporate governance if their *PCT_INDEP* (*PCT_FEMALE*) is higher than the sample median. Table V shows the testing results. We find that the DiD coefficient, *NINTH* × *POST*, loads significantly positively at the 1 (5) per cent level for weak internal corporate governance firms in Panel A (B), rejecting the null *H3* by showing that strong internal corporate governance could curtail increased REM following the Ninth Circuit Court ruling[25].

4.4 Sensitivity to litigation risk

Firms are not equally vulnerable to legal threats, as some industry characteristics or firm characteristics will make a firm more or less sensitive to shareholder litigation risk (Kim and Skinner, 2012). As a result, we expect to find firms with higher susceptibility to litigation risk drive our results if the facilitating effect of lesser shareholder lawsuits promotes a firm's REM. Following prior research, we identify firms with high legal exposure as proxied by:

- the firm operates in a high litigation risk industry including biotechnology, computers, electronics and retail (Francis *et al.*, 1994);
- the young firm whose future prospects are uncertain (Chen *et al.*, 2002); and
- the firm has low debt and high equity and is susceptible to shareholder lawsuits (Cazier *et al.*, 2017).

We re-estimate Model 4 using two subsamples partitioned by litigation exposure as identified above. Particularly, we group firms into a high- (low-) litigation sample if a firm operates in a litigious industry or its firm age (leverage ratio) is below the median. Table VI shows the estimation results. We find that the DiD coefficient is positive and significant only for the subsample of firms with high shareholder litigation risk. Overall, the results suggest that lower risk of shareholder litigation incentivizes managers to engage in REM and the effect is mainly driven by firms with higher vulnerability to legal threats.

Variable	*REM1* Low (1)	*REM1* High (2)	*REM2* Low (3)	*REM2* High (4)
Panel A: internal governance = PCT_INDEP				
NINTH	−0.074*** (−4.04)	−0.119** (−2.69)	−0.074*** (−4.04)	−0.151** (−2.35)
POST	0.010 (0.50)	−0.041 (−0.68)	0.010 (0.50)	−0.026 (−0.30)
NINTH × POST	0.042*** (5.14)	0.056 (1.38)	0.042*** (5.14)	0.028 (0.56)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	1,134	1,039	1,134	1,039
Adj. R^2	0.332	0.210	0.332	0.246
Subsample difference: *NINTH × POST*	$\chi^2 = 0.34$ ($p = 0.559$)		$\chi^2 = 0.07$ ($p = 0.976$)	
Panel B: internal governance = PCT_FEMALE				
NINTH	−0.088*** (−3.63)	−0.129*** (−5.02)	−0.168** (−2.51)	−0.150*** (−3.60)
POST	−0.050** (−2.04)	−0.123*** (−2.93)	−0.379*** (−2.88)	−0.070 (−1.31)
NINTH × POST	0.033** (2.03)	0.031 (1.20)	0.182** (2.06)	0.013 (0.31)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	1,288	893	1,288	893
Adj. R^2	0.225	0.332	0.175	0.294
Subsample difference: *NINTH × POST*	$\chi^2 = 0.45$ ($p = 0.502$)		$\chi^2 = 4.31$ ($p = 0.038$)	

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; ** and ***indicate statistical significance at the 5 and 1 % levels (two-tailed), respectively. All variables are defined in Appendix 1

Table V. The impact of litigation risk on REM: partitioned on internal corporate governance strength

4.5 Robustness tests

4.5.1 Dynamic effect. In this section, following Houston *et al.* (2019), we examine the dynamic effect of the court's ruling on managers' behavior and further validate the causal effect. While Houston *et al.* (2019) trace the dynamic effect of the ruling on managers' earnings forecasts, we focus on the effect on managers' real operating decisions. Particularly, we use the following model:

$$\begin{aligned} REM_{it} = {} & \theta_0 + \theta_1 NINTH_{it} + \sum_{\tau=1}^{4} \gamma_\tau RULING_{t,\tau} + \sum_{\tau=1}^{4} \varphi_\tau NINTH_{it} \times RULING_{t,\tau} \\ & + \theta_2 SOX_{it} + \theta_3 ANANO_{it} + \theta_4 MRT_{SHRit} + \theta_5 AEM_{it} + \theta_6 ROA_{jt} \\ & + \theta_7 LAT_{it} NG_{t,\tau} + \theta_8 BTM_{jt} + \theta_9 LEV_{it} + (\text{Year dummies}) \\ & + (\text{Industry dummies}) + \varepsilon_{it} \end{aligned} \tag{5}$$

where $RULING_{t,\tau}$ denotes the τ-th year relative to the 1999 Ninth Circuit Court ruling. Table VII presents the regression results that test the dynamic effect of the ruling decision on REM. We find that the coefficient of interaction term, $NINTH_{it} \times RULING_{t,\tau}$, is positive in every year of the four years after the ruling and significant in three of the years. This

Variable	*REM1* Low (1)	*REM1* High (2)	*REM2* Low (3)	*REM2* High (4)
Panel A: litigation = LITIGATION				
NINTH	−0.050*** (−2.69)	−0.087*** (−4.21)	−0.081** (−2.54)	−0.127*** (−4.00)
POST	−0.046 (−0.79)	−0.069** (−2.11)	0.005 (0.05)	−0.094* (−1.68)
NINTH × POST	0.016 (1.06)	0.066*** (3.59)	0.030 (1.33)	0.080*** (3.33)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	3,133	2,820	3,133	2,820
Adj. R^2	0.262	0.194	0.285	0.196
Subsample difference:				
NINTH × POST	$\chi^2 = 5.65$ ($p = 0.018$)		$\chi^2 = 2.98$ ($p = 0.084$)	
Panel B: litigation= FIRM AGE				
NINTH	−0.093*** (−4.75)	−0.074*** (−3.51)	−0.133*** (−3.72)	−0.121*** (−3.90)
POST	0.039 (0.69)	−0.065* (−1.89)	0.038 (0.34)	−0.090 (−1.13)
NINTH × POST	0.084*** (4.46)	0.006 (0.43)	0.116*** (4.22)	0.013 (0.60)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	3,069	2,884	3,069	2,884
Adj. R^2	0.169	0.220	0.203	0.207
Subsample difference:				
NINTH × POST	$\chi^2 = 18.41$ ($p = 0.000$)		$\chi^2 = 18.49$ ($p = 0.000$)	
Panel C: litigation = LEV				
NINTH	−0.110*** (−5.60)	−0.051*** (−3.25)	−0.178*** (−5.37)	−0.068** (−2.24)
POST	−0.098 (−1.37)	0.000 (0.00)	−0.159 (−1.34)	−0.014 (−0.20)
NINTH × POST	0.082*** (4.67)	0.015 (1.25)	0.121*** (5.05)	0.013 (0.65)
Controls	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
No. of observations	2,976	2,977	2,976	2,977
Adj. R^2	0.193	0.207	0.204	0.246
Subsample difference:				
NINTH × POST	$\chi^2 = 13.30$ ($p = 0.000$)		$\chi^2 = 15.33$ ($p = 0.000$)	

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; *; **; and ***indicate statistical significance at the 10, 5 and 1 % levels (two-tailed), respectively. All variables are defined in Appendix 1

Table VI.
The impact of litigation risk on REM: partitioned on firm litigation

indicates that firms operating in the affected states, which have an environment less friendly to plaintiffs, respond to the ruling with continuous use of REM.

4.5.2 The initial public offering setting. In this section, we investigate whether REM decreases in another setting, which also poses a high risk for litigation. Prior literature (Lowry and Shu, 2002; Venkataraman *et al.*, 2008) finds that in the pre-IPO period managers have incentive to manipulate earnings for a higher IPO stock price and therefore litigation risk significantly increases in that period. Thus, using IPO as an alternative setting can supplement the primary setting in this study to explore our research question. We next examine whether managers engage in lower levels of REM in the pre-IPO period, which has higher litigation risk than in the post-IPO period. To test this conjecture, we collect IPO data from the SDC Global New Issues database and match it with our REM data. For each IPO,

Variable	Pred. sign	*REM1* (1)	*REM2* (2)
NINTH	?	−0.074*** (−5.42)	−0.115*** (−4.71)
RULING (+1)	?	0.020 (0.75)	0.018 (0.55)
NINTH × *RULING* (+1)	+	0.016 (1.07)	0.029* (1.81)
RULING (+2)	?	−0.023 (−1.06)	−0.047 (−1.33)
NINTH × *RULING* (+2)	+	0.071*** (3.01)	0.112*** (2.95)
RULING (+3)	?	−0.019 (−0.81)	−0.007 (−0.24)
NINTH × *RULING* (+3)	+	0.091*** (4.28)	0.111*** (4.10)
RULING (+4)	?	−0.051 (−1.18)	−0.062 (−1.06)
NINTH × *RULING* (+4)	+	0.080** (2.46)	0.107** (2.14)
SOX	+	0.049 (0.79)	0.089 (0.96)
ANANO	−	−0.006*** (−10.23)	−0.008*** (−8.01)
MRT_SHR	+	0.079 (1.50)	0.027 (0.29)
AEM	?	0.261*** (8.88)	0.018 (0.38)
ROA	?	−0.188*** (−5.45)	0.124*** (2.69)
LAT	?	0.044*** (7.38)	0.087*** (8.48)
BTM	?	0.088*** (7.87)	0.130*** (7.83)
LEV	?	0.241*** (10.41)	0.278*** (7.15)
Intercept		−0.300*** (−5.57)	−0.386*** (−4.37)
Year fixed-effects		Yes	Yes
Industry fixed-effects		Yes	Yes
No. of observations		5,953	5,953
Adj. R^2		0.185	0.189

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; *; **; and ***indicate statistical significance at the 10, 5 and 1 % levels (two-tailed), respectively. All variables are defined in Appendix 1

Table VII.
Dynamic effect of litigation risk on REM

we use four years around the IPO with two years before (after) the IPO. Our sample consists of 3,747 firm-years (982 IPOs). Consistent with the expectation that litigation risk constrains managers' REM, we find in Table VIII that the magnitude of REM is lower in the pre-IPO period, which has higher litigation risk. This result further strengthens our findings and suggests our result is not sensitive to a different setting.

4.5.3 Simulation and bootstrap. According to Bertrand *et al.* (2004), the DiD coefficient could be inflated when:

- standard errors are significantly downward biased from within-group clustering; and/or
- the dependent variable is autocorrelated.

To alleviate this concern, we conduct simulation and bootstrap tests to evaluate whether a downward bias drives our results.

To conduct simulation tests, we repeat Model 4 5,000 times on the pseudo-treatment and control samples, which are formed by randomly assigning the 1,094 firms into a pseudo-treatment group (with the probability of 547/1,024) and the pseudo-control group. Panel A of Table IX presents the percentiles of the estimated DiD estimator (*NINTH* × *POST*) and the rejection rate of the random sample. We find that the actual estimates of both *REM1* and *REM2* models are higher than the 99 per cent percentiles of the simulated estimations and

Variable	Pred. sign	*REM1* (1)	*REM2* (2)
PRE_IPO	−	−0.146** (−1.97)	−0.229** (−2.06)
SOX	+	0.032 (0.24)	0.273 (0.66)
ANANO	−	−0.005** (−2.25)	−0.017* (−1.89)
MRT_SHR	+	4.253*** (4.21)	12.276* (1.86)
ROA	?	−0.008 (−0.16)	−1.180 (−1.50)
LAT	?	0.247*** (4.10)	1.102** (2.17)
BTM	?	−0.017 (−1.41)	0.016 (0.55)
LEV	?	0.180*** (10.33)	0.161* (1.94)
Intercept		0.441*** (7.40)	0.490*** (4.12)
Year fixed-effects		−0.036	−0.032
Industry fixed-effects		(−0.38)	(−0.12)
No. of observations		3,747	3,747
Adj. R^2		0.060	0.053

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; *; **; and ***indicate statistical significance at the 10, 5 and 1 % levels (two-tailed), respectively. All variables are defined in Appendix 1

Table VIII.
The impact of litigation risk on REM: the IPO setting

the rejection rates are both smaller than 10 per cent, indicating that the DiD estimator is unlikely to be significant by randomly assigning firms to the pseudo-treatment and control samples.

Following Bertrand *et al.* (2004), we conduct a bootstrap-standard error test to address the over-rejection problem. Specifically, we repeat the DiD regressions on 5,000 bootstrap samples, which are formed by re-sampling 1,024 firms with replacement from the original 1,024 firms. We then calculate the bootstrap standard error with the standard deviation of the coefficient estimated on the bootstrap samples and the bootstrap *z*-statistics with the difference between the coefficients on the bootstrap sample and the original sample scaled by the bootstrap standard error. The bootstrap test results reported in Panel B of Table IX suggest that the DiD estimators are still statistically significant. Taken together, Table IX shows our baseline results are unlikely to be affected by an over-rejection problem.

4.5.4 The placebo test. The DiD test results could be attributable to some unobservable factor that does not affect control firms but affects treatment firms. The causal inference of the DiD results would be erroneous if that were the case. To address this concern, we follow Bertrand *et al.* (2004) and conduct a placebo test. Particularly, we create a pseudo-event in July 2006 and assume that the pseudo-event reduces treatment firms' litigation risk. We use eight years surrounding the pseudo-event month and rerun Model 4 to examine whether the pseudo-event affects treatment firms' REM decisions. The results in Table X show that our coefficients of DiD estimator, $NINTH \times POST$, are insignificant in every model, which indicates that our baseline results are unlikely to be driven by some unobservable factors that systematically affect treatment firms but not control firms.

4.5.5 Alternative measure of real earnings management. Following Gunny (2010), we also use measures of REM based on expectation models for R&D expenditures, SG&A expenditures, gains on asset sales, and production costs. Appendix 2 gives a description of the expectation models used in Gunny (2010) measure. Using the alternative measures of REM, we re-estimate Model 4 and find that the DiD coefficient is significantly negative in all columns except for Column 3. Therefore, our conclusions are qualitatively unchanged using the alternative measures of REM (Table XI).

Table IX. Simulation and bootstrap tests

Model	Count	Mean	SD	P1	P5	P10	P25	P50	P75	P90	P95	P99	Rejection rate
Panel A: simulation													
REM1	5,000	0.000	0.013	−0.030	−0.022	−0.017	−0.009	0.000	0.009	0.016	0.021	0.030	0.073
REM2	5,000	−0.001	0.021	−0.050	−0.035	−0.027	−0.015	0.000	0.014	0.025	0.033	0.048	0.085

Panel B: bootstrap tests

Model	Original sample		Bootstrap sample	
	Coefficient	*t*-statistic	Standard error	*t*-statistic
REM1	0.037	3.35	0.017	3.00
REM2	0.042	2.99	0.026	2.65

Notes: Panel A reports the summary statistics of the 5,000 simulation test results. For each simulation, we randomly assign the 547 firms into the pseudo-treatment group (with probability of 547/1,094) and the pseudo-control group, and then run Model 1 with the pseudo-sample. Panel B reports the block bootstrap results. We re-sample 547 firms with replacement from the original 547 firms to generate 5,000 bootstrap samples. We run the DiD regressions, the bootstrap standard error is calculated as the standard deviation of the coefficient estimated on the bootstrap sample and the bootstrap *t*-statistic is calculated as the difference between the coefficient on the bootstrap sample and the original sample divided by the bootstrap standard error. All variables are defined in Appendix 1

Table X.
The impact of litigation risk on REM: placebo test

Variable	Pred. sign	*REM_CFO* (1)	*REM_PROD* (2)	*REM_DISX* (3)	*REM1* (4)	*REM2* (5)
NINTH	?	−0.005 (−1.58)	−0.026** (−2.64)	−0.044*** (−2.99)	−0.046*** (−3.29)	−0.064*** (−2.79)
POST	?	0.082*** (10.03)	0.023* (2.00)	−0.041*** (−2.94)	0.042** (2.61)	−0.018 (−1.09)
NINTH × *POST*	+	−0.004 (−0.88)	−0.002 (−0.28)	0.002 (0.22)	−0.003 (−0.29)	−0.009 (−0.62)
SOX	+	0.024*** (3.39)	0.036*** (3.87)	0.053*** (3.71)	0.082*** (4.87)	0.096*** (4.44)
ANANO	−	−0.003*** (−14.46)	−0.006*** (−14.56)	−0.005*** (−10.25)	−0.007*** (−14.52)	−0.010*** (−11.86)
MRT_SHR	+	0.059*** (3.85)	0.049 (1.52)	−0.052 (−1.29)	0.006 (0.16)	−0.025 (−0.37)
AEM	?	−0.011** (−2.17)	−0.006 (−1.33)	0.049*** (6.24)	0.047*** (5.32)	0.057*** (5.22)
ROA	?	−0.416*** (−49.67)	−0.252*** (−17.99)	0.197*** (10.39)	−0.250*** (−16.40)	−0.051 (−1.66)
LAT	?	0.000 (0.05)	0.039*** (12.71)	0.062*** (9.53)	0.058*** (12.90)	0.099*** (11.38)
BTM	?	0.008 (1.55)	0.091*** (7.83)	0.147*** (7.55)	0.146*** (8.60)	0.245*** (8.26)
LEV	?	0.015* (1.91)	0.043** (2.32)	0.092*** (3.98)	0.120*** (5.42)	0.141*** (3.95)
Intercept		−0.221*** (−4.90)	−0.487*** (−7.90)	0.070 (0.45)	−0.182 (−1.04)	−0.322 (−1.12)
Year fixed-effects		Yes	Yes	Yes	Yes	Yes
Industry fixed-effects		Yes	Yes	Yes	Yes	Yes
No. of observations		7,197	7,197	7,197	7,197	7,197
Adj. R^2		0.446	0.258	0.263	0.195	0.198

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; *; **; and ***indicate statistical significance at the 10, 5 and 1 % levels (two-tailed), respectively. All variables are defined in Appendix 1

Table XI. The impact of litigation risk on REM: Gunny (2010) models

Variable	Pred. sign	*REM_RD* (1)	*REM_SGA* (2)	*REM_GAINA* (3)	*REM_PRO* (4)	*REM_PROXY* (5)
NINTH	?	−0.004* (−1.87)	−0.055*** (−5.77)	0.000* (1.80)	−0.045*** (−3.71)	−0.113*** (−4.66)
POST	?	−0.020*** (−3.45)	−0.029 (−1.07)	0.001 (1.05)	−0.065*** (−3.01)	−0.035 (−0.51)
NINTH × *POST*	+	0.004* (1.85)	0.023*** (2.70)	−0.000 (−0.54)	0.021*** (2.68)	0.050** (2.28)
SOX	+	0.002 (0.69)	0.045*** (2.74)	0.000 (0.90)	0.025 (1.66)	0.064** (2.08)
ANANO	−	−0.000*** (−4.83)	0.000 (0.10)	−0.000 (−0.38)	−0.004*** (−9.21)	−0.003*** (−3.98)
MRT_SHR	+	−0.041*** (−3.78)	−0.194*** (−3.05)	0.003 (0.74)	0.063** (2.01)	−0.217 (−1.49)
AEM	?	0.005* (1.77)	−0.047 (−1.57)	−0.001** (−2.16)	−0.006 (−0.98)	−0.066* (−1.72)
ROA	?	0.007** (2.01)	0.011 (0.63)	0.002*** (3.88)	−0.161*** (−6.38)	−0.154*** (−4.17)
LAT	?	0.012*** (23.50)	0.024*** (6.83)	−0.000 (−0.58)	0.051*** (14.19)	0.090*** (12.23)
BTM	?	−0.009*** (−7.71)	0.053*** (6.28)	−0.001*** (−3.29)	0.062*** (7.83)	0.111*** (6.37)
LEV	?	0.004 (0.77)	0.158*** (6.53)	−0.001 (−1.03)	0.064*** (3.65)	0.237*** (4.26)
Intercept		−0.069*** (−6.46)	−0.230*** (−2.70)	0.000 (0.14)	−0.248*** (−5.90)	−0.800*** (−5.43)
Year fixed-effects		Yes	Yes	Yes	Yes	Yes
Industry fixed-effects		Yes	Yes	Yes	Yes	Yes
No. of observations		4,383	4,416	3,398	5,953	3,377
Adj. R^2		0.196	0.075	0.116	0.195	0.165

Notes: The *t*-statistics reported in parentheses are computed using standard errors clustered at the operating state level; *; **; and ***indicate statistical significance at the 10, 5 and 1 % levels (two-tailed), respectively. All variables are defined in Appendix 1

4.5.6 Alternative classification of the pre- and post-periods. Our baseline analysis explores the four years before (after) the Ninth Circuit Court ruling took effect as the pre- (post-) event period. We next examine whether our results are sensitive to the cutoff used. As our post-ruling period overlaps with the passage of SOX, we assess the robustness of our main results by considering two alternative cutoffs. Specifically, we explore six (four) years surrounding the event month instead of eight years. The tests of Model 4 (untabulated) yield qualitatively similar results using these alternative cutoff periods.

4.5.7 Excluding Nevada firms. Our post-ruling sample period of 1999-2003 overlaps with a Nevada corporate law, which was passed in 2001. The law protects executives by stipulating that they can only be held liable if their behaviors involve purposeful misconduct, fraud or violation of the law (Cazier *et al.*, 2017). Therefore, NV directors and officers are exposed to lower litigation risk relative to managers in other states following this legislation taking effect. It is possible that Nevada firms drive our results. To eliminate this possibility, we exclude all Nevada firms and re-estimate Model 4. The results (unreported) indicate that our primary conclusions are not significantly impacted by Nevada firms.

5. Conclusions

Protection of investors' interest is the focus of corporate governance. Designed as an important corporate governance mechanism, shareholder litigation enables investors to pursue legal actions to recover their losses in the event of corporate misbehaviors. However, whether shareholder litigation is an effective corporate governance tool and beneficial to shareholders and firms is not without controversy. We contribute to the debate by examining whether shareholder litigation risk causally impacts managers' decisions of REM, an important earnings management tool, which is detrimental to long-term firm value.

Shareholder legal threat potentially imposes high financial and non-financial burdens on managers and firms, and shareholders are able to pursue legal action on the ground of breach of fiduciary duty. Thus, shareholder litigation risk is an exceptionally strong external corporate governance mechanism. We use the unexpected 1999 Ninth Circuit Court ruling as a quasi-experiment to identify reductions in shareholder litigation risk that are exogenous to firm characteristics (Crane and Koch, 2016; Cazier *et al.*, 2017; Hopkins, 2018; Houston *et al.*, 2019). Using DiD methodology, we find that firms increase opportunistic REM to respond to decreased shareholder litigation risk. Although shareholder litigation risk curbs AEM (Venkataraman *et al.*, 2008), our evidence suggests it also significantly constrains REM. This result is surprising given a large literature of the substitution effect of the two earnings management alternatives, which suggests firms turn to REM to improve short-term earnings when AEM is limited.

Our result is robust to different measures of REM and other robustness controls. Cross-sectional test results suggest the negative effect of decreased shareholder litigation is more pronounced when monitoring difficulty is higher, when information environment is more impoverished or when internal corporate governance is weaker. The negative effect is also stronger in firms with higher sensitivity to legal threats.

Notes

1. We focus on *ex ante* litigation risk, as our research question is concerned with whether litigation risk modifies firm behavior. See Kim and Skinner (2012) for a discussion of the difference between *ex ante* litigation risk and *ex post* litigation risk. We thank a participant at the public

interest concurrent session of 2017 American Accounting Association annual meeting for pointing this out.

2. Following Roychowdhury (2006), we define REM as "departures from normal operational practices, motivated by managers' desire to mislead at least some stakeholders into believing certain financial reporting goals have been met in the normal course of operations."

3. Cohen *et al.* (2008) and Zang (2012) demonstrate that managers favor REM over AEM to achieve short-term earnings goal. Survey evidence from Graham *et al.* (2005) also suggests managers strongly prefer REM as AEM easily attracts scrutiny from regulators, auditors and other stakeholders.

4. www.businesswire.com/news/home/20161215006156/en/Whistleblowers-Claim-MiMedx-Group-Defrauded-Investors-Lawsuit

5. Prior literature documents this pressure to avoid loss and stock price decline and ensuing legal threat significantly modifies management behaviors such as information disclosure (Skinner, 1994; Rogers and Buskirk, 2009), IPO pricing (Lowry and Shu, 2002), compensation policy (Laux, 2010) and financial reporting (Bergstresser and Philippon, 2006).

6. We do not fully exclude the possibility of a positive relationship. Current empirical evidence suggests managers usually engage in more REM when their ability to use other earnings management tools is restricted by external corporate governance (Cohen *et al.*, 2008; Zang, 2012, Kothari *et al.*, 2016). If shareholder litigation risk curbs accrual-based earnings management, high shareholder ligation risk may actually be positively related to a firm's REM.

7. These empirical proxies include industry membership (Francis *et al.*, 1994), estimated litigation likelihood (Field *et al.*, 2005) and directors and officers (D&O) liability insurance premium (Cao and Narayanamoorthy, 2011).Kim and Skinner (2012) argue those proxies all suffer from endogeneity and sometimes produce mixed empirical results.

8. Crane and Koch (2016) indicate subsequent to the ruling, the number of class action suits dropped 43 per cent in the Ninth Circuit Court, compared with a 14 per cent increase in other circuits. Nevertheless, the Ninth Circuit Court still remains as the most influential Court of Appeals in terms of the number of class action lawsuits per year (securities class action settlements – 2015 review and analysis, Cornerstone Research, http://securities.stanford.edu/research-reports/1996-2015/Settlements-Through-12-2015-Review.pdf).

9. We appreciate the suggestion of an anonymous reviewer. To provide further evidence that shareholder litigation cases against REM activities significantly decrease after the 1999 Ninth Circuits ruling, we randomly select and read 160 shareholder litigation cases, among which 40 cases are in each of the pre- (post-) period for treatment (control) firms from Stanford Securities Class Action Clearinghouse. We find that there are six litigation cases against REM in the Ninth Court sample (treatment group) before the ruling, and this number decreases to three after the ruling. For the control sample, the matching number increases from four to five in the same period. Taken together, the result of real litigation data is consistent with that of our multiple regression: there is a negative relationship between shareholder litigation risk and opportunistic REM.

10. Existing academic evidence suggests managerial myopia is the primary driving force of REM as firms make opportunistic investment adjustments to meet short-term earnings goals at the expense of long-term growth (Dechow and Sloan, 1991; Cohen *et al.*, 2008; Cohen and Zarowin, 2010).

11. For example, using the setting of IPO as a proxy of high litigation risk environment, Venkataraman *et al.* (2008) find a significantly negative relationship between litigation risk and discretionary accruals.

12. We thank two anonymous expert reviewers for those two differentiating points here: internal corporate governance and alternative test using IPO setting.

13. Cao and Narayanamoorthy (2011) suggest on the date of a shareholder lawsuit filing, the defendants on average lose 1 per cent of their firm value or 2.73 per cent if any violation of securities laws is involved.

14. For example, Lowry and Shu (2002) report the average settlement payment in their IPO sample was equal to 11 per cent of the total proceeds raised by those IPOs. Recently, a study published by Cornerstone Research shows the total value of class action settlement in 2015 was $3bn and the average settlement size was $37.9m in 2015 (securities class action settlements – 2015 review and analysis, Cornerstone Research, http://securities.stanford.edu/research-reports/1996-2015/Settlements-Through-12-2015-Review.pdf).

15. Although D&O insurance can substantially minimize the out-of-pocket liability risk of managers, recent court case developments suggest a trend of rising personal stake. For example, in the Enron and WorldCom settlements, private litigants staunchly demanded managers' personal payments as a condition of settlement. Laux (2010) suggests this shift in the legal environment has significantly impacted managerial incentives and firm behavior.

16. One recent settlement was the case of Salix Pharmaceuticals, Inc. in March of 2017. The firm has agreed to pay $210m to settle the litigation, which claimed that Salix Pharmaceuticals committed channel stuffing and had caused its distributors to over-accumulate inventories of more than nine months.

17. Consistent with Cohen *et al.* (2008), when SG&A expenses are not missing, we set advertising expenses and R&D expenses to zero if they are missing.

18. The results are similar if we use Fama and French (1997) industry grouping for all estimation regressions.

19. We do not aggregate all three individual REM metrics because, as pointed by Roychowdhury (2006) and Cohen and Zarowin (2010), the activities that lead to abnormally high PROD might also result in abnormally low CFO. Therefore, aggregating abnormal PROD and abnormal CFO can lead to double counting.

20. https://sraf.nd.edu/data/augmented-10-x-header-data/

21. After the matching procedure, the control variables between treatment firms and their matched control firms are not significantly different, satisfying the balancing property. Using 12,377 observations before matching, we repeat our main analysis and find that our results are qualitatively unchanged.

22. While it is difficult to identify any possible reason for the pre-existing differences of REM, the focus of the paper is to use the setting of this regulation to examine the impact of shareholder litigation risk on REM. The unique DiD design properly controls for impacts of any preexisting firm characteristics and any other contemporaneous event.

23. We appreciate the suggestion of an anonymous reviewer for additionally testing the relation between litigation risk and AEM. Our untabulated results show an insignificant interaction term, indicating that the positive and the negative effects are cancelled out.

24. For brevity, we do not report the regression results for the control variables for Tables IV-VI. Results are available upon request.

25. We also consider the effect of an alternative external corporate governance, i.e. audit quality on REM. We group firms into a high- (low-) auditor tenure sample if a firm's auditor tenure is above (below) the median. We find (results untabulated) that the DiD coefficient is positive and significant only for the subsample of firms with high auditor tenure. Overall, the results suggest that our findings are consistent with the unintended consequence that higher auditor quality would incentivize managers to engage in greater REM.

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Appendix 1

REM_CFO	A firm's abnormal operating cash flows measure, which equals (−1) × abnormal cash flows estimated from Roychowdhury (2006) models
REM_PROD	A firm's signed abnormal production costs measure, which equals abnormal production costs estimated from Roychowdhury (2006) models
REM_DISX	A firm's signed abnormal discretionary expenditures measure, which equals (−1) × abnormal discretionary expenses estimated from Roychowdhury (2006) models
REM1	A firm's aggregate REM measure, which equals REM_CFO + REM_PROD
REM2	A firm's aggregate REM measure, which equals REM_PROD + REM_DISX
NINTH	An indicator variable that takes the value of 1 if a firm is headquartered in the states of US Court of Appeals for the Ninth Circuit, including Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon and Washington, and 0 otherwise
PRE	An indicator variable that takes the value of 1 if a firm-year's fiscal year end falls between January 1, 1995 and June 30, 1999, and 0 otherwise
POST	An indicator variable that takes the value of 1 if a firm-year's fiscal year end falls between July 1, 1999 and December 31, 2003, and 0 otherwise
SOX	An indicator variable that takes the value of 1 if a firm's fiscal year is 2002 and onwards, and 0 otherwise
ANANO	The number of analyst following for the firm
MRK_SHR	The ratio of a company's sales to the total sales of its industry (based on three-digit SIC codes)
AEM	The value of discretionary accruals estimated from modified Jones (1991) model
ROA	Net income before extraordinary items (#IB) divided by total assets (#AT) at the beginning of the year
LAT	The natural logarithm of total assets (#AT)
BTM	The book value of equity (#CEQ) divided by the market value of equity (# PRCC_F × # CSHO)
LEV	The leverage ratio, calculated as the short-term debt plus long-term debt (#DLC+#DLTT), divided by the total assets (#AT)
Variables in additional tests	
BID-ASK SPREAD	The average bid-ask spread of the year. Spread $= \frac{(\#\text{ASKHI} - \#\text{BIDLO})}{(\#\text{ASKHI} - \#\text{BIDLO})/2}$
FERROR	The absolute value between the mean analysts' earnings forecast and actual firm earnings scaled by the firm's stock price
R&D	The annual R&D expense (# XRD), scaled by total operating expenses (# XOPR)
LITIGATION	An indicator variable that takes the value of 1 for firms operating in the biotechnology (SIC 2833-2836; 8731-8734), computers (3570-3577; 7370-7374), electronics (3600-3674) and retailing (5200-5961) industries, and 0 otherwise
FIRM AGE	The number of entire years, as a firm's first appearance in the CRSP monthly stock returns file
PCT_INDEP	The proportion of independent directors on the board
PCT_FEMALE	The proportion of female directors on the board
PRE_IPO	An indicator variable that takes the value of 1 if a firm-year's fiscal year end falls in the two years before the IPO, and 0 otherwise
REM _RD	A firm's signed abnormal R&D expenses, which equal (−1) × abnormal R&D costs estimated from Gunny (2010) models (see Appendix 2 for details)
REM_SGA	A firm's signed abnormal SG&A expenses, which equal abnormal SG&A costs estimated from Gunny (2010) models (see Appendix 2 for details)
REM _GAINA	A firm's signed abnormal production expenses, which equal abnormal production costs estimated from Gunny (2010) models (see Appendix 2 for details)
REM _PRO	A firm's signed abnormal production expenses, which equal abnormal gains on asset sales estimated from Gunny (2010) models (see Appendix 2 for details)
REM _PROXY	A firm's aggregate REM measure, which equals REM_RD + REM_SGA + REM_PRO + REM_GAINA

Table AI.
Definitions of variables

Appendix 2. Measurement of REM using the methodology of Gunny (2010)

Normal levels of R&D expense, normal levels of SG&A expense, normal level of gain on asset sales and normal levels of production costs are estimated using the following models:

$$\frac{R\&D_{it}}{TA_{it-1}} = \theta_0 + \theta_1 \frac{1}{TA_{it-1}} + \theta_2 MV_{it} + \theta_3 Q_{it} + \theta_4 \frac{INT_{it}}{TA_{it-1}} + \theta_5 \frac{R\&D_{it-1}}{TA_{it-1}} + \varepsilon_{it} \quad (2.1)$$

$$\frac{SG\&A_{it}}{TA_{it-1}} = \theta_0 + \theta_1 \frac{1}{TA_{it-1}} + \theta_2 MV_{it} + \theta_3 Q_{it} + \theta_4 \frac{INT_{it}}{TA_{it-1}} + \theta_5 \frac{\Delta SALE_{it}}{TA_{it-1}} + \theta_6 \frac{\Delta SALE_{it}}{TA_{it-1}} * DD_{it} + \varepsilon_{it} \quad (2.2)$$

$$\frac{GAINA_{it}}{TA_{it-1}} = \theta_0 + \theta_1 \frac{1}{TA_{it-1}} + \theta_2 MV_{it} + \theta_3 Q_{it} + \theta_4 \frac{INT_{it}}{TA_{it-1}} + \theta_5 \frac{ASALE_{it}}{TA_{it-1}} + \theta_6 \frac{ISALE_{it}}{TA_{it-1}} + \varepsilon_{it} \quad (2.3)$$

$$\frac{PRO_{it}}{TA_{it-1}} = \theta_0 + \theta_1 \frac{1}{TA_{it-1}} + \theta_2 MV_{it} + \theta_3 Q_{it} + \theta_4 \frac{SALE_{it}}{TA_{it-1}} + \theta_5 \frac{\Delta SALE_{it-1}}{TA_{it-1}} + \theta_6 \frac{\Delta SALE_{it-1}}{TA_{it-1}} * DD_{it} + \varepsilon_{it} \quad (2.4)$$

In Models 2.1-2.4,

$R\&D_{it}$ = R&D expense for firm i in year t (#XRD);
TA_{it-1} = total assets for firm i in year t−1 (#AT);
MV_{it} = the natural log of market value for firm i in year t (#PRCC_F × #CSHO);
Q_{it} = Totin's Q for firm i in year t [(#PRCCF × #CSHO + #UPSTK + #DLTT + #DLC)/#AT];
INT_{it} = internal funds for firm i in year t (#IB + #XRD + #DP);
$SG\&A_{it}$ = SG&A expense for firm i in year t (#XSGA);
$\Delta SALE_{it}$ = change in sales revenue for firm i in year t (#SALE);
DD_{it} = an indicator equal to one when total sales decrease between year t−1 and year t, and zero otherwise;
$GAINA_{it}$ = income from assets sales for firm i in year t (#SPPIV);
$ASALE_{it}$ = long-lived assets sales for firm i in year t (#SPPE);
$ISALE_{it}$ = long-lived investment sales for firm i in year t (#SIV);
PRO_{it} = cost of goods sold plus change in inventory (#COGS + #INVCH);
$SALE_{it}$ = sales for firm i in year t (#SALE).

For each firm-year, we estimate the cross-sectional regressions of Models 2.1-2.4 for each two-digit industry and require that at least 20 firms in a particular industry for model estimation. We create four continuous variables, abnormal R&D, abnormal SG&A, abnormal GAINA and

abnormal PRO to measure the magnitude of abnormal R&D expense, abnormal SG&A expense, abnormal gain on asset sales and abnormal production, respectively. When a firm boosts current-period income by cutting investment in R&D, the abnormal R&D is negative. Portions of SG&A expense are subject to managerial discretion. If the manager cut employee-training program to engage in REMs, the abnormal SG&A is negative. To have consistent signs across different measures so that a higher value of each measure indicates a greater magnitude of REM, we multiply abnormal R&D investment and abnormal SG&A by negative one such that they have a positive relationship with REM activities. We compute the REM measure, *REM_PROXY* = (−1) × abnormal R&D costs + (−1) × abnormal SG&A costs + abnormal gains on asset sales + abnormal production costs.

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