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The relationship between R&D intensity, conservatism, and management earnings forecast issuance

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ABSTRACT

R&D-intensive firms suffer from high information asymmetry and high proprietary costs and are prone to exhibit bottom-line losses given the unconditional conservative accounting treatment of R&D expenses. We examine how R&D intensity influences the issuance of management earnings forecasts (MEFs) across levels of accounting conservatism, controlling for proprietary costs and other earnings guidance determinants. We provide insights into how managers view the tradeoffs of using MEF disclosures to lower information asymmetry versus the costs of releasing proprietary information to competitors and the loss of reputational capital that could arise from providing inaccurate forecasts. We find that although R&D intensity and conditional conservatism are negatively related to the issuance of MEFs, as shown in prior research, at high levels of research intensity and the accompanying uncertainty about future payoffs, the negative association between conditional conservatism and MEF issuance is mitigated. These findings point to a role for conditional conservatism as a credibility enhancer for managers of R&D intense firms.

1. Introduction

This study examines the mediating effect of R&D intensity on the association between managerial issuance of earnings guidance/forecasts (hereafter MEFs) and conditional conservatism. Intangible assets realized through R&D expenditures are market-based assets positively correlated with firm market value (Lev & Sougiannis, 1996; Sougiannis, 1994). However, the payoffs from intangibles generated through research and development activities are uncertain, and the uncertainty of the timing and magnitude of the economic benefits that might one day manifest as a result of the investment complicates the valuation of intangible assets. Corresponding to the speculative nature of the payoff from most R&D investments, U.S. Generally Accepted Accounting Principles (GAAP) requires the expensing of R&D costs in the period in which the corresponding intangible assets are developed.

The unconditional conservative practice[1] of immediately expensing R&D costs biases R&D-intensive firms towards losses (Ciftci & Darrough, 2015), and may distort the information content of financial reports resulting from a misalignment in the recognition of the costs and benefits of these investments (Amir & Lev, 1996; Lev, 2001; Lev, 2004; Lev, Nissim, & Thomas, 2005; Lev & Sougiannis, 1996; Lev & Zarowin, 1999) and could potentially bias firm valuation (Amir & Lev, 1996; Ciftci & Darrough, 2015; Monahan, 2005; Sougiannis & Yaekura, 2001). To the extent that these distortion effects are more prevalent for R&D-intensive firms, they exhibit greater levels of information asymmetry than firms with primarily tangible assets (Lev, 2001; Lev, 2004; Lev & Zarowin, 1999). As a result, managers may seek to lower asymmetric information regarding the timing and magnitude of cash flows that may ultimately arise from research and development spending by providing management earnings forecasts (MEFs).

The issuance of MEFs involves tradeoffs. Managers of firms with greater R&D intensity may prefer to retain proprietary information internally rather than risk disclosing it to competitors through the issuance of MEFs despite the potential benefits from reduced information asymmetry. In addition, management may fear damage to credibility (Hirst, Koonce, & Miller, 1999; Hirst, Koonce, & Venkataraman,

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[1] Conditional conservatism is defined as per Basu (1997) as "the implementation of more stringent verifiability criteria for the recognition of good news than bad news in earnings". Unconditional conservatism "occurs through the consistent under-recognition of accounting net assets" (Ruch & Taylor, 2015).

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2008), litigation, and human capital penalties (Lee, Matsunaga, & Park, 2012) arising from the issuance of inaccurate forward-looking forecasts.

In addition, recent research regarding conservative accounting practices may add a new dimension to managers' multifaceted tradeoffs regarding the issuance of MEFs. Hui, Matsunaga, and Morse (2009) suggest that conditional conservatism may play a substitution role for MEFs, as indicated by the negative relationship between conditional conservatism and MEFs, but do not explicitly address the relationship between R&D intensity and MEFs. Further, conditional conservatism has been linked to the enhancement of managers' credibility when making MEF disclosures. According to García Osma, Guillamon-Saorin, and Mercado (2020), conservative managers may be able to use MEFs to convey their confidence in distant and highly uncertain future payoffs. However, none of these studies examines the impact of conservatism on managers' decision to issue MEFs across increasing levels of R&D intensity, i.e., for firms increasingly and disproportionately impacted by the unconditional conservative policy of mandatory expensing of R&D investments.

To examine the impact of R&D intensity on the relationship between conditional conservatism and the issuance of management earnings forecasts, we first investigate the distribution of MEFs by the highest R&D intensity firms versus those in the bottom quintile of R&D intensity. Our univariate analysis indicates a decreasing trend in the likelihood of MEF issuance from the lowest to the highest R&D intensity quintiles and an increasing trend in conditional conservatism from the lowest to the highest R&D intensity quintiles. After controlling for MEF determinants, our logistic regression analysis findings include a negative and significant main effect relationship between MEF issuance and R&D intensity and MEF and conditional conservatism, consistent with Hui et al. (2009). Further, as R&D intensity increases, the impact of increasing conditional conservatism on the odds in favor of MEF issuance increases. On a stand-alone basis, managers appear less likely to issue MEFs in the presence of greater conditional conservatism; however, their issuance decision is altered at greater R&D intensity and corresponding levels of uncertainty and information asymmetry. Our finding suggests that the enhanced credibility role of conditional conservatism entices managers to issue MEFs for high information asymmetry firms.

We also find that this relationship between conditional conservatism, R&D intensity, and MEF issuance is robust to alternative specifications: the high proprietary costs subsample, after controlling for opportunistic MEFs, in both the pre and post-Regulation Fair Disclosure periods (albeit marginally significant in the post-Regulation Fair Disclosure period), when controlling for the time delay between the MEF and the earnings release, when we substitute the dichotomous MEF measure with the MEF frequency measure, and when using alternative measures of conditional conservatism.[2]

To our knowledge, we are the first study to assess the impact of conditional conservatism on managers' voluntary MEF disclosure decisions in the presence of increasing unconditional conservatism and the potentially distortive effects of immediate expensing on the usefulness of financial reports. This assessment contributes to several lines of research. First, we contribute to the ongoing debate on the usefulness of immediate expensing of R&D costs according to U.S. GAAP requirements. This accounting treatment has been criticized for depressing reported earnings and for negatively impacting the informativeness of earnings for equity investors (Amir & Lev, 1996; Lev & Zarowin, 1999), whereas other research suggests that the immediate expensing of R&D costs (unconditional conservatism) comprises a form of risk communication to stakeholders reminding them of the long term uncertain nature of the payoffs from these investments (e.g., Barker and Penman (2020) and Penman (2016a). Thus, introducing the notion of conditional conservatism to this debate may provide valuable insights to academics and standard setters and offer a different perspective on the ongoing debate surrounding the immediate expensing of R&D costs. Further, we add to the current literature on whether conditional conservatism plays a substitutional role (as suggested by Hui et al., 2009 or a complementary role (as suggested by García Osma et al., 2020) to MEF disclosures.

Finally, public think tanks, investor groups, and industry organizations suggest that short-term guidance may lead to myopic managerial behavior that could distort investments and incentivize earnings management (CFA Institute, 2006; The Aspen Institute, 2007, Karageorgiou, Saltzman, & Serafeim, 2014). Prior research reports that managers tend to cut R&D expenditures and accordingly, increase reported earnings when vesting their stock options to benefit from short-term increases in the stock price at the expense of long-term stock performance. This myopic managerial behavior is motivated by the immediate expensing of R&D (Edmans, Fang, & Lewellen, 2017; Ladika & Sautner, 2017).

On the other hand, academic research finds evidence of an adverse market reaction, increased analyst forecast dispersion, decreased forecast accuracy, and lower analyst following related to the decision to terminate MEF issuance (Chen, Matsumoto, & Rajgopal, 2011; Houston, Lev, & Tucker, 2010). Further, survey evidence by Hsieh, Koller, & Rajan (2006) document a reluctance by executives to cease issuing MEFs. Academics and practitioners may be interested in the role conditional conservatism may play in the decision by managers to issue MEFs and whether it alleviates the notion of "short-termism."

The remainder of the paper is organized as follows. Section 2 presents the literature review and the hypotheses. Section 3 discusses data and research design. Section 4 provides the results, and Section 5 concludes the paper.

2. Literature review and hypotheses

2.1. The accounting treatment of R&D

Substantial literature exists regarding the accounting treatment of unrecognized intangible assets. Lev and Sougiannis (1996) find that R&D intensity is positively associated with future earnings, indicating that investing in intangible assets through R&D has future economic benefits, just as investments in tangible assets do. Yet, U.S. GAAP requires, with a few exceptions, the immediate expensing of R&D outflows with no corresponding asset on the balance sheet, whereas investment in certain other intangible assets (such as the defense of a patent, licenses, trademarks, and other purchased intangible assets) and tangible assets are capitalized. The distinct accounting treatment arises from insufficient certainties in estimating the timing and magnitude of the economic benefits that may ultimately arise from R&D investments (Kothari, Laguerre, & Leone, 2002).[3] Amir, Guan, and Livne (2007) find that this greater uncertainty regarding future benefits from investment is specific to R&D-intensive industries, confirming the idea that research and development represent unique forms of investment.

The asymmetric treatment of R&D under GAAP has been criticized in several studies (Amir & Lev, 1996; Lev, 2001; Lev, 2004; Lev, 2018, 2019; Lev et al., 2005; Lev & Zarowin, 1999). Lev and Zarowin (1999) state that while R&D expenditures are immediately expensed, their benefits are recorded later and not matched with the previously expensed investments. They argue that the fundamental accounting measurement process of periodically matching costs with revenues becomes highly distorted for R&D-intensive firms, affecting the

[2] We thank an anonymous reviewer for these suggestions.

[3] R&D intensive firms are difficult to forecast because their investments in R&D activities are inherently risky and characterized by high information asymmetry. Specifically, these investments are unique to the firm, lack an organized market where resulting assets are traded, and these firms tend to invest in technological complexities (Aboody & Lev, 2000).

informativeness of financial reports.[4] Correspondingly, they find that the informativeness of reported earnings, as measured by the earnings response coefficient, has declined over time, primarily due to increased R&D spending over the last few decades of the 20th century.[5] Amir and Lev (1996) find that on a stand-alone basis, financial information for cellular companies with high levels of R&D investments is largely irrelevant for valuation, suggesting that while significant value creation occurs in high-tech industries through R&D, key financial variables such as earnings and book values of R&D intensive firms are often negative, excessively depressed, or unrelated to market values. Accordingly, Lev, Nissim and Thomas (2005, 26) argue that adjusted book values, rather than adjusted earnings, correlate significantly with future returns for R&D intense firms, concluding: "Our results suggest that firms in some but not all industries may improve the informativeness of their financial statements if they capitalize and amortize R&D expenditures over industry-specific useful lives."

More so, the immediate expensing of R&D costs depresses reported earnings, often resulting in losses for non-distressed R&D-intensive firms, thus adding to the distortion of accounting information and, in turn, increasing the complexity of valuing these firms. (Ciftci & Darrough, 2015; Darrough & Ye, 2007). On the other hand, investors seem to recognize the potential value distortion of conservative accounting on R&D-intensive firms and make the necessary adjustments in pricing. Consistent with this notion, Joos and Plesko (2005) show that over half of persistent[6] losses that firms experience contain an R&D component and argue that R&D expenses contribute to the negative cash flow component of persistent losses. Further, they show that investors price the R&D component of persistent losses more as the persistence of the losses evolves.

Other research indicates that the conservative U.S. GAAP treatment of R&D investments yields a desirable benefit related to risk communication. This is because the immediate expensing of R&D reminds investors of uncertainty regarding the outcomes of investments in intangible assets (Penman, 2016a). Barker and Penman (2020, 328) argue that if there were no uncertainty regarding the outcomes of investments, investments would be capitalized, and "net assets and expected earnings would be two sides of the same coin." However, the resulting income statements from the conservative treatment of R&D provide investors *ex-ante* information on the likelihood of future payoffs from these uncertain investments (Penman, 2016b). This critical role of *ex-ante* risk communication characterizes GAAP principles. It is a criticism of International Accounting Standards (IAS) 38, which does not require the immediate expensing of some R&D investment activities.

2.2. Management earnings forecasts and R&D investments

MEF disclosures are considered one of the most important voluntary disclosures (Hirst et al., 2008) and are value-relevant (Rogers, Skinner, & Van Buskirk, 2009). Research indicates that managers use MEFs to manage the expectations of market participants (Cotter, Tuna, & Wysocki, 2006), reduce information asymmetry (Ajinkya, Bhojraj, & Sengupta, 2005; Ajinkya & Gift, 1984; Coller & Yohn, 1997; Frankel, McNichols, & Wilson, 1995; Hui et al., 2009; Karamanou & Vafeas, 2005; Kasznik & Lev, 1995), and in turn, potentially lower the cost of capital (Frankel et al., 1995). However, MEFs also create potential costs for managers and the firm. MEFs may transfer proprietary information to competitors; Wang (2007) finds that firms with high proprietary costs provided private earnings guidance pre-Regulation Fair Disclosure (RegFD) and reports that firms were more likely to replace private guidance with non-guidance following the enactment of RegFD in the presence of lower information asymmetry (using the ratio of R&D expenditure to total assets as a proxy).[7] Further, prior studies report that managers who provide inaccurate forecasts face a greater risk of litigation (Hirst et al., 2008; Hutton & Stocken, 2021; Williams, 1996; Yang, 2012) and damage to reputational and human capital (Lee et al., 2012).

Research documenting a potential impact of R&D intensity on the MEF decision and the tradeoffs embedded in this decision is limited and somewhat indirect. Cao, Ma, Tucker, and Wan (2018) document a significant negative relationship between voluntary product-specific disclosures and firm proprietary costs.[8] In an additional analysis, when replacing voluntary product disclosures with MEF frequency, Cao et al. document a significant, positive relationship between MEF frequency and proprietary costs. Extending Wang (2007) and building on Cao et al. (2018), Khallaf and Kannan (2020) assess the impact of the accounting treatment of intangibles (both recognized and unrecognized) on managers' decisions to issue MEFs and find that recognized intangible assets are positively related to MEF issuance, whereas immediately expensed/unrecognized intangibles are negatively associated with MEFs. In disaggregated cross-sectional analysis, they also find a positive and significant likelihood of MEF issuance in the presence of both higher R&D intensity and greater earnings uncertainty, suggesting that managers' concerns regarding the consequences of issuing inaccurate forecasts may be outweighed by a need to convey confidence to market participants.

2.3. Conditional conservatism and management earnings forecasts

The relationship between conditional conservatism and information asymmetry is not a settled matter in the literature. Conditional conservatism is positively and significantly related to a higher quality information environment (García Lara, García Osma, & Penalva, 2011) and lower information asymmetry (Francis, Hasan, & Wu, 2013; Kim, Li, Pan, & Zuo, 2013). As such, it may act as a substitute for MEFs, given that it increases the informativeness of earnings information. In support of this "substitution paradigm", Hui et al. (2009) and LaFond and Watts (2008) demonstrate that greater conservatism (using both conditional and unconditional conservatism proxies) is associated with a lower incidence of quantitative management forecasts, because conservatism itself lowers information asymmetry, lessening the need of MEFs to reduce information asymmetry. While Hui et al. (2009) do not explicitly examine R&D-intensive firms, they also demonstrate that higher conservatism (including conditional conservatism) lowers litigation risk and, accordingly, MEF issuance.

Li, Wasley, and Zimmerman (2016) use insider trading and the release date of MEFs to differentiate between three different types of MEFs: cost of capital MEFs issued to reduce information asymmetry, opportunistic MEFs issued to maximize managers' benefits, and mandatory MEFs required by SEC regulations when managers intend to trade in their firms' stocks. In a recent study, Jaggi, Xin, and Ronen

[4] However, Penman (2016a) argues that focusing on the matching principle is "missing the point", because perfect matching can never occur under conditions of uncertainty, stating "An understanding of conservative accounting suggests the 'matching principle' should not be embraced as a matter of accounting principle if one wishes to convey information about the amount and uncertainty of future cash flows."

[5] However, Collins, Maydew, and Weiss (1997) and Francis and Schipper (1999) did not find any difference in usefulness of earnings and book values between intangible-intensive industries and other industries.

[6] Persistent losses are those characterized by a low reversal probability.

[7] Specifically, Wang (2007) finds that a one standard deviation increase in the probability of informed trading (PIN) decreases the odds of becoming a nondisclosure post RegFD by approximately 25%, and a one standard deviation increase in proprietary costs increases the odds of becoming a nondisclosure post RegFD by approximately 55%.

[8] The paper uses Technological Peer Pressure (TPP) as a proxy for proprietary costs. This measure is based on the relationship between a firm's R&D and its peer firms' R&D. When a firm's R&D is low (high) compared to its peers' R&D, TPP is high (low).

(2021) utilized Li et al.'s (2016) methodology to examine the link between accounting conservatism and the frequency by MEF type and to explore whether the negative association between accounting conservatism and MEFs documented by Hui et al. (2009) is equally valid for the three different types of MEFs. Findings reveal that while cost of capital MEFs are negatively and significantly associated with accounting conservatism, opportunistic and mandatory MEFs are positively and significantly associated with accounting conservatism. This result indicates that conservatism is a substitute for only informative MEFs (cost of capital), but not for mandatory or opportunistic MEFs. However, Jaggi et al. (2021) did not examine the impact of R&D intensity on the association between accounting conservatism and MEFs.

Other studies, however, indicate that conditional conservatism is associated with greater information asymmetry in other contexts, thus potentially influencing managerial MEF disclosure decisions. Specifically, Gu and Wu (2003) and Givoly and Hayn (2000) find that conditional conservatism is positively and significantly associated with earnings volatility and skewness in the earnings distribution. Louis, Lys, and Sun (2008) document excessive optimism by less experienced analysts, reflected in their initial earnings forecasts, for more conditionally conservative firms, which they argue could yield misevaluation of the stock.

There is also the possibility that the relationship between MEFs and conditional conservatism is not as straightforward as the above perspectives imply. García Osma et al. (2020) provide additional evidence that conditional conservatism increases the frequency of good news disclosures and the credibility of these disclosures. This finding implies that conservatism may act as an information intermediary rather than a substitute for MEFs in that it provides monitoring and disciplinary benefits, but that managers can "push back" on the bias towards losses generated from conservatism using voluntary disclosures such as MEFs. García Osma, Guillamon-Saorin and Mercado (2020, 29) reconcile these seemingly contradictory perspectives as follows: "Conservatism may attain this benefit because (1) it acts as a governance mechanism that reduces managerial incentives and ability to manipulate accounting earnings, and (2) it provides a benchmark for current performance that enables other sources of information to produce credible information." A potential implication of García Osma et al. (2020) is that for high R&D intensity firms, the substitution effect documented by Hui et al. (2009) may not occur because of the greater information asymmetry inherent in R&D intensive activities and because managers of conditionally conservative firms can correct analyst forecast errors through MEFs (as per Li, 2008a, Li, 2008b).

2.4. Hypotheses development

MEFs may be a useful information communication mechanism for investors to estimate the probability distribution of future payoffs arising from contemporaneous R&D expenditures, thus alleviating some of the information asymmetry associated with R&D-intensive firms. However, the limited evidence on the association between R&D intensity and MEF issuance (Cao et al., 2018; Khallaf & Kannan, 2020; Wang, 2007) suggests reluctance by managers to issue MEFs, possibly due to reputational and human capital concerns associated with issuing inaccurate forecasts. Conditional conservatism may shift the tradeoffs in favor of MEF issuance by R&D-intensive firms as they are more highly impacted by policies requiring immediate expensing of R&D costs rather than the capitalization of long-term investments and biased towards losses than less conditionally conservative managers are.

While Hui et al. (2009) argue that greater conditional conservatism could serve as a "substitute" for MEFs, high conditional conservatism environments may lend credibility to managerial earnings guidance (García Osma et al., 2020), particularly for firms that invest in unique technologies that are not traded in active markets and which are thus characterized by high information asymmetry (e.g., R&D intensive firms). A greater level of MEF credibility could portray a higher level of managerial confidence in their ability to one day monetize the assets ultimately yielded through investment in R&D by issuing MEFs. Further, conditional conservatism is negatively associated with future litigation costs (Ettredge, Huang, & Zhang, 2016; Hui et al., 2009), further reducing managerial perception of human capital risk arising from inaccurate forecasts.

In sum, greater R&D intensity may incentivize managers at firms characterized by greater conditional conservatism who would otherwise be reluctant to issue MEFs due to fears of providing inaccurate forecasts and the ensuing repercussions. Therefore, we anticipate that increasing levels of R&D intensity will mitigate the negative association between MEFs and conditional conservatism. We present our first hypothesis in the alternative form as follows:

Hypothesis 1. R&D intensity mitigates the negative relationship between conditional conservatism and the likelihood of issuing MEFs.

Firm performance may play a role in the hypothesis above. The expensing of R&D costs depresses reported earnings, often resulting in losses even for non-distressed R&D-intensive firms (Ciftci & Darrough, 2015; Darrough & Ye, 2007), distorting valuation. Furthermore, Ajinkya et al. (2005) find that managers of loss firms are less likely to issue MEFs than non-loss firms, suggesting greater reputational concerns from issuing inaccurate forecasts for loss firms. However, Ajinkya et al. (2005) do not consider the unique features of R&D-intensive firms. Based on García Osma et al. (2020), it may be the case that managers of conditionally conservative *loss* firms have more of an incentive to lower information asymmetry and convey greater confidence in the future returns on R&D investments through their MEF disclosures than profit firms. Therefore, we present our second hypothesis as follows:

Hypothesis 2. Greater R&D intensity mitigates the negative relationship.

between the likelihood of issuing MEFs and conditional conservatism for loss firms.

3. Data and methods

We include all the firm-year observations in the S&P Compustat Annual Files and I/B/E/S that have data required to estimate eq. (1) below, i.e., those with positive values of R&D expenditures (exclude missing, zero, and negative R&D expenditure values). In addition, we exclude firm-year observations with negative sales revenue or total assets. We require firm-year observations to have at least one analyst following the firm and a positive market to book ratio in year t-1consistent with prior literature (Barth, Kasznik, & McNichols, 2001; Chang, Dasgupta, & Hilary, 2006). Our sample covers the 1999 to 2015 period for U.S. public firms and excludes firms in the financial (2 digit SIC codes 60–69) and utilities (2 digit SIC codes 44–50) sectors. We obtain financial statement data from Compustat Annual Files. Analyst following and management earnings forecasts are generated from I/B/E/S. There are 10,315 firm-year observations in our sample satisfying the above criteria.

To assess the potential mitigating effect of R&D intensity on the association between MEF issuance and conditional conservatism (H1) we use the following logistic regression model:

$$\begin{aligned} OCCUR_{it} = {} & \beta 0 + \beta 1\ CONSV_{it-1} + \beta 2\ RDA_{it-1} + \beta 3\ (CONSV{*}RDA)_{it-1} + \beta 4\ LAGOCCUR_{it-1} + \beta 5\ CAPX_{it-1} + \beta 6\ PROP\_COST_{it} \\ & -1 + \beta 7\ DISPERSE_{it-1} + \beta 8\ ANLST_{it-1} + \beta 9\ STDRET_{it-1}. \\ & + \beta 10\ STDER_{it-1} + \beta 11\ LEV_{it-1} + \beta 12\ LMV_{it-1} + \beta 13\ ROE_{it-1} + \beta 14\ ISSUE_{it-1}. \\ & + \beta 15\ ABS\_NEWS_{it-1} + \beta 16\ LITIG_{it-1} + \beta 17\ AUDIT_{it-1} + \beta 18\ INST_{it-1} + \beta 19\ MISS\_EST_{it-1}. + \beta 20\ REGFD_{it-1} + \beta 21\ MA_{it-1} \\ & + \sum \text{Year} + \sum \text{Industry} + \varepsilon_{iq} \end{aligned} \quad (1)$$

The dependent variable OCCUR is a dichotomous variable equal to 1 if firm *i* issued voluntary earnings forecast at time *t*, and 0 otherwise. CONSV is a firm-specific measure of conditional conservatism at time *t-1*, and represents the principal components common factor score of three alternative conditional conservatism measures used in the literature. This score is based on the Beaver and Ryan (2000) market measure of conservatism, Givoly and Hayn's (2000) negative accruals-based measure, and the Khan and Watts (2009) firm-specific conservatism score.[9] We rely on the principal-component common score because each of the above measures captures a different aspect of conservatism with error (Hui et al., 2009).[10] RDA is a measure of firm-specific R&D intensity at time *t-1*. The dependent variable OCCUR is measured at time *t*, whereas all independent variables are at time *t-1* to ensure that information is available to managers prior to issuing an MEF. See the Appendix for all variable definitions.

H1 suggests that R&D intensity mitigates the negative association between OCCUR and CONSV and predicts that β_3 in Model (1) is positive and significant.

To test our second hypothesis, we estimate Model 1 for a subsample of loss firms and predict that β_3 in Model (1) for the loss subsample is positive and significant.

The literature suggests that proprietary costs and reputational risks arising from inaccurate forecasts reduce managers' incentives to issue MEFs. Accordingly, we control for proprietary costs (PROP_COST) by taking a factor score of two measures used in prior research: 1) market to book; and 2) industry concentration.[11] For earnings uncertainty, we use two proxies: 1) analyst EPS forecast dispersion (DISPERSE); and 2) the standard deviation of annual earnings (STDER) over the past five years, following Waymire (1985).

We also include a vector of MEF determinants identified in prior research, including lagged MEF issuance (LAGOCCUR) to account for the stickiness of MEF issuance, the log of number of analysts following the firm (ANLST) consistent with the findings of Lang and Lundholm (1993) of a positive association between company disclosures and analyst following, firm size using the natural log of market value (LMV), leverage (LEV), return on equity (ROE), debt and equity issuance (ISSUE), litigation risk (LITIG), and top tier auditor (AUDIT) (Ajinkya et al., 2005; Francis, Philbrick, & Schipper, 1994; Kasznik & Lev, 1995; Lang & Lundholm, 1993; Wang, 2007). Further, Baginski, Hassell, and Kimbrough (2002) suggest that earnings news is negatively related to the issuance of MEFs. Accordingly, we include the variable (ABS_NEWS) in the model to control for earnings news. We also include *INST* (the percentage of institutional ownership, following Cao et al. (2018)) to control for holdings of institutional investors. Finally, we include CAPX (the ratio of capital expenditure to total assets) to control for tangible investments.

[9] For measurement details, refer to Heflin, Charles, and Qinglu (2015) pages 683–684 and Hui et al. (2009) pages 194–195.

[10] Given the limitations of each of the individual conditional conservatism measures, we rely on a principle component common factor score to mitigate some of these limitations, consistent with Heflin et al. (2015).

[11] We calculate industry concentration as one minus the proportion of firm year sales at time t-1 relative to total industry sales at time t-1.

4. Results

4.1. Descriptive statistics

Table 1 presents the descriptive statistics for our dependent variable (OCCUR), test variables and control variables. OCCUR is measured at time *t*, whereas all treatment and control variables are measured at time *t-1*.

Table 1, Panel A provides descriptive statistics for the full sample for all model variables. The full sample consists of 10,315 firm-year observations, 41% of which issued an MEF (OCCUR) at time *t*. As for our common score conditional conservatism measure (CONSV), and the three detailed measures used to construct the common score (CSCORE_I, CONS_GH, and CONS_BR), the mean (median) descriptive information for CONSV is 0.026 (−0.056), for CSCORE_I is 0.091 (0.109), for CONS_GH is 0.022 (0.011), and for CONS_BR is −0.047 (0.000), respectively.

R&D expense scaled by total assets (RDA), our measure of R&D intensity, has a mean of 8.7% and a median of 5.8%. The LOSS variable indicates that 27.5% of sample firm-years exhibited a loss, but the median firm-year did not. Approximately 39% of our sample issued an MEF at time *t-1* (LAGOCCUR), indicating the previously documented stickiness of this decision. Approximately 11% of our sample accessed the capital markets (ISSUE), 32% fall into the litigious industry category (LITIG), 90% were auditing by a top-tier auditor (AUDIT), and 88% of our sample represents the post-RegFD (REGFD) implementation period.

Table 1 also shows that the mean (median) capital expenditure to total assets (CAPX) was 6.4 (3.7) percent. The mean (median) common score proprietary cost measure (PROP_COST) were 4.4 (−15.6) percent. As for our measures for earnings uncertainty, the mean (median) standard deviation of analyst EPS forecasts (DISPERSE) is 11.0 (6.0) percent, and the mean (median) standard deviation of earnings (STDER) is 7.4 (4.4) percent, respectively. The mean number of analysts (ANLST), which is equal to the median, is approximately 2.2, calculated using I/B/E/S files.

In Panel B of Table 1, we provide information regarding the distribution of model variables across R&D intensity quintiles (1 being the lowest and 5 being the highest). Moving from lowest R&D intensity to highest, we see that the incidence of MEF issuance (OCCUR) decreases from approximately 54 to 25%, respectively, suggesting that the frequency of management forecast issuance is lowest for the firms most vulnerable to the accounting treatment of R&D expenditures and embedded characteristics such as earnings uncertainty (STDER), and lower accounting profits (ROE) associated with immediate expensing of R&D. The incidence of loss (LOSS) increases across quintiles (from 9.9% in the lowest to 58.2% in the highest). Conditional conservatism also increases across R&D intensity quintiles. Overall, these results indicate that as R&D intensity increases, conditional conservatism does as well, and managers are less likely to issue MEFs at higher levels of R&D intensity.

Firm size (LMV), leverage (LEV), profitability (ROE), number of analysts following (ANLST), and occurrence of a merger or acquisition (MA) show a declining tendency across the quintiles. In contrast, litigation risk (LITIG) displays an increasing trend across the quintiles.

Table 1 (Panel B) indicates that managers of firms with increasing R&D expenses face complex choices regarding their deployment of

Table 1

OCCUR, an indicator variable equal to 1 if firm *i* issues quarterly earnings per share (EPS) forecast for year *t* and 0 otherwise; RDA, research and development expense to total assets; CONSV, is a firm-specific measure of conditional conservatism; CSCORE, firm-specific CSCORE conservatism measure; CONS_GH, market-based conservatism measure; CONS_BR. accruals-based conservatism measure; LOSS, an indicator variable equal to 1 if income before extraordinary items for firm *i* in year *t-1* and 0 otherwise; LAGOCCUR, an indicator variable equal to 1 if firm *i* issues quarterly earnings per share (EPS) forecast for year *t-1* and 0 otherwise; CAPX; the capital expenditure to total assets. PROP_COST, a factor score of two competition measures for firm *i* at time t: 1) the firm-specific market to book ratio at time t-1; 2) the firm measure of industry competition, calculated as one minus the proportion of firm-year sales at time *t-1* relative to total industry sales at time *t-1*. DISPERSE, the standard deviation of analyst annual EPS forecasts (STDDEV from I/B/E/S forecast file) for firm *i* at time *t-1;* ANLST, log number of analysts issuing earnings forecasts for firm i at time *t-1*, from I/B/E/S Files; STDRET, standard deviation of market-adjusted daily returns over fiscal year *t-1;* STDER, standard deviation of earnings; LEV, long term debt divided by total assets at the end of year *t-1;* LMV, log of market value of equity at the end of the year *t-1;* ROE, income before extraordinary items divided by shareholders equity at the end of year *t-1;* ISSUE, the sum of stock issuance and debt issuance divided by total assets at the end of year *t-1;* ABS_NEWS, the absolute value of change in EPS from time *t-2* to *t-1,* LITIG, an indicator variable equal to 1 if a firm *i* is in biotechnology (2833-2836), computers (3570-3577), electronics (3600-3674), retail (5200-5961) and 0 otherwise at time *t-1* AUDIT, an indicator variable equals 1 if firm *i*'s auditor is one of the Big N at time *t-1* and 0 otherwise INST, the percentage of institutional ownership for firm *i* at time *t-1*, MISS_EST, an indicator variable equal to 1 if firm *i*'s EPS is less than the mean of analyst annual estimates of EPS and 0 otherwise at time *t-1,* REGFD, an indicator variable equal to 1 if firm-year is after October 2000 and 0 otherwise; MA, an indicator variable equal to 1 if firm *i* had an acquisition and 0 otherwise at time *t-1*.

Panel A: descriptive statistics

	N	Mean	STD	Q1	Median	Q3
Dependent variable						
OCCUR	10,315	0.410	0.491	0.000	0.000	1.000
Conservatism measures						
CONSV	10,315	0.026	0.953	−0.606	−0.056	0.566
CSCORE_I	10,315	0.091	0.189	−0.026	0.109	0.229
CONS_GH	10,315	0.022	0.055	−0.006	0.011	0.040
CONS_BR	10,315	−0.047	0.352	−0.215	0.000	0.167
Interaction Variables:						
RDA	10,315	0.087	0.094	0.020	0.058	0.116
LOSS	10,315	0.275	0.446	0.000	0.000	1.000
MEF Determinants:						
LAGOCCUR	10,315	0.392	0.488	0.000	0.000	1.000
CAPX	10,315	0.064	0.110	0.022	0.037	0.065
PROP_COST	10,315	0.044	0.647	−0.325	−0.156	0.138
DISPERSE	10,315	0.110	0.131	0.030	0.060	0.130
ANLST	10,315	2.206	0.763	1.609	2.197	2.772
STDRET	10,315	0.029	0.015	0.018	0.025	0.036
STDER	10,315	0.074	0.086	0.029	0.044	0.080
LEV	10,315	0.148	0.158	0.000	0.104	0.256
LMV	10,315	6.952	1.744	5.729	6.759	7.983
ROE	10,315	0.008	0.401	−0.019	0.088	0.164
ISSUE	10,315	0.111	0.177	0.010	0.034	0.125
ABS_NEWS	10,315	0.065	0.134	0.008	0.021	0.058
LITIG	10,315	0.322	0.467	0.000	0.000	1.000
AUDIT	10,315	0.903	0.294	1.000	1.000	1000
INST	10,315	0.695	0.231	0.552	0.730	0.868
MISS_EST	10,315	0.666	0.471	0.000	1.000	1.000
REGFD	10,315	0.881	0.323	1.000	1.000	1.000
MA	10,315	0.473	0.499	0.000	0.000	1.000

Panel B: Descriptive Statistics for R&D intensity Quintiles

	1 (lowest)	2	3	4	5 (highest)
Treatment Variable:					
RDA	0.054	0.066	0.074	0.088	0.152
Dependent Variable:					
OCCUR	0.545	0.478	0.437	0.338	0.254
Conservatism Measures:					
CONSV	−1.200	−0.489	−0.052	0.428	1.445
CSCORE_I	−0.102	0.028	0.109	0.182	0.241
CONS_GH	−0.007	−0.000	0.009	0.022	0.088
CONS_BR	−0.352	−0.118	−0.028	0.077	0.187
Controls					
LOSS	0.099	0.152	0.226	0.317	0.582
LAGOCCUR	0.514	0.452	0.427	0.322	0.246
CAPX	0.055	0.060	0.060	0.068	0.078

(*continued on next page*)

Table 1 (*continued*)

Panel B: Descriptive Statistics for R&D intensity Quintiles

	1 (lowest)	2	3	4	5 (highest)
PROP_COST	0.174	0.010	−0.026	−0.023	0.086
DISPERSE	0.107	0.119	0.108	0.108	0.108
ANLST	2.683	2.323	2.171	1.997	1.878
STDRET	0.022	0.025	0.027	0.031	0.038
STDER	0.049	0.052	0.055	0.066	0.148
LEV	0.196	0.169	0.148	0.130	0.097
LMV	8.616	7.451	6.817	6.225	5.649
ROE	0.160	0.091	0.043	−0.017	−0.234
ISSUE	0.091	0.103	0.108	0.110	0.142
ABS_NEWS	0.036	0.042	0.049	0.068	0.130
LITIG	0.289	0.297	0.301	0.311	0.413
AUDIT	0.957	0.940	0.920	0.869	0.830
INST	0.706	0.718	0.739	0.710	0.602
MISS_EST	0.616	0.638	0.673	0.687	0.719
REGFD	0.831	0.844	0.898	0.900	0.935
MA	0.564	0.528	0.510	0.425	0.335

Panel C: Pearson Correlation Table

	OCCUR	RDA	CONSV	CSCORE_I	CONS_GH	CONS_BR
OCCUR	**1.000**					
RDA	**−0.222**	**1.000**				
CONSV	**−0.209**	**0.376**	**1.000**			
CSCORE_I	**−0.288**	**0.193**	**0.604**	**1.000**		
CONS_GH	**−0.080**	**0.379**	**0.695**	**0.072**	**1.000**	
CONS_BR	−0.015	**0.062**	**0.524**	**0.073**	**0.053**	**1.000**

Notes: Panel A provides descriptive statistics for our dependent, treatment and control variables. Panel B presents the mean value of firm characteristics for quintiles of R&D intensity (RDA). The definitions of variables are in Appendix 1. Panel C provides the correlation table among the dependent variable MEF (OCCUR), R&D intensity (RDA), and the other treatment variables, conservatism (CONSV) and the components of the CONSV common factor score (CSCORE_I, CONS_GH, and CONS_BR). All items in bold in Panel C are significant at the 0.01 level of significance.

MEFs. Furthermore, due to the highly uncertain nature of the assets they invest in, and by virtue of Statement of Financial Accounting Standard (SFAS) No. 2 (1974), they are highly vulnerable to the consequences of expensing the costs associated with research and development (RDA). Firms simultaneously characterized by high information asymmetry, litigation risk, and proprietary costs must trade off the benefits of using MEFs to decrease information asymmetry against the costs associated with releasing inaccurate forecasts and related litigation and costs associated with disclosing proprietary information to competitors.

Table 1 Panel C provides the correlation table among the dependent variable, MEFs (OCCUR), and the treatment variables, R&D intensity (RDA) and the conservatism measure, both the common factor score (CONSV) and the three independent measures used in determining the common factor score (CONS_GH, CSCORE_I, and CONS_BR).

We next investigate the potentially mitigating role that R&D intensity plays on managers' likelihood of issuing an MEF in the presence of greater conditional conservatism. We rely on a multivariate framework, controlling for proprietary costs, litigation risk, and other MEF determinants.

4.2. The impact of R&D intensity on the relationship between conservative accounting and management forecast issuance

We first revisit the association between MEF issuance and conditional conservatism by regressing a dichotomous variable equal to 1 if the firm issued an MEF at time *t* (OCCUR) and 0 otherwise on conditional conservatism at time *t-1*, and other OCCUR determinants, also determined at time *t-1*. Model 1 of Table 2 presents the baseline logit OCCUR model. Model 2 introduced our variable of interest, R&D intensity (RDA), into the logit model to assess its potentially mitigating role.

As for the association between MEF issuance (OCCUR) and conditional conservatism (CONSV), Model 1 of Table 2 indicates a significant negative association (*p-value* < *0.05*). This finding is consistent with the substitutional role of accounting conservatism on management forecasts presented in Hui et al. (2009).[12] The log odds ratio of −0.102 on CONSV implies that a one-unit increase in CONSV is associated with a decrease in the odds of issuing an MEF of approximately 9.7% percent, holding all other control variables constant.

The finding in Model 1 of Table 2 on the association between OCCUR and its determinants is consistent with prior research. We find a positive and significant association between OCCUR and prior period MEF issuances (LAGOCCUR), indicating the persistent nature of MEF issuance, meaning that managers who issue MEFs in one year are more likely to continue to issue in the following year. We also find a positive and significant association between OCCUR and firm leverage (LEV), size (LMV), profitability (ROE), the likelihood of accessing capital markets (ISSUE), (*p-value* < *0.01*), the engagement of a top tier auditor (AUDIT) and the involvement in M&A activities (MA) (*p-value* < *0.05*), and

[12] This negative and significant association holds across two out of three individual conditional conservatism measures (CSCORE_I and CONS_GH) used in constructing the CONSV factor score. The market measure of conservatism (Beaver & Ryan, 2000) and the interaction variable in model 5 is not significant. There may be a variety of reasons as to why the market measure is not significant, unlike in the case of Hui et al. (2009). For instance, the data period of our sample spans from 1999 to 2016, in comparison to the sample of Hui et al. (2009) which ranges from 1997 to 2002; additionally, the sample size of our study is 10,315, compared to 2244 of Hui et al. (2009). Furthermore, our models take into account numerous variables that influence the likelihood of MEFs, including R&D, which is strongly associated with the likelihood of MEFs and reflects future growth opportunities just as the market measure does (Ahmed & Duellman, 2007). All these dissimilarities could be the reason for our results, which further underscores the importance of combining multiple measures to reduce the measurement error associated with a single conservatism variable. This approach is shared by previous studies like Zhang (2008) and Hui et al. (2009).

following the enactment of Regulation Fair Disclosure (REGFD) (*p-value < 0.10*). We also find that firms are significantly less likely to issue an MEF in the presence of greater analyst earnings forecast dispersion (DISPERSE), the standard deviation of returns (STDRET), litigation risk (LITIG) (*p-value < 0.01*), and proprietary costs (PROP_COST) (*p-value < 0.05*). The coefficient of −3.957 on DISPERSE corresponds to an odds ratio of 0.019, exp. (−3.956), which suggests that a one-unit increase in DISPERSE decreases the odds of issuing an MEF by approximately 98%. The coefficient of −0.752 on LITIG indicates that the odds of issuing an MEF is 0.471 (or a decrease in odds of issuing an MEF by approximately 53% for firms in litigious industries). This finding is consistent with the conjecture that management weighs the human capital implications of providing inaccurate forecasts when deciding to issue an MEF.

Model 2 of Table 2 presents the results of tests of Hypothesis 1. This model examines the impact on MEFs of the interaction between conditional conservatism and R&D intensity. Once again, we include a vector of control variables and year and industry controls. All control variable findings are consistent with Model 1, except for an insignificant association between OCCUR and PROP_COST in Model 2.

According to the Model 2 results, we find a negative and significant main effect association between CONSV and OCCUR (*p-values < 0.01*), consistent with the results in Model 1 of the same table. We also find a negative and significant main effect association between OCCUR and RDA (*p-values < 0.05)*. This could be attributed to a lower incidence of MEF issuance for high R&D firms given a greater possibility of error in guidance and correspondingly, concerns associated with the error in analysts' short-term earnings forecasts (see, for example. Amir, Lev, & Sougiannis, 2003; Barron, Byard, Kile, & Riedl, 2002). As for the magnitude of this main effect, the coefficient on CONSV in Model 2 is −0.170, corresponding to an odds ratio for OCCUR equal to 0.843 and a percentage decrease in odds of issuing an MEF of approximately 16% resulting from a one-unit increase in CONSV. Hypothesis 1 argues that R&D intensity incrementally and significantly mitigates the negative association between OCCUR and CONSV. In Model 2 of Table 2, we find a significant positive association between OCCUR and the interaction term CONSV*RDA, consistent with Hypothesis 1. Regarding the magnitude of the effect of the interaction term on OCCUR,[13] our findings suggest that a one-unit increase in CONSV, when firms' R&D intensity increases from the lowest to the highest quintile, is associated with a log odds of (−0.170 + 0.721)*(0.152–0.054) = 0.054, which corresponds to an odds of issuing an MEF of 1.054 (or 5.4% increase in odds of issuing an MEF).

In sum, our Table 2 findings are consistent with Hypothesis 1 and consistent with the notion presented by García Osma et al. (2020) that conditional conservatism adds credibility to the information disclosure; they are also consistent with Li (2008b), who suggests that managers compensate for analysts' increased forecast errors in the presence of greater information asymmetry by issuing more earnings forecasts. Using MEFs may benefit managers of high R&D intensity firms, which are biased towards loss due to the immediate expensing of R&D investments and its effect on bottom-line accounting performance measures, to signal more optimistic future performance from current expenditures because the credibility provided through the MEF may offset career considerations from providing inaccurate forecasts. Therefore, our findings are consistent with García Osma et al. (2020) and the argument that MEFs can reduce information asymmetry for conditionally conservative firms, as conditional conservatism itself provides a "certification effect" of credibility, and credible managers may have fewer concerns regarding the reputational impact of inaccurate forecasts.

Further, given that the expensing of R&D itself is informative about the eventual future returns distribution associated with risky investments in intangible assets (Penman, 2016a), MEF disclosure is a tactic for conditionally conservative firms to reduce information asymmetry and, at the same time, emphasize the uncertain nature of future payoffs.

Hypothesis 2 posits that the above significant positive association between OCCUR and the interaction term CONSV*RDA exists for loss firms, which may have a greater incentive to provide MEFs to clarify the nature of accounting losses and reduce information asymmetry associated with future benefits from incurring R&D expenditures. In Table 3, we divide our sample into: 1) loss firms (LOSS = 1) in Model 1; and 2) profit firms (LOSS = 0) in Model 2 and reassess the association between OCCUR and the interaction term CONSV*RDA.

Our findings in Model 1 indicate that for the LOSS = 1 subgroup, the main effect CONSV is negative and significantly associated with OCCUR (*p-value < 0.05)*. In contrast, *RDA* and the interaction term RDA*CONSV are not significantly associated with OCCUR. In Model 2, the interaction effect (CONSV*RDA) is also not significantly associated with OCCUR for profit firms (LOSS = 0). Our findings suggest that managers are not influenced by the contemporaneous profitability of the firm when deciding to issue an MEF in the presence of greater conditional conservatism and R&D expenditures. This finding is inconsistent with Hypothesis 2.

5. Additional analysis and robustness tests

Table 4 presents the results of additional analysis conducted to demonstrate the robustness of our results. We examine the impact of proprietary costs (PROP_COST) and litigious industries (LITIG) on the relationship between CONSV*RDA and OCCUR. We also examine whether our results are affected by controlling for the use of GAAP versus STREET earnings, the time delay between the MEF and the release of earnings, pre and post-RegFD, analyst following, and whether opportunistic earnings forecasts drive our findings.[14]

5.1. Proprietary costs

The proprietary cost hypothesis argues that firms evaluate the costs of disclosure of proprietary information when making determinations regarding disclosure, suggesting that these costs might deter managers' from engaging in full disclosure (Verrecchia, 1983), even if this lack of disclosure increases the cost of raising additional equity (Darrough, 1993; Darrough & Stoughton, 1990). Harris (1998) and Bamber and Cheon (1998) find a link between high industry concentration and lower levels of segment disclosure and lower levels of management earnings forecasts, respectively, and Wang (2007) attributes the finding of a negative relationship between R&D intensity and MEF issuance to proprietary costs.

Zhang (2008) find that higher proprietary costs generated after adopting the inevitable disclosure doctrine deterred public disclosure. To further investigate these arguments and assess whether the results of our tests of Hypothesis 1 are influenced by proprietary costs, we divide our sample into high (above median) and low (below median) proprietary cost (PROP_COST) subgroups and then examine the association between OCCUR and the interaction term CONSV*RDA. Table 4 Model 1 provides the results for the high proprietary cost subsample (High PROP_COST) and Model 2 provides the results for the low proprietary cost subsample (Low PROP_COST).

For high proprietary cost firms (Model 1), we find a negative and significant association between OCCUR and both CONSV (*p-value <*

[13] The interaction of coefficients of continuous predictor variables in a multivariate logistic framework is complex. See, e.g., http://www.cantab.net/users/filimon/cursoFCDEF/will/logistic_interact.pdf and https://stats.idre.ucla.edu/other/mult-pkg/faq/general/faq-how-do-i-interpret-odds-ratios-in-logistic-regression/

[14] We thank an anonymous reviewer for this suggestion.

Table 2
The association between conditional conservatism, R&D intensity, and management earnings forecast issuance.

	Dependent Variable = OCCUR				
		H1			
	Model 1	Model 2 CONSV	Model 3 CSCORE_I	Model 4 CONS_GH	Model 5 CONS_BR
	Coefficient (z-stat)	Coefficient (z-stat)	Coefficient (z-stat)	Coefficient (z-stat)	Coefficient (z-stat)
Intercept	−2.389 (−4.08)***	−2.240 (−3.82)***	−1.819 (−2.74)***	−2.449 (−4.15)***	−2.388 (−4.03)***
CONSV	−0.102 (−2.21)**	−0.170 (−2.85)***	−1.093 (−2.41)**	−2.474 (−2.69)***	0.013 (0.10)
RDA		−1.428 (−2.47)**	−1.932 (−2.88)***	−1.497 (−2.45)**	−1.044 (−1.90)*
CONSV*RDA		0.721 (2.01)**	4.671 (1.94)*	10.040 (2.07)**	−0.463 (−0.43)
LAGOCCUR	2.233 (32.30)***	2.222 (32.09)***	2.237 (32.36)***	2.221 (32.11)***	2.239 (32.34)***
CAPX	−0.464 (−1.52)	−0.435 (−1.42)	−0.439 (−1.42)	−0.458 (−1.49)	−0.471 (−1.52)
PROP_COST	−0.106 (−2.05)**	−0.080 (−1.50)	−0.073 (−1.32)	−0.087 (−1.63)	−0.091 (−1.70)*
DISPERSE	−3.956 (−10.27)***	−3.912 (−10.17)***	−3.898 (−10.08)***	−3.923 (−10.16)***	−3.916 (−10.12)***
ANLST	−0.086 (−1.47)	−0.072 (−1.23)	−0.086 (−1.44)	−0.068 (−1.16)	−0.077 (−1.31)
STDRET	−9.161 (−2.91)***	−8.949 (−2.85)***	−8.731 (−2.73)***	−9.170 (−2.92)***	−9.231 (−2.93)***
STDER	−0.525 (−1.23)	−0.466 (−1.09)	−0.732 (−1.79)*	−0.342 (−0.75)	−0.692 (−1.71)*
LEV	0.870 (4.08)***	0.780 (3.59)***	0.763 (3.50)***	0.814 (3.74)***	0.808 (3.73)***
LMV	0.251 (6.80)***	0.232 (6.12)***	0.193 (3.71)***	0.263 (7.17)***	0.262 (7.15)***
ROE	0.440 (3.77)***	0.397 (3.30)***	0.406 (3.35)***	0.386 (3.18)***	0.393 (3.24)***
ISSUE	0.438 (2.65)***	0.432 (2.61)**	0.456 (2.75)***	0.411 (2.48)**	0.427 (2.57)**
ABS_NEWS	0.205 (0.75)	0.174 (0.64)	0.120 (0.44)	0.193 (0.71)	0.145 (0.53)
LITIG	−0.752 (−4.20)***	−0.710 (−3.94)***	−0.707 (−3.97)***	−0.715 (−3.99)***	−0.724 (−4.07)***
AUDIT	0.275 (2.28)**	0.296 (2.44)**	0.266 (2.22)**	0.307 (2.53)**	0.297 (2.44)**
INST	0.288 (1.71)*	0.288 (1.72)*	0.303 (1.80)*	0.269 (1.60)	0.261 (1.55)
MISS_EST	−0.011 (−0.21)	−0.013 (−0.26)	−0.013 (−0.26)	−0.018 (−0.35)	−0.023 (−0.45)
REGFD	0.351 (1.89)*	0.358 (1.94)*	0.354 (1.89)*	0.350 (1.90)*	0.320 (1.73)*
MA	0.107 (2.00)**	0.102 (1.91)*	0.107 (1.98)**	0.103 (1.94)*	0.102 (1.91)*
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
N	10,315	10,315	10,315	10,315	10,315
R^2	63.11%	63.15%	63.18%	63.14%	63.12%
Model Chi^2	54.34***	54.02***	50.01***	61.29***	58.59***

H1: Greater conditional conservatism significantly mitigates the negative relationship between the likelihood of issuing MEFs and R&D intensity.
*, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively.

$$OCCUR_{it} = \beta_0 + \beta_1\ CONSV_{it\text{-}1} + \beta_2\ RDA_{it\text{-}1} + \beta_3\ (CONSV{*}RDA)_{it\text{-}1} + \beta_4\ LAGOCCUR_{it\text{-}1} + \beta_5\ CAPX_{it\text{-}1} + \beta_6\ PROP\_COST_{it\text{-}1} + \beta_7\ DISPERSE_{it\text{-}1} + \beta_8\ ANLST_{it\text{-}1} + \beta_9\ STDRET_{it\text{-}1} + \beta_{10}\ STDER_{it\text{-}1} + \beta_{11}\ LEV_{it\text{-}1} + \beta_{12}\ LMV_{it\text{-}1} + \beta_{13}\ ROE_{it\text{-}1} + \beta_{14}\ ISSUE_{it\text{-}1} + \beta_{15}\ ABS\_NEWS_{it\text{-}1} + \beta_{16}\ LITIG_{it\text{-}1} + \beta_{17}\ AUDIT_{it\text{-}1} + \beta_{18}\ INST_{it\text{-}1} + \beta_{19}\ MISS\_EST_{it\text{-}1} + \beta_{20}\ REGFD_{it\text{-}1} + \beta_{21}\ MA_{it\text{-}1} + \sum \text{Year Fixed Effects} + \sum \text{Industry Fixed Effects} + \varepsilon_{iq} \quad (1).$$

Model 1 presents the baseline logit model regressing OCCUR on CONSV and OCCUR determinants identified from prior literature without introducing the RDA main and mediating effects. Models 2–5 assess the potentially mitigating role of R&D intensity on the association between OCCUR and CONSV using logit model (1) above. Model 2 uses the common factor conditional conservatism score (CONSV), whereas Models 3–5 assesses H1 using the disaggregated conditional conservatism measures (CSCORE_I, CONS_GH, and CONS_BR respectively). We exclude the market-to-book variable from all models because of its high correlation with the PROP_COST variable, as it is a factor used in determining this variable. All model variables are defined in Appendix 1.

Notes: In all estimations we include year and industry dummies to control for year and industry fixed effects. Firm-year observations are clustered by firm to eliminate heteroscedasticity and autocorrelation as suggested by Petersen (2009).

Table 3
The association between conditional conservatism, R&D intensity, and management earnings forecast issuance for loss firms

	Dependent Variable = OCCUR	
	Model 1 LOSS = 1 (H2)	Model 2 LOSS = 0
	Coefficient (z-stat)	Coefficient (z-stat)
Intercept	−3.262 (−4.34)***	−2.147 (−2.64)***
CONSV	−0.235 (−2.10)**	−0.062 (−0.83)
RDA	−0.399 (−0.45)	−1.330 (−1.66)*
CONSV * RDA	0.692 (1.43)	−0.076 (−0.11)
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	2845	7470
R^2	50.09%	64.40%
Model Chi^2	18.11**	29.22***

H2: Greater R&D intensity significantly mitigates the negative relationship between the likelihood of issuing MEFs and conservatism for loss firms.
*, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively.
$OCCUR_{it} = \beta_0 + \beta_1\ CONSV_{it\text{-}1} + \beta_2\ RDA_{it\text{-}1} + \beta_3\ (CONSV{*}RDA)_{it\text{-}1} + \sum Controls + \sum Year\ Fixed\ Effects + \sum Industry\ Fixed\ Effects + \varepsilon_{it}$ (1).
Model 1 presents the logistic estimation results of eq. (1) for a subsample of loss firms (LOSS = 1) and Model 2 presents the logistic estimation results of eq. (1) for a subsample of profit firms (LOSS = 0). We exclude the market-to-book variable from all models because of its high correlation with the PROP_COST variable, as it is a variable used in determining this factor. All model variables are defined in Appendix 1.
Notes: In all estimations we include year and industry dummies to control for year and industry fixed effects. Firm-year observations are clustered by firm to eliminate heteroscedasticity and autocorrelation as suggested by Petersen (2009).

0.01) and RDA (*p-value < 0.01)*. Further, we find a positive and significant association between OCCUR and the interaction term (CONSV*RDA) (*p-value < 0.05)*. This finding is somewhat surprising, given that firms with greater concerns regarding the loss of control of proprietary information are more likely to issue MEFs overall. However, at higher levels of R&D intensity, the tradeoffs in favor of issuing a MEF outweigh a potential loss due to the release of proprietary information, given the impact of conditional conservatism on income. For low proprietary cost firms (Model 2), we find no significant association between OCCUR and CONSV*RDA. This finding suggests that the mitigating role of R&D intensity on the negative association between MEFs and conditional conservatism holds for high proprietary cost environments.

5.2. Litigation risk

Models 3 and 4 of Table 4 examine the effect of industry-based litigation risk on our results. After removing the LITIG control variable from our model and segmenting the sample into litigious industries (LITIG = 1 in Model 3) and non-litigious industries (LITIG = 0 in Model 4), we reassess the association between OCCUR and CONSV*RDA, while controlling for other OCCUR determinants. Furthermore, given that LITIG represents litigation industries, we exclude industry controls. For the litigious industry subgroup (Model 3), we find a positive and significant association between OCCUR and the main effects CONSV (*p-value < 0.01)* and RDA (*p-value < 0.10)*. We do not find a significant association between OCCUR and CONSV*RDA. This insignificant finding on the interaction term also holds for the LITIG = 0 subsample.

Table 4
Cross-sectional analysis-the influence of proprietary costs and litigation risk.

	Proprietary Costs		Litigation Risk	
	Model 1	Model 2	Model 3	Model 4
	High PROP_COST	Low PROP_COST	LITIG = 1	LITIG = 0
	Coefficient (z-stat)	Coefficient (z-stat)	Coefficient (z-stat)	Coefficient (z-stat)
Intercept	−2.060 (−2.99)***	−2.886 (−4.62)***	−2.246 (−4.48)***	−3.491 (−10.17)***
CONSV	−0.264 (−3.40)***	−0.125 (−1.38)	−0.304 (−2.80)***	−0.068 (−1.02)
RDA	−2.017 (−3.06)***	−1.450 (−1.35)	−1.322 (−1.68)*	0.197 (0.24)
CONSV * RDA	0.893 (2.33)**	1.049 (1.54)	0.741 (1.41)	0.360 (0.73)
Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	No	No
N	5157	5158	3331	6984
R^2	67.93%	57.92%	58.37%	61.74%
Model Chi^2	13.63*	38.79***	20.01**	43.02***

*, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively.
$OCCUR_{it} = \beta_0 + \beta_1\ CONSV_{it\text{-}1} + \beta_2\ RDA_{it\text{-}1} + \beta_3\ (CONSV{*}RDA)_{it\text{-}1} + \sum Controls + \sum Year + \sum Industry + \varepsilon_{it}$ (1).
$OCCUR_{it} = \beta_0 + \beta_1\ CONSV_{it\text{-}1} + \beta_2\ RDA_{it\text{-}1} + \beta_3\ (CONSV{*}RDA)_{it\text{-}1} + \sum Controls + \sum Year + \varepsilon_{it}$ (2).
Table 4 presents the logistic estimation results of eq. (1) to assess the influence of proprietary costs (Models 1 and 2) and the eq. (2) the influence of litigation risk (Models 3 and 4) on the mitigating role of R&D intensity. Model 1 (2) presents the logistic estimation results of eq. (1) for the High (Low) proprietary cost subsample, whereas Model 3 (4) presents the logistic estimation results of eq. (1) for the litigious industry LITIG = 1 (non-litigious industry LITIG = 0) subsample. The High PROP_COST sample are firm-year observations greater than or equal to sample median PROP_COST (−0.156), whereas the Low PROP_COST sample are firm-year observations less than the sample median PROP_COST. We exclude the market-to-book variable from all models because of its high correlation with the PROP_COST variable, as it is a variable used in determining this factor. All other variable definitions are in Appendix 1.
Notes: In all estimations we include year and industry dummies to control for year and industry fixed effects. Firm-year observations are clustered by firm to eliminate heteroscedasticity and autocorrelation as suggested by Petersen (2009).

5.3. Regulatory fair disclosure (RegFD) and analyst following

We also examine the period pre-RegFD (prior to October 2000 enactment date) and a more recent post-RegFD period (2010–2015). Findings presented in Table 5, Models 1 and 2 indicate that the coefficient on the interaction term CONSV*RDA is positive and significant (*p-value < 0.01*) for the pre-RegFD period (*p-value < 0.10*) and for the post-RegFD period.[15]

We further examine whether analyst following impacts the relationship between CONSV, RDA, and MEF issuance and divide our sample into low analyst following and high analyst following subgroups. For both subgroups, we find no significant association between OCCUR and the interaction term CONSV*RDA.

[15] We also conduct our post-RegFD analysis for the period from the enactment of RegFD (October 2000) onwards ($n = 9089$) and find consistent results to the most recent post- RegFD subgroup. Specifically, the main effects CONSV and RDA are both negative and significant (*p-value < 0.01*) and the interaction effect is positive and significant (*p-value < 0.10)*. These tables are available upon request.

Table 5
Cross-sectional analysis-the influence of Regulation Fair Disclosure and analyst following.

	Regulation Fair Disclosure		Analyst Following	
	Model 1	Model 2	Model 3	Model 4
	Pre (1999–2000)	Post (2010–2015)	High Analyst	Low Analyst
	Coefficient (z-stat)	Coefficient (z-stat)	Coefficient (z-stat)	Coefficient (z-stat)
Intercept	−5.096 (−4.76)***	−4.335 (−5.08)***	−0.978 (−1.31)	−3.423 (−6.50)***
CONSV (2)	−0.368 (−2.41)**	−0.258 (−1.67)*	−0.100 (−1.06)	−0.131 (−1.67)*
RDA (1)	0.828 (0.46)	−1.866 (−1.11)	−1.764 (−2.16)**	−1.415 (−1.74)*
(1) * (2)	2.761 (3.22)***	1.636 (1.85)*	0.679 (1.11)	0.523 (1.10)
Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
N	1226	3496	4939	5376
R^2	36.12%	75.46%	69.42%	55.50%
Model Chi^2	6.79	22.20***	23.86***	7.36

*, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively.

$$OCCUR_{it} = \beta_0 + \beta_1 CONSV_{it\text{-}1} + \beta_2 RDA_{it\text{-}1} + \beta_3 (CONSV*RDA)_{it\text{-}1} + \sum Controls + \sum Year + \sum Industry + \varepsilon_{it} \quad (1).$$

Table 5 presents the logistic estimation results of eq. (1) to assess the influence of Reg FD (Models 1 and 2) and analyst following (Models 3 and 4) on the mitigating role of R&D intensity. Model 1 (2) presents the logistic estimation results of eq. (1) for the Pre (post) RegFD time-period subsamples, whereas Model 3 (4) presents the logistic estimation results of eq. (1) for the High (Low) analyst following subsample. High Analyst subsample is firm-year observations with greater than or equal to the sample median number of analysis (2.197), whereas the Low Analyst subsample is firm-year observations less than the sample median number of analysts. We exclude the market-to-book variable from all models because of its high correlation with the PROP_COST variable, as it is a variable used in determining this factor. All other variable definitions are in Appendix 1.

Notes: In all estimations we include year and industry dummies to control for year and industry fixed effects. Firm-year observations are clustered by firm to eliminate heteroscedasticity and autocorrelation as suggested by Petersen (2009).

5.4. GAAP earnings versus street earnings

Thus far in the paper, we have addressed street earnings MEFs, which constituted 55% of MEFs issued in 2013 (Bentley, Christensen, Gee, & Whipple, 2017) and appear to be preferred by investors. However, there is debate regarding management's use of street earnings to exclude material but transitory items, potentially misleading market participants regarding earnings and the chance of meeting or beating their numbers (Baik, Farber, & Petroni, 2009; Christensen, Drake, & Thornock, 2014). Whipple (2015) finds that GAAP earnings are characterized by greater analyst forecast error because they include transitory items (such as lawsuits) often excluded in street earnings numbers. Because of the differential treatment of transitory items, the divergence between GAAP and street earnings numbers increases as the earnings announcement draws closer (Bradshaw, Christensen, Gee, & Whipple, 2018). Bradshaw et al. (2018) find that the difference between street and GAAP earnings is itself informative to market participants regarding the nature of exclusions forecasts and provides clarity regarding core earnings. In addition, they find that GAAP forecasts contain greater measurement error than street earnings forecasts.

Accordingly, we substitute management street earnings guidance with GAAP earnings guidance and repeat all analyses. Our sample size drops significantly (from 10,315 to 5216 firm-year observations) due to lack of availability of this data in I/B/E/S in earlier years of our sample (prior to 2006) and less frequent provision of this data across the sample period. We repeat our analysis of Hypothesis 1 while substituting an annual GAAP earnings guidance dichotomous variable for our annual street earnings guidance dichotomous dependent variable (OCCUR) and after excluding industries and years without GAAP earnings guidance as a method of matching the two subgroups (OCCUR = 1 and OCCUR = 0). We find no significant association between OCCUR and the interaction term CONSV*RDA (results available upon request). This finding can be attributed to the importance that both managers and market participants assign to street earnings relative to GAAP earnings and the nature of exclusions in street earnings of R&D-intensive firms, particularly those with losses and in litigious industries.

5.5. Timing between MEF issuance and earnings announcement date

We include a control for the number of days between the announcement of MEF guidance (from I/B/E/S) and the earnings announcement date to which the guidance was related using the square root of the difference. We still find a negative and significant main effect result on the association between OCCUR and both CONSV *(p-value < 0.01)* and RDA *(p-value < 0.05)* (results available upon request). Further, the positive and significant interaction effect (CONSV*RDA) on OCCUR still holds *(p-value < 0.05)*.

5.6. MEF frequency

We also substituted our dichotomous dependent variable (OCCUR) with a continuous measure of the annual frequency of OCCUR, excluded the highest frequency subgroup, and incorporated a control variable for the relative industry frequency of MEFs as a proxy for information demand at the industry level. These scenarios result in a negative and significant association between OCCUR frequency and CONSV (*(p-value < 0.10)* and a positive and significant association between OCCUR frequency and the interaction term CONSV*RDA *(p-value < 0.01)*, consistent with our H1 findings above. The results from these regressions are untabulated, but available upon request.

5.7. Opportunistic earnings forecasts

We also check if our results are driven by managerial forecasts categorized as opportunistic.[16,17] Following Li et al. (2016), we create three variables to identify opportunistic managerial forecasts: Oa, Ob, and Oc. Oa is a dummy variable that equals one when there are insider purchases within 30 days of good news managerial forecasts (i.e., a positive CAR at MEF date) or insider sales within 30 days prior to bad news managerial forecasts (i.e., a negative CAR at MEF date). Ob is a dummy variable that equals one when there is a large positive CAR on the managerial forecast day, the forecast is followed by insider sales during the next 30 days, and the managerial forecast is greater than actual earnings per share announced. Oc is a dummy variable that equals one when insider purchases follow a large negative CAR on the managerial forecast day within the next 30 days and the managerial forecast is smaller than the actual earnings per share announced, and zero otherwise.

[16] We combine three databases to conduct this analysis: CRSP, Thomson Reuters Insider Database, and First Call Management Guidance Data. We start with Thomson Reuters Insider Database, we restrict transaction code "trancode" to purchases "P" and sales "S", focusing only on purchases and sales by Chief Executive Officers, Chief Financial Officers, Executive Vice Presidents, Presidents, Board chairs, and Senior Vice Presidents (Li et al., 2016).

[17] Good news managerial forecasts are defined as forecasts associated with positive two-day ($t = 0$, $t = +1$) market-adjusted cumulative abnormal returns (CARs). Bad news managerial forecasts are forecasts associated with negative two-day ($t = 0$, $t = +1$) market-adjusted CARs. Large news managerial forecasts are defined as those with >5 % (in absolute value) CARs.

We assess whether our results are influenced by the presence of opportunistic forecasts by (1) excluding opportunistic forecasts from all analyses and (2) replacing OCCUR with OCCUR_OPP, a dichotomous variable equal to 1 if the firm issued an opportunistic MEF and 0 if they did not issue an MEF. We revisit the tests of H1 and H2 after excluding opportunistic forecasts from the sample ($n = 10{,}183$) and find that our results and conclusion are the same as previously reported. These findings are robust across the three opportunistic forecast measures developed by Li et al. (2016) and suggest that opportunistic forecasts do not drive our H1 and H2 findings.

When regressing OCCUR_OPP on CONSV, RDA, the interaction effect CONSV*RDA (H1) and OCCUR determinants (untabulated), we find that the CONVS and RDA main effect results of Table 2 no longer hold; further, the interaction effect (CONSV*RDA) is not significantly associated with OCCUR_OPP. In sum, our additional analysis suggests that our H1 findings are not driven by opportunistic forecasts.

We also revisit our second hypothesis by substituting OCCUR_OPP for OCCUR. For the loss subsample (LOSS = 1), our results are consistent with our initial findings for loss firms in that R&D intensity does not significantly impact the relationship between conditional conservatism and MEF (opportunistic or non-opportunistic) issuance.

From the non-loss firms (LOSS = 0) analysis, however, we find a significant negative association between OCCUR_OPP and CONSV*RDA (*p-value < 0.05)*. This finding indicates that managers of R&D-intensive profit firms (LOSS = 0) are less enticed to issue an opportunistic MEF when conditional conservatism is high. This could suggest that since profitable firms are able to overcome the effects of high R&D expenditures, they require less credibility enhancement through MEF issuance. Their focus may then be on the accuracy of the forecast in the presence of greater information asymmetry, and they may realize that by not issuing a forecast, especially an opportunistic forecast, they are shielded from reputational damage and potential litigation.

6. Conclusions

Prior research suggests that expensing R&D costs generates a conservative bias in earnings, negatively affecting the usefulness of accounting information to investors (Amir & Lev, 1996; Lev & Zarowin, 1999). In addition, conditional conservatism may act as a substitute for MEFs (Hui et al., 2009) or as a way to establish credibility (García Osma et al., 2020). Managers face concerns regarding risks to human capital, including job loss and litigation, from providing inaccurate earnings forecasts and the loss of control over proprietary information, and must trade off these costs with potential benefits from MEFs, such as lowered information asymmetry.

We find that as R&D intensity increases with corresponding information asymmetry regarding future payoffs, more conservative firms are likely to issue MEFs. This result suggests that conditional conservatism could increase managers' credibility regarding information disclosure and that MEFs have a useful purpose for managers of high R&D intensity firms that are penalized in terms of lower earnings due to the policy of immediately expensing R&D costs. This finding supports our first hypothesis.

Our results are robust to several robustness tests, including models controlling for proprietary costs, suggesting that the negative relationship between MEF issuance and R&D intensity documented by Wang (2007) is likely driven by conditional conservative accounting rather than proprietary information costs. Further, our results are consistent with Jones (2007), which argues that proprietary information costs associated with R&D apply to nonfinancial information rather than MEFs. Our findings continue to hold when we control for the effects of RegFD, timing of MEFs, MEF frequency, and opportunistic forecasts.

Our results bring together the seemingly contradictory findings of Hui et al. (2009) and Li (2008a), Li, 2008b) in that, in general, managers can use conditional conservativism as a substitute for MEF disclosure. However, for firms most vulnerable to the effects of policies that require immediate expensing of R&D, conditional conservatism lends credibility to managers providing MEF disclosures, and by doing so, they lead analysts' expectations and lower information asymmetry while not incurring higher potential costs from reputational damage arising from inaccurate forecasts.

Our findings point to several other avenues for future research. In this study, we restrict our attention to management earnings forecasts. Future research could investigate how conservative accounting treatment of R&D affects voluntary nonfinancial disclosures. On one hand, conservative accounting might lead to greater investor demand for nonfinancial information for R&D-intensive firms because financial information is less useful for valuation. On the other hand, nonfinancial information is associated with proprietary information costs (Jones, 2007). Hence, it might be interesting to examine the impact of conservative accounting on the tradeoff between the costs and benefits of disclosing non-financial information for R&D-intensive firms. It would also be interesting to examine whether management forecast reputational concerns discourage managers from issuing earnings guidance in high uncertainty environments.

Additional research could also extend the Jaggi et al. (2021) paper by examining the interface between insider trading, the motives for MEF issuance, and conservatism for R&D-intensive firms. In addition, when information asymmetry is high, management may be driven by human capital considerations. When uncertainty is high, managers establish reputational capital through their disclosure behavior. That is, the likelihood of forecasting error is likely to discourage managers from offering earnings forecasts in high uncertainty environments (Hutton & Stocken, 2021; Yang, 2012). Given that management may face difficulty in coming up with accurate forecasts, in high R&D firms, they may prefer to issue MEFs less frequently because when MEFs are inaccurate, the CEO also risks litigation, the loss of reputational capital, or job loss (Lee et al., 2012). Future research can provide greater insights into how governance affects management earnings forecasts and the use of both street and GAAP earnings forecasts.

Declaration of Competing Interest

The authors of this paper have no conflicts of interest to disclose.

Data availability

Data will be made available on request.

Appendix 1

Definition of variables.

Dependent Variable	$OCCUR_{it}$	An indicator variable equal to 1 if firm *i* issues quarterly earnings per share (EPS) forecast for year *t* and 0 otherwise. We generate management EPS forecasts from I/B/E/S.
Treatment Variables	$OCCUR\_OPP_{it}$	A dichotomous variable equal to 1 if the firm issued an opportunistic MEF and 0 if they did not issue an MEF
	$CONSV_{it-1}$	Is a principal-component factor analysis common score of the following three alternative conservatism measures: The Beaver and Ryan (2000) conservative market measure (CONS_BR), the Givoly and Hayn (2000) accruals-based conservatism measure (CONS_GH),[a] the Khan and Watts (2009) firm-specific CSCORE conservatism measure (CSCORE_I)

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Dependent Variable	$OCCUR_{it}$	An indicator variable equal to 1 if firm *i* issues quarterly earnings per share (EPS) forecast for year *t* and 0 otherwise. We generate management EPS forecasts from I/B/E/S.
Control Variables	RDA_{it-1}	R&D expense (XRD from Compustat annual file) to total assets (AT from Compustat annual file) at the end of year *t-1*
	$LOSS_{it-1}$	An indicator variable equal to 1 if income before extraordinary items for firm *i* in year *t-1* is negative and 0 otherwise
	LAGOCCUR	An indicator variable equal to 1 if firm *i* issues quarterly earnings per share (EPS) forecast for year *t-1* and 0 otherwise
	CAPX	The capital expenditure (CAPX from Compustat) to total assets (AT from Compustat) for firm *i* in year *t-1*
	PROP_COST	A factor score of two competition measures for firm *i* at time t: 1) the firm-specific market to book ratio at time t-1[b]; 2) the firm measure of industry competition, calculated as one minus the proportion of firm-year sales at time *t-1* relative to total industry sales at time *t-1*
	DISPERSE	The standard deviation of analyst annual EPS forecasts (STDDEV from I/B/E/S forecast file) for firm *i* at time *t-1*.
	ANLST	Log number of analysts issuing earnings forecasts for firm i at time *t-1*, from I/B/E/S Files.
	STDRET	Standard deviation of market-adjusted daily returns over fiscal year *t-1*. Market-adjusted daily returns are calculated as a firm's daily returns (RET from CRSP) minus value-weighted daily market return (VWRETD from CRSP).
	STDER	Standard deviation of earnings (IB from Compustat) divided by total assets (AT from Compustat) over the past five years (from year *t-1* to year *t-5*).
	LEV	Long term debt (DLTT from Compustat annual) divided by total assets at the end of year *t-1*.
	LMV	Log of market value of equity at the end of the year *t-1*.
	ROE	Income before extraordinary items divided by shareholders equity at the end of year *t-1*.
	ISSUE	The sum of stock issuance (SSTK from CCM annual) and debt issuance (DLTIS from Compustat annual) divided by total assets (AT from Compustat annual) at the end of year *t-1*.
	ABS_NEWS	The absolute value of change in EPS (EPSPX from Compustat annual files) from time *t-2* to *t-1*.
	LITIG	An indicator variable equal to 1 if a firm *i* is in biotechnology (2833–2836), computers (3570–3577), electronics (3600–3674), retail (5200–5961) and 0 otherwise at time *t-1*.
	AUDIT	An indicator variable equals 1 if firm *i*'s auditor is one of the Big N at time *t-1* and 0 otherwise (AU from Compustat annual files). We consider a firm Big N if the firm's auditor, AU = 1, 3, 4, 5, 6, 7.
	INST	The percentage of institutional ownership for firm *i* at time *t-1*, from Thompson Reuters database.
	MISS_EST	An indicator variable equal to 1 if firm *i*'s EPS (EPSPX from Compustat annual) is less than the mean of analyst annual estimates of EPS (MEANEST from I/B/E/S) and 0 otherwise at time *t-1*.
	REGFD	An indicator variable equal to 1 if firm-year is after October 2000 and 0 otherwise.
	MA	An indicator variable equal to 1 if firm *i* had an acquisition and 0 otherwise at time *t-1*, based on the acquisition variable AQC from Compustat annual files.

[a] This is the average of total accruals (net income before extraordinary items plus depreciation and minus cash flows from operations) scaled by total assets over a 6-year period, multiplied by negative one. A firm is considered more conservative if the mean accruals are more negative across the 6-year window.

[b] Market to book ratio at the end of the quarter *t-1,* calculated as market value of equity divided by shareholders equity (CEQ from Compustat annual). Market value of equity is calculated as share price (PRCC_F from Compustat annual) times the number of shares outstanding (CSHO from Compustat annual).

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