Are Investors Misled by Exclusions of Recurring Expenses from Non-GAAP Earnings?

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Abstract

While non-GAAP reporting is under debate as managers might opportunistically inflate non-GAAP earnings, analytical research by Hirshleifer and Teoh (2003) proposes that limited attention causes mispricing when inappropriate items are excluded from non-GAAP earnings but will be reversed subsequently. Addressing this proposition empirically, we find that market revisions upon the release of material restatements (a proxy of heightened investor attention) are more negative for firms that ex-ante excluded recurring expenses frequently (a proxy for inappropriate non-GAAP adjustments). This finding suggests that investors may fail to detect less salient, yet available, public information. Further, we document that investors reward aggressively reported non-GAAP earnings before the restatement announcement, but punish the same reporting choices in the post-restatement period. Overall, our findings suggest that investor attention, which increases after the restatement, enhances investors' ability to disentangle aggressive from non-aggressive non-GAAP reporting choices. Findings hold for the pre- and post-Regulation G period.

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I.   INTRODUCTION

Non-GAAP reporting is a controversial topic and has recently been debated by regulatory bodies (SEC 2018), standard setters (Kabureck 2017; Golden 2017) and practitioners (PWC 2019), addressing the concern that artificially inflated non-GAAP earnings might mislead investors. For example, the S&P 500 firms reported non-GAAP earnings that exceeded GAAP earnings by 33 percent in 2015 (Fahey 2016). However, despite the excessive and frequent exclusion of income increasing expenses, prior literature shows that investors find non-GAAP earnings more informative than GAAP earnings (Bradshaw et al. 2018; Bradshaw and Sloan 2002). While the exclusion of "non-recurring" expenses per se is not suspicious in terms of being opportunistically motivated by the management, the exclusion of "recurring" expenses raises questions about its justification and managers' real intentions behind such adjustments. As time and attention are costly, investors may fail to detect less salient, yet available, public information that intents to manipulate investors' perceptions of the true operating performance. Consequently, the overarching question is whether market participants are misled by inappropriate non-GAAP adjustments. While analytical research proposes that investors are misled by inappropriate non-GAAP adjustments, in particular due to limited investor attention (Hirshleifer and Teoh 2003), empirical research yields ambiguous findings (Johnson and Schwartz 2005; Doyle et al. 2003) without addressing investor attention and appropriateness of non-GAAP adjustments in particular.[1]

We capture the increase in investors' attention through the announcement of material restatements and identify the inappropriateness of non-GAAP adjustments through the exclusion of recurring expenses, which we refer to as aggressive non-GAAP reporting.[2] We first investigate whether investors' responsiveness to aggressive non-GAAP reporting choices changes after the investor has learned about firms' poor financial reporting quality through the restatement. We find that investors reward aggressively reported non-GAAP earnings before the restatement announcement, but punish firms for the same reporting choices ex-post. Second, in our main analyses, we investigate whether market revisions for firms with aggressive pre-restatement non-GAAP reporting are any different from those for firms with non-aggressive ex-ante non-GAAP reporting.[3] Consistent with expectations, we find statistically

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[1]   Hirshleifer and Teoh (2003) are the subject of a discussion by Lambert (2003), Doyle et al. (2003) are the subject of a discussion by Easton (2003) and Johnson and Schwartz (2005) are the subject of a discussion by Berger (2005), suggesting room for improvement.
[2]   Consistent with prior literature (Doyle et al. 2013; Heflin and Hsu 2008), we identify aggressiveness non-GAAP reporting choices based on the exclusion of recurring expenses.
[3]   We identify firms with aggressive ex-ante non-GAAP reporting through the frequency of recurring expense exclusions in the five quarters leading up to the announcement of a material restatement.

and economically significant negative outcomes for firms with aggressive ex-ante non-GAAP reporting. Specifically, the information content of earnings drops by 43.93 percent for aggressive firms vs. no decline for non-aggressive firms, the market value drops by – 10.9 percent vs. – 3.8 percent and overvaluation decreases by – 17.49 percent vs. no decline.[4] Supposing that market revisions are indicative of prior mispricing, we provide strong empirical evidence that investors were misled to a higher degree by firms that reported non-GAAP earnings aggressively before the restatement announcement as compared to those with non-aggressive ex-ante non-GAAP reporting. Hence, our findings support the view that investors are first misled by inappropriate non-GAAP adjustments before the restatement, but subsequently reverse ex-ante mispricing due to increased investor attention and scrutiny. Overall, our findings suggest that attention is vital in investors' ability to disentangle aggressive from non-aggressive non-GAAP reporting choices.

Our empirical findings are consistent with the analytical research performed by Hirshleifer and Teoh (2003), who propose that investors are misled by inappropriate non-GAAP adjustments attributable to limited investor attention. We also contribute to the influential findings of Doyle et al. (2003), whose results are consistent with the theory of Hirshleifer and Teoh (2003) but do not easily reconcile with that of Johnson and Schwartz (2005). Most importantly, we are the first (to the best of our knowledge) to provide empirical evidence that increased firm specific attention allows investors to disentangle informative from opaque non-GAAP reporting choices.[5] Our findings are also novel to the restatement related literature, which so far has not conditioned market reactions on ex-ante non-GAAP reporting.[6]

Our focus on the exclusion of recurring expenses carefully addresses current concerns related to non-GAAP reporting quality. Being precise, the IASB (Kabureck 2017) and the FASB (Golden 2017) express concerns that managers might artificially boost non-GAAP earnings through the exclusion of inappropriate expenses (e.g., recurring expenses) for self-serving

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[4]   Changes in the information content of earnings are captured through the earnings response coefficient (ERC) and changes in the market value are captured through the cumulative abnormal return (CAR) around the restatement announcement date. Overvaluation (OVER) reflects the overpricing by the market compared to the residual income model estimates. Referring to overvaluation, it is important to recall that well-known empirical studies (e.g., Francis et al. 2000; Heinrichs et al. 2013) find that prices are on average higher than values (e.g., using the residual income model and a growth assumption of 2%, Heinrichs et al. 2013 find an overvaluation mean of 34.62%). This is consistent either with an overvaluation by the market or misspecification of the intrinsic value models. Our research takes the very established residual income model as given and primarily investigates overvaluation for the different sub-samples (aggressive vs. non-aggressive firms).

[5]   According to DellaVigna and Pollet (2009), "[d]espite the intuitive appeal of limited attention, little evidence exists on the extent to which the quality of decision-making by investors declines in response to distractions" (p. 709). Existing research provides evidence that investors are less responsive to earnings news when they are distracted (Drake et al. 2016; Hirshleifer et al. 2009). We extend these findings by investigating investor responsiveness to aggressive non-GAAP reporting choices before and after material restatements.

[6]   Li et al. (2018) argue that the prior research fails to condition restatement-related consequences on pre-restatement disclosure.

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purposes.[7] In line with this concern, Warren Buffett highlights that "it has become common for managers to tell their owners to ignore certain expense items that are all too real" (Buffet 2015, p. 16). Addressing inappropriate non-GAAP adjustments and current research gaps, Black et al. (2018) pose the following question:

> "*If recurring exclusions really are a signal of aggressive and opportunistic reporting, how do managers continue to benefit from making these same adjustments year after year while explicitly disclosing them to investors?*" (p. 284)

Striving for an explanation, we refer to the analytical work performed by Hirshleifer and Teoh (2003), who propose that "[l]imited attention takes the form of investors failing to discount for the strategic incentive of the firm to manipulate pro forma disclosures to improve perceptions of the firm" (p. 353). Further, they propose "[s]tock prices are on average higher than they would be if adjusted pro forma disclosure were prohibited" (p. 359), suggesting mispricing of non-GAAP information.[8] Consistent with the ambiguous empirical findings regarding whether non-GAAP reporting is misleading investors (Johnson and Schwartz 2005; Doyle et al. 2003), we consider two potential competing outcomes that differ in terms of investors' ex-ante attention, hence, investors' ability to see through the quality of expense exclusions. In the first scenario (ex-ante attentive investors), we assume that aggressive firms experience no different market revisions upon the release of a financial restatement compared to non-aggressive firms, suggesting that ex-ante investors were not misled and, therefore, have no mispricing to reverse.[9] In the second scenario (ex-ante inattentive investors), aggressive firms experience larger market revisions compared to non-aggressive firms, as ex-ante inattentive investors were misled by aggressive non-GAAP reporting firms.[10] Consistent with the latter prediction, we find larger revisions for firms with aggressive pre-restatement non-GAAP reporting, suggesting that investors have failed to identify inappropriate exclusions ex-ante.

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[7] Inflated non-GAAP earnings are potentially driven by the managers' desire to i) camouflage poor operating performance (Graham et al. 2005), ii) distract investors' attention from low GAAP earnings (Ciccone 2002; Graham et al. 2005), iii) increase the likelihood of exceeding the analyst forecast (Doyle et al. 2013), and iv) make the stock appear "affordable" through a lower non-GAAP price-to-earnings ratio. Supporting the concerns about opportunistic motives, the financial press highlights that in 2015, GAAP earnings declined by –12.7% for S&P 500 firms, while non-GAAP earnings grew by 0.4% (Lahart 2016). In 2017, 97% of S&P 500 firms reported non-GAAP metrics (Usvyatsky and Coleman 2018).

[8] Empirical research cannot observe the price that would had been assigned to the firm if the manager had not excluded inappropriate expenses. However, according to Hirshleifer and Teoh (2003), the initial mispricing will subsequently be corrected over time as these same investors reveal that actual earnings are lower than previously perceived. Through an informational shock (e.g., financial restatement), investors are potentially able to reveal that actual earnings are lower than previously perceived.

[9] The first prediction (no ERC-decline for aggressive firms) is empirically supported by Doyle et al. (2013), who suggest that investors partially see through the quality of exclusions, meaning that investors are less responsive (lower ERC) when recurring expenses are excluded.

[10] This second prediction (ERC-decline for aggressive firms) is analytically supported by Hirshleifer and Teoh (2003), who suggest that investors are misled due to their lack of attention to inappropriate exclusions. A further third potential finding could imply that non-aggressive firms are punished most, as investors are more negatively surprised by these firms (e.g., investors assumed high reporting quality, but ex-post are disconfirmed in their belief).

Taken together, we provide strong empirical evidence that is consistent with the idea that executives are able to exploit non-GAAP reporting strategically before the release of material restatements. Consequently, our findings support concerns that the discretionary nature of non-GAAP calculations has a "dark side" (Bhattacharya et al. 2018, p. 7), which makes it difficult to "distinguishing the 'good guys' from the 'bad guys'" (Black and Christensen 2009, p. 297). Further, we refine contributions by Chen et al. (2014) by showing that the revision in the information content of earnings is limited to firms with aggressive pre-restatement non-GAAP reporting. While our findings are based on a specific group of firms, the implications might be generalizable, as we apply the restatement solely as an informational shock to identify the increase in investor attention and scrutiny towards financial reporting quality. Despite our findings, we do not intend to challenge the informativeness of non-GAAP reporting per se. Instead, similar to Black et al. (2018), we perceive examples of abusive non-GAAP reporting as "tails of the distribution rather than the norm" (p. 28). However, if the average investor attention remains low and executives' pressure to perform increases in light of decreasing operating performance and high market expectations, these tails will likely become larger and may destroy investors' wealth in the long run. Therefore, given our findings, we propose that investors should consistently be vigilant when relying on non-GAAP reporting, especially in times in which the gap between GAAP and non-GAAP earnings increases. To regulatory bodies, we suggest that they enforce more precise guidelines on recurring expense items, which under no circumstances may be excluded. The FASB could take into account an alternative GAAP metric that inherits benefits from non-GAAP earnings but provides more reliance.

The remainder of this paper is organized as follows. Section II introduces the prior literature concerning non-GAAP reporting, attention, and restatements. Section III outlines our hypotheses, and section IV illustrates our research design choices and the models applied. Sample descriptions and empirical results are presented in section V. Section VI presents robustness checks and alternative explanations, and section VII concludes.

II.   PRIOR LITERATURE

Non-GAAP Reporting

Using non-GAAP reporting, managers may exclude expenses and gains that are otherwise required to be included under GAAP (Cohen et al. 2007). While the exclusion of expenses inflates non-GAAP earnings, the exclusion of gains decreases these earnings.[11] Given that non-GAAP reporting is widely unregulated and not audited, critics argue that managers may distract investors from the true firm performance at a relatively low cost attributable to the low likelihood of "mis-exclusions" being detected.[12] Despite these plausible concerns, the prior literature finds that investors place more emphasis on non-GAAP than GAAP earnings (Bradshaw and Sloan 2002; Brown and Sivakumar 2003; Doyle et al. 2003). Especially, Johnson and Schwartz (2005) document that mispricing for firms with non-GAAP disclosure is not different to those with GAAP-only disclosure. In addition, Doyle et al. (2013) show that investors are less responsive to aggressively reported non-GAAP earnings, suggesting that investors see through the quality of non-GAAP adjustments. While, on average, the findings mitigate the concern that non-GAAP reporting causes mispricing, the exclusion of recurring expenses is perceived to be less justifiable and of lower quality (Barth et al. 2012; Bhattacharya et al. 2003). The prior literature finds that managers use the exclusion of recurring items to meet or beat the analyst forecast (Black and Christensen 2009; Doyle et al. 2013).[13] Christensen et al. (2014) provide evidence that short-sellers target firms with exclusions of recurring expenses, suggesting that these firms are perceived as mispriced and having low financial reporting quality. Overall, the exclusion of recurring expenses supports the view that managers exclude expenses inappropriately to distract investors from low GAAP performance (e.g., Doyle et al. 2003; Kolev et al. 2008; Heflin and Hsu 2008).[14]

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[11]   Black et al. (2018) use the term non-GAAP earnings as an umbrella term. Non-GAAP earnings may refer to "pro forma earnings", which are manager based, and/or "street earnings", which refer to metrics from forecast data providers (e.g., I/B/E/S) and are analyst based.

[12]   The low detection likelihood of managerial "mis-exclusions" increases the opportunity to manipulate earnings without being subsequently punished. Further, within non-GAAP reporting, no accrual has to be later reversed. Consistently, non-GAAP reporting is a relatively inexpensive earnings management tool (Black et al. 2018), for executives who desire to inflate or sustain the firm value.

[13]   Recent research addresses a measurement error in the meet-or-beat related non-GAAP literature, stating that "after removing measurement error, we find that meet-or-beat reporting primarily occurs through transitory item exclusions" (Bradshaw et al. 2018). The prior literature suggests that the exclusion of "recurring" items is attributable to the higher likelihood of meeting and beating analysts' forecasts (Black and Christensen 2009; Doyle et al. 2013).

[14]   Whipple (2015) provides evidence that other item exclusions (which we label as recurring items) are informative in post-Regulation G periods. Given that regulations are also targeted towards increasing investors' attention, this finding suggests that, on average, investors have become more attentive.

Hirshleifer and Teoh (2003) analytically investigate the question of whether investors are misled by non-GAAP reporting, in particular by inappropriate adjustments (e.g., recurring expenses). Specifically, Hirshleifer and Teoh (2003) propose that inattentive investors will be first misled by inappropriate exclusions and then reverse mispricing later, leading to a firm value decline.[15] Further, Hirshleifer and Teoh (2003) propose that executives will be more inclined to exclude inappropriate exclusions when investors are highly responsive, meaning a high ERC. Recalling empirical findings, Doyle et al. (2003) find negative future returns for firms that have greater exclusions, supporting the propositions by Hirshleifer and Teoh (2003). By contrast, Johnson and Schwartz (2005) find neither a valuation premium for firms with non-GAAP disclosure nor a subsequent decline in firm value and Doyle et al. (2013) find a lower ERC when inappropriate expenses are excluded, suggesting that investors see through the quality of non-GAAP adjustments.[16]

Taken together, the empirical research supports the view that non-GAAP reporting is informative, on average; however, the exclusion of recurring expenses rather supports critics' concern that non-GAAP earnings include "everything but the bad stuff" and may mislead investors.[17] While theory suggests that investors are misled by inappropriate non-GAAP adjustments, the empirical research yields mixed findings.[18] We highlight that, yet, empirical findings that investigate mispricing of non-GAAP earnings have not addressed i) inappropriate non-GAAP adjustments and ii) changes in firm specific investor attention in a research setting.

Investor Attention

While the semi-strong form of the Efficient Markets Hypothesis states that all publicly available information is reflected in current market prices (Fama 1970), suggesting that investors do not misprice non-GAAP earnings, Bloomfield (2002) provide the Incomplete Revelation Hypothesis, suggesting that information that is costly to extract may cause mispricing.[19] Given that time and attention are costly, it seems reasonable to assume that some

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[15] Hirshleifer and Teoh (2003) show that investors with limited attention cause mispricing, which attentive investors do not arbitrage away due to risk aversion.

[16] While Johnson and Schwartz (2005) test the propositions by Hirshleifer and Teoh (2003), they discard two essential features, which refer to investors' attention and appropriateness of exclusions. These and further differences to our study will be presented in the "Relation to prior literature and contributions" section.

[17] Prior studies examine the exclusion of recurring items (also labelled as other, non-transitory) and find evidence that is consistent with aggressively motivated disclosures of non-GAAP EPS (e.g., Doyle et al. (2003), Black and Christensen (2009), Barth et al. (2012) and Doyle et al. (2013)).

[18] Young (2014) and Black et al. (2018) provide an extensive review of the non-GAAP reporting literature.

[19] DeHaan et al. (2015) state that "[p]rior research has posited that, at some point, the limited capabilities of humans to acquire and process information prevent them from absorbing the complete set of public information, in what is referred to as market "inattention" or "distraction"." Further, Lim and Teoh (2010) provide a review of the limited attention literature and note that empirical proxies of investor attention is based on "salience of the information and the ease of processing the information", amongst others. In light of material

investors can be misled when executives exclude inappropriate items for self-serving purposes (Hirshleifer and Teoh 2003). Providing empirical evidence that attention is a crucial determined for market reactions, DellaVigna and Pollet (2009) show that Friday earnings announcements have a 15 percent lower immediate response. Further, Drake et al. (2016) document that price reactions are muted during the NCAA basketball tournament, suggesting that investors may be distracted by other events. In a similar vein, Hirshleifer et al. (2009) find that the market underreacts when earnings are released on days with a high number of competing announcements from other firms, indicating that the allocated attention per earnings release is lower compared to "low news days" (days with a low number of competing announcements). Finally, Basu et al. (2019) show that firms disclose non-GAAP metrics more aggressively when institutional investor attention is low. This finding provides strong evidence that attention is vital for understanding managerial non-GAAP reporting behavior.

Turning to investor sophistication, experimental (Frederickson and Miller 2004; Elliott 2006) and archival research (Allee et al. 2007) suggests that income-increasing non-GAAP adjustments affect less-sophisticated investors but do not influence more-sophisticated investors. For example, Christensen et al. (2014) show that sophisticated market participants, in the form of short traders, are quite active when recurring expenses are excluded, suggesting that professional traders understand the quality and implications of non-GAAP reporting choices. Addressing the anticipation of restatements, Griffin (2003) shows that insiders, short sellers, and institutional managers "are unusually active several months ahead of a corrective disclosure event" (p. 479). Surprisingly, however, analysts do not anticipate the restatement announcement, despite being perceived as more sophisticated than ordinary investors.[20] Since we empirically test propositions in line with Hirshleifer and Teoh (2003), we focus on changes in investor attention and not sophistication. In other words, the restatement announcement influences investors' attention but is unlikely to impact investors' sophistication.[21]

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restatements, investors' attention is likely higher compared to aggressively reported non-GAAP earnings, suggesting that we are likely to capture a significant increase in investor attention for both, aggressive and non-aggressive reporting firms.

[20] Griffin (2003) demonstrates neither a decrease in forecast errors nor a downwards revision of a forecast before the corrective disclosure.

[21] We note that investor attention, sophistication and responsiveness to earnings may be highly correlated with each other, but depict different concepts. We use the term attention to reflect the investor's effort and skepticism (scrutiny) in processing publicly available information. In contrast, sophistication reflects the investor's experience and talent, while investor's responsiveness reflects investors' perception about financial reporting quality. Understanding the difference is important, since we investigate investors' responsiveness to quarterly earnings before and after investor attention increases due to a material restatement announcement. Put differently, situations may exist in which responsiveness is high, while attention low and vice versa. After a restatement announcement, for example, sophisticated investors may become more attentive and less responsive to earnings.

Financial Restatements

As financial restatements uncover prior misreporting, they are "a shock to the operating environment of the firm" (Richardson 2005, p. 341) and a vivid signal of low financial reporting quality (Pomeroy and Thornton 2008). Upon this informational shock, investors increase their attention and re-estimate the expected future cash flows, and the information risk leading to firm value declines (Palmrose et al. 2004). Firms that announce material restatements experience cumulative abnormal returns (CAR) of – 14 percent (Hennes et al. 2008) and a long-lived decline of several years in the earnings response coefficient (ERC) (Chen et al. 2014).[22] Further, market consequences are more severe when the restatement is disclosed prominently (e.g., in the headline of a press release) (Files et al. 2009) and through 8-K filings and press announcements compared to regular and amended filings (10-Q, 10-K, 10-Q/A, 10-K/A) (Myers et al. 2013; Gordon et al. 2013).[23] Bliss et al. (2018) find that adding good news to a restatement announcement offsets price declines. Turning to restatements and ex-ante disclosure, Li et al. (2018) argue that prior research fails to condition market reactions (e.g., CAR) on ex-ante disclosure. One exception is Gordon et al. (2013), who condition the CAR on the ex-ante disclosure tone and find that firms with an optimistic tone in the latest press release before the restatement announcement experience more negative CARs.[24]

In sum, investor attention increases after a material restatement announcement and (unconditionally) causes large revisions in the market value and perceived financial reporting quality, suggesting that market participants become more skeptical towards the financial reporting quality.[25] Moreover, high ex-ante information asymmetries may incentivize managers to mislead investors and misguide analysts before the restatement announcement.[26]

Contribution to the Prior Literature

Our main contribution is targeted towards the non-GAAP reporting literature, as we show that aggressive non-GAAP reporting misleads inattentive investors. A strong signal, in this study, a

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[22] The findings by Hennes et al. (2008) and Chen et al. (2014) refer to a subsample of restatement firms, which are defined as irregularities by Hennes et al. (2008) and describe intentional reporting cases rather than technical errors.

[23] We note that a prominent disclosure may increase investor attention and, hence, lead to greater firm value revisions.

[24] Gordon et al. (2013) measure the disclosure tone via the frequency counts of "positive and negative words" in the last earnings press release before the restatement announcement.

[25] Amiram et al. (2018) provide an extensive review of the financial misconduct literature, while Sievers and Sofilkanitsch (2019) provide a review of the restatement literature.

[26] Executives have access to the severity and timing of the restatement. Moreover, they know about the quality of non-GAAP adjustments. This information asymmetry may incentivize executives to adopt reporting and trading strategies to sell stocks at inflated prices and deliberately misguide analysts.

restatement, attracts investors' attention and leads to a revision of beliefs. The prior theoretical (Hirshleifer and Teoh 2003) and empirical research in this area (Johnson and Schwartz 2005; Doyle et al. 2003; Doyle et al. 2013) yield inconsistent results.[27] While Hirshleifer and Teoh (2003) analytically propose that inattentive investors are misled by the exclusion of inappropriate expenses, Johnson and Schwartz (2005) "reveal no evidence of a stock return premium for pro forma firms" (p. 915).[28] Adding to the inconsistency of findings, Doyle et al. (2003) empirically find that firms with aggressive non-GAAP earnings (highest decile of recurring expense exclusions) have subsequent negative returns, suggesting that the prior mispricing is reversed in the long run. Hirshleifer and Teoh (2003) also propose that managers are more inclined to exclude inappropriate items when investors are highly responsive, suggesting that investors assign a relatively high ERC to aggressively reported non-GAAP earnings. By contrast, Doyle et al. (2013) document that investors assign a lower ERC to aggressively reported earnings, meaning that investors understand the quality of exclusions and are not deceived by aggressively inflated non-GAAP numbers. Basu et al. (2019) test theoretical propositions by Hirshleifer and Teoh (2003) in a different setting and show that non-GAAP numbers are reported more aggressively when institutional investors are distracted. While Basu et al. (2019) substantially enrich the non-GAAP reporting literature by providing evidence that attention by sophisticated investors (institutional investor attention) impacts manager's non-GAAP reporting choices, we contribute to this strand of literature as outlined next.[29]

Seeking to address controversies and enrich the non-GAAP literature, we incorporate prior concerns and research suggestions by Lambert (2003), Berger (2005), and McVay (2006). First, we address comments by Berger (2005), who find that the comparison between non-GAAP and GAAP-only disclosure firms, as applied by Johnson and Schwartz (2005), is not convincing. To resolve this issue, we compare the valuation for the same set of firms before and after the increase of investors' attention but partition those firms based on pre-restatement non-GAAP reporting aggressiveness. Second, Lambert (2003) advises that future research could

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[27]   Berger (2005) suggests that the between sample design that is applied by Johnson and Schwartz (2005) "does not allow a convincing evaluation" (p. 967) of pricing differences. Lambert (2003) refers to Hirshleifer and Teoh (2003) and expresses concerns that a "controversial feature is that the errors made by individuals do not ''wash out'' in aggregate nor are they driven out by the behavior of more sophisticated investors" (p. 388). Easton (2003) refers to the findings by Doyle et al. (2003) and notes that "firms with more exclusions have lower expected returns than firms with less exclusions" (p. 180). Additionally, Johnson and Schwartz (2005) state that Doyle et al. (2003) do not address the question regarding whether non-GAAP reporting leads to overvaluation.

[28]   As a side note, whether Johnson and Schwartz (2005) exclude negative price-to-earnings ratios from their mispricing investigation is not known. As these are commonly excluded, interesting cases in which firms turn GAAP loss into non-GAAP profit disappear from the investigation. Given that Johnson and Schwartz (2005) fail to account for the vital features assumed by Hirshleifer and Teoh (2003), we do not assume that the propositions by Hirshleifer and Teoh (2003) are convincingly disconfirmed.

[29]   We note that investor's responsiveness to aggressive non-GAAP reporting at different levels of investor attention has not been addressed yet.

investigate "the process by which the valuation errors made by inattentive investors get corrected (whether it is by eventually learning the truth or by having the error driven out by the attentive investors)" (p. 399). We address this suggestion by observing corrections upon the increase of investors' attention, which takes place after the restatement announcement. Third, McVay (2006) proposes investigating item shifting in a setting in which executives might be incentivized to exclude expenses from core earnings. To address executives' incentive to manage non-GAAP earnings, we explore non-GAAP reporting choices in periods of relatively high information asymmetry (between executives and investors) before the release of unfavorable news in form of material restatements. Further, to closely align with the theory of Hirshleifer and Teoh (2003), we address investor "attention" by applying restatements as attention grabbing events and "inappropriateness" of non-GAAP adjustments by identifying firms with frequent exclusions of recurring expenses before the restatement announcement. Overall, we aim to contribute to current debates on non-GAAP reporting. We hope to resolve the tension between the opponents (regulatory bodies, financial press, practitioners) and proponents (managers, analysts) of non-GAAP reporting to some extent (Bradshaw and Sloan 2002). In detail, our research closely addresses Black et al. (2018), who ask the following referring to the exclusion of recurring expenses: "[i]s it possible that investors could really be fooled time and time again?"(p. 284)

Lastly, we add to the restatement literature performed by Gordon et al. (2013), who condition market reactions (CARs) to restatements on the ex-ante disclosure tone and amount. However, as we investigate ex-ante non-GAAP reporting and ask whether investors misprice shares in light of aggressive non-GAAP reporting, we substantially differ from Gordon et al. (2013). Further, we deviate from Gordon et al. (2013), as we extend our analyses to changes in the ERC and overvaluation and focus only on material restatements. Our ERC-design enables us to capture market consequences beyond the immediate effect usually captured by CARs.[30]

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[30] Our investigation of the ERC contributes to the restatement-related literature performed by Chen et al. (2014), Chakravarthy et al. (2014) and Hirschey et al. (2015), who investigate the ERC-decline after restatement announcements and focus on the mitigating effects (e.g., short vs. long ex-ante detection periods).

III. HYPOTHESIS DEVELOPMENT

Our hypotheses are substantially based on Hirshleifer and Teoh (2003), who analytically propose that inattentive investors are misled by inappropriate non-GAAP adjustments. We extend the idea to a scenario in which, over time, investors become more attentive to the financial reporting quality. To identify the inappropriateness of non-GAAP adjustments, we focus on the exclusion of recurring expenses. Firms with frequent exclusions of recurring expenses before the restatement announcement are referred to as firms with aggressive ex-ante non-GAAP reporting. To address the increase in investor attention, we exploit an informational shock in the form of material restatement announcements, which adequately reflect the revelation of decision relevant information and signal poor financial reporting quality.

If the lack of attention is explaining the mispricing of shares, then we would expect to see two effects upon the increase of investors' attention. First, investors will be less responsive to aggressively reported non-GAAP earnings after the restatement announcement (H1). Second, downward revisions will be more pronounced for firms with aggressive pre-restatement non-GAAP reporting, compared to firms with non-aggressive ex-ante non-GAAP reporting (H2-H4). We investigate revisions in three dimensions: i) perceived financial reporting quality (ERC), ii) short-term market reaction to the restatement (CAR), and iii) overvaluation (OVER).

Change in Investors' Responsiveness to Recurring Expense Exclusions

Our first test focuses on the investor's ability to disentangle aggressive from non-aggressive quarterly earnings announcements. For that reason, we compare investors' responsiveness to the exclusion of recurring expenses before and after the increase of investors' attention. Following the theory of Hirshleifer and Teoh (2003), we predict that investors are highly responsive to aggressively reported earnings ex-ante, yet inattentive (H1A). However, once the investor attention increases through the restatement announcement, we assume that investors detect the quality of non-GAAP adjustments and thus are less responsive to earnings whenever recurring expenses are excluded (H1B).[31] In other words, we predict that attention is a key

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[31] While our predictions of a discount in the ERC for aggressive firms in the post-period align with non-restatement related findings by Doyle et al. (2013), we assume that investors do not discount the ERC in the pre-period due to the lack of investor attention (Hirshleifer and Teoh 2003).

determinant of investors' ability to disentangle opaque from informative non-GAAP reporting choices.[32]

> **H1A:** *Before the restatement, investors are more responsive to aggressively reported non-GAAP earnings.*

> **H1B:** *After the restatement, investors are less responsive to aggressively reported non-GAAP earnings.*

Revisions Considering Three Dimensions (ERC, CAR, OVER)

Turning to our main analyses, according to Chakravarthy et al. (2014), imperfectly informed agents revise their beliefs using Bayes' rule whenever new information reveals decision-relevant information (Harsanyi 1967; Cyert and DeGroot 1974; Feldman 1987; Kihlstrom and Mirman 1975). Further, "information events trigger greater belief revisions when prior disclosures are of lower precision" (Veenman 2011, p. 314).[33] Following managers' claims that non-GAAP earnings are precise on average, revisions upon an informational shock should not be significantly different for aggressive and non-aggressive reporting firms, as both types of firms provide precise information. However, since non-GAAP reporting is largely unregulated and managers may exclude inappropriate exclusions (e.g., recurring expenses), the imprecision may increase when recurring expenses are excluded.[34] Consequently, finding a greater revision for firms with aggressive ex-ante non-GAAP reporting will indicate both the imprecision of non-GAAP reporting and investors' lack of attention before the restatement announcement. Consistent with the view that inattentive investors will be misled by imprecise non-GAAP earnings in periods of high information asymmetry, we predict that revisions in perceived financial reporting quality (Hypothesis 2: ERC), market value (Hypothesis 3: CAR) and market overvaluation (Hypothesis 4: OVER) will be higher for firms with aggressive ex-ante non-GAAP reporting.[35]

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[32] Our predictions are consistent with the existence of situations in which i) firm disclosures may be opaque, ii) investors' attention is limited, and/or iii) a manager's focus is myopic (Black et al. 2018). According to Hirshleifer and Teoh (2003), "[i]n sum, allocation timing, aggregation, the format of presentation, and the reporting or disclosure of redundant information can influence the degree to which an investor inattentively simplifies the values of public information signals or the values of environmental parameters" (p. 350). Further, Bloomfield (2002) suggests that extraction costs may impede the complete revelation of public data in market prices. The extracting costs include the "costs of identifying, collecting, compiling, printing and processing data, or hiring others to do so" (Bloomfield 2002, p. 236).

[33] Veenman (2011) refers to Holthausen and Verrecchia (1988).

[34] Healy and Palepu (2001) propose that the ex-post credibility of voluntary disclosures will be verified through actual realizations.

[35] In a set of supportive univariate tests, we predict that the divergence between GAAP and non-GAAP loss is higher for aggressive firms, and aggressive firms are more likely to meet and beat the analyst forecasts compared to non-aggressive firms.

Perceived Financial Reporting Quality (ERC)

Turning to the revision of perceived financial reporting, we predict that the ERC-decline is greater (H2A) and longer-lived (H2B) for firms with aggressive ex-ante non-GAAP reporting compared to firms with non-aggressive ex-ante non-GAAP reporting.

> **H2A:** *The decline in the information content of earnings is more pronounced for firms with ex-ante aggressive non-GAAP reporting.*

> **H2B:** *The decline in the information content of earnings is longer-lived for firms with ex-ante aggressive non-GAAP reporting.*

Short-Term Market Reaction (CAR)

Addressing the mispricing that arises from aggressive non-GAAP reporting, Hirshleifer and Teoh (2003) propose the following:

> "*[i]f some investors have limited attention in their evaluation of pro forma earnings announcements, then the larger are excess pro forma earnings, the greater (more positive) on average is overvaluation, and the more negative is the average subsequent abnormal return.*" (p. 357)

Being precise, according to Hirshleifer and Teoh (2003), we should be able to empirically observe two effects for firms with aggressive ex-ante non-GAAP reporting: i) higher overvaluation in the pre-restatement period compared to non-aggressive counterfactuals and ii) more negative subsequent abnormal returns compared to non-aggressive counterfactuals. Turning to the subsequent abnormal returns, we investigate whether the market reverses prior mispricing upon the increase of investor attention. Hence, we analyze CARs around the restatement announcement date and predict that firms with aggressive ex-ante non-GAAP reporting will experience a more negative market reaction relative to non-aggressive firms.

> **H3:** *Around the restatement announcement date, firms with aggressive ex-ante non-GAAP reporting experience higher market value declines.*

Overvaluation (OVER)

Next, we address the question whether aggressive firms are ex-ante more overvalued compared to firms with non-aggressive non-GAAP reporting. First of all, it is important to recall that well-known empirical studies (Francis et al. 2000; Heinrichs et al. 2013) document in large samples for the US stock market an average overvaluation by the market (the price is higher than the estimated intrinsic value).

Bearing this in mind, we test whether firms with ex-ante aggressive non-GAAP reporting are more overvalued compared to their non-aggressive counterfactuals before the restatement announcement (H4A). Considering the theory of Hirshleifer and Teoh (2003) and the empirical findings by Christensen et al. (2014)[36], one might expect that aggressive firms are more overvalued than non-aggressive firms. However, as we measure overvaluation based on the relation between prices (determined by investors' beliefs) and values (determined by analyst forecasts and discount factors), the overvaluation might be offset, if both prices and values are biased upwards ex-ante.[37] In other words, if both investors and analysts are misled because of, e.g. limited attention, a higher overvaluation for aggressive firms will be unlikely detectable. Yet, both prices and values will be upwardly biased for aggressive firms, suggesting that aggressive non-GAAP reporting is harmful.[38] Given that analysts are more sophisticated than (naïve) investors, one might argue that the bias in values will be smaller than the bias in prices, leading to detectable overvaluation for aggressive firms. However, since we do not know whether sophistication mitigates mispricing of non-GAAP information in light of limited attention, we cannot provide a clear prediction about whether aggressive firms are ex-ante more overvalued than non-aggressive firms. Finally, we note that since analysts exclude more recurring items from their forecasts when managers guide analysts (Christensen et al. 2011), it is possible that opportunistic minded managers might bias analyst forecasts upwardly to increase share prices. Considering these arguments, we do not have clear predictions regarding

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[36] Christensen et al. (2014) document that short sellers target firms that disclose non-GAAP earnings aggressively, suggesting that sophisticated traders view these firms as overvalued and as having lower financial reporting quality. Further, they reveal that aggressive reporting choices are followed by negative returns. We highlight that Christensen et al. (2014) apply short trading as a signal for overvaluation, but do not calculate overvaluation directly. Further, Badertscher et al. (2011) find that approximately 70% of restatement firms were overvalued before executives decided to misreport and suggest that sustaining overvaluation drives misreporting.

[37] We highlight that overvaluation from markets` perspective (using valuation models) reflects the relative amount that the price (determined by investors` beliefs) exceeds the value (determined by analyst forecast and discount factors). Being precise we measure overvaluation as: (price-value)/price

[38] Griffin (2003) show that analysts downgrade their recommendation only after the restatement. Further, Cotter and Young (2007) identify that analysts "are not significantly more likely to show downward revisions in recommendations" in the period preceding the public revelation of AAER-related misreporting. Bradshaw et al. (2001) suggest that analysts "do not alert investors to the future earnings problems associated with high accruals" (p. 45). According to Ronen and Yaari (2008), such findings "might raise the suspicion that all analysts publicize biased reports all the time" (p. 204). Eventually Baik et al. (2009) find that "analysts are more likely to exclude expenses from street earnings that should not be excluded for glamour stocks than for value stocks" (p. 67).

the (over)valuation analysis before the restatement happens. Hence, the issue is ultimately an empirical question (H4A).

Focusing on the post-restatement period, we try to shed some light on this issue by decomposing the revisions of overvaluation into revisions of price and value. In light of increased attention, we argue that the price drop will be stronger than the induced earnings forecast revision of (sophisticated) analysts, and the overvaluation will be reduced. Again, we reiterate that alternative scenarios are possible and it will be an empirical question (H4B).

> **H4A:** *Before the restatement, the overvaluation could be more pronounced for firms with ex-ante aggressive non-GAAP reporting if analysts' forecast (values) are less biased upwards.*

> **H4B:** *After the restatement, the decline in the market`s overvaluation is greater for firms with ex-ante aggressive non-GAAP reporting.*

IV.   RESEARCH DESIGN

As we are interested in whether executives are able to mislead inattentive investors through income increasing inappropriate non-GAAP adjustments, we rely on a setting in which a) executives are more likely to exploit information asymmetries for self-serving purposes before an anticipated release of unfavorable news, b) non-GAAP earnings are increased through inappropriate expense exclusions and c) investors become more attentive towards firms´ financial reporting quality and have the chance to revise prior pricing. To address these conditions, we employ a setting where material restatements serve as an informational shock and signal poor financial reporting quality. The pre-restatement period is characterized by high ex-ante information asymmetry between investors and executives[39], and the post-restatement period accounts for the increase in investor attention. The exclusion of recurring expenses serves as our proxy for inappropriate non-GAAP adjustments, which we describe as aggressive non-GAAP reporting. We capture the mispricing that is attributable to aggressive non-GAAP reporting through the differences in market reactions between aggressive and non-aggressive restatement firms. We propose that differences in market revisions between aggressive and non-aggressive firms are indicative of prior mispricing of aggressive non-GAAP reporting. In short, we condition market revisions to material restatements on ex-ante non-GAAP reporting.

Identification of Attention Grabbing Events[40]

According to the prior restatement literature (Hennes et al. 2008), most restatements do not arise from intentional misreporting and therefore do not suit well as an attention grabbing event. Material restatements, in contrast, are likely attributable to former intentional misreporting, cause adverse market reactions and signal poor financial reporting quality, which in turn increases investor attention/scrutiny. Given that managers are likely informed about the upcoming release of unfavorable news before the restatement announcement, while investors are not, executives may choose to exploit the momentum of high information asymmetry and

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[39]   Executives have informational advantages about the severity of prior misreporting, the timing of future restatements, and the quality of non-GAAP exclusions. Further, findings by Christensen et al. (2014) are consistent with the theory that the exclusion of recurring expenses creates information asymmetries.

[40]   We apply material restatements as an attention grabbing event, as restatements are found to trigger the highest investors' interest in the EDGAR database (Drake et al. 2015). Further, restatements are a clear signal of poor financial reporting quality (Pomeroy and Thornton 2008) and "the most readily available signal of low audit quality" (Christensen et al. 2016). Most importantly, restatements are neither anticipated by invetsors nor analysts (Griffin 2003), as they are announced by the firm and in most cases represent the first incidence at which the public learns about prior reporting failurs (Ronen and Yaari 2008). Finaly, given that Burns and Kedia (2006) observe a mean time-lapse between the misstated year and the restatement announcement year of 1.47 years, we likely investigate non-GAAP reporting choices outside of GAAP misreporting time-frames. Being aware of alternative events, (e.g., Accounting and Auditing Enforcement Releases, Class Action Lawsuits), we conciously chose restatements for reasons design that will be discussed in the section sample selection.

report non-GAAP earnings aggressively before the expected decline in share price. We would not expect such managerial behavior before the release of less severe restatements. We retrieve restatement data from two databases; Government Accountability Office (GAO) and AuditAnalytics (AA). For GAO restatement data, we apply the classification by Hennes et al. (2008) to identify material restatements. Unfortunately, Hennes et al. (2008) do not provide their popular classification (irregularities vs. errors) for AA restatements. To overcome this issue, we follow prior literature and identify restatements as material when they are related to fraud, SEC investigations or Accounting and Auditing Enforcement Releases (AAERs) (Armstrong et al. 2013; Chen et al. 2014).[41]

Identification of Aggressive Non-GAAP Reporting

According to the prior literature (Black and Christensen 2009; Doyle et al. 2013), the exclusion of recurring expenses is less justifiable and consistent with opportunistically minded executives.[42] We use the exclusion of recurring expenses to identify aggressive non-GAAP reporting choices. As non-GAAP reporting is "part of a multi-period disclosure policy" (Black et al. 2018, p. 7), we choose to identify ex-ante non-GAAP reporting behavior throughout five quarters before the restatement announcement.[43] Specifically, we count the frequency of recurring expense exclusions per firm in the five quarters leading up to the restatement and divide this number by the total quarters observed.[44]

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[41] Being aware of alternative attention grabbing events such as Accounting and Auditing Enforcement Releases (AAERs) and Class Action Lawsuits, we chose material restatement announcements for a set of reasons. First, restatements are on average announced earlier than AAERs (Karpoff et al. 2017), suggesting that restatements offer a pre-period in which investors are less likely to anticipate poor financial reporting quality compared to AAERs. Karpoff et al. (2017) find that Class Action Lawsuits take place earlier than restatements in cases of financial misrepresentation under Section 13(b). While Class Action Lawsuits perform slightly better in revealing the initial signal of fraud, Class Action Lawsuits are often initiated by investors as response to sharp share price declines and therefore provide a pre-period in which investors are attentive before the filing date. Moreover, Class Action Lawsuits do not necessarily signal poor financial reporting quality. Lastly, Class Action Lawsuits and AAERs are announced by investors and the SEC, restatements are announced by the firm. As restatements are announced by the firm, ex-ante executives are likely to know about the upcoming revision of earnings and past reporting failure, while investors do not. Given the high information asymmetry, executives might choose to extract rents through adoption of more aggressive non-GAAP reporting behavior before the release of unfavorable news to increase share price and sell stock. In robustness tests, we provide results based on AAERs and Class Action Lawsuits samples as a placebo test. The findings are consistent with our expectations that restatement related findings do not hold for AAERs and Class Action Lawsuits.

[42] Potential motives include executives' desire to increase or sustain overvaluation, meet or beat analyst forecasts, distract investors from low GAAP performance and sell stock holdings at inflated prices.

[43] Richardson et al. (2002) document that it takes 454 days on average from the end of the fiscal year of alleged manipulation to the restatement announcement, which is similar to Burns and Kedia (2006), who observe a mean time-lapse between the misstated year and the restatement announcement year of 1.47 years. Given this time lag of about 6 quarters between GAAP misreporting end and its correction through a restatement, omits concerns that our 5 quarter pre-periods covers periods of GAAP manipulation on average. Further, 5 quarters, which we apply as our pre-period, seem a reasonable timeframe during which managers are likely to have knowledge about prior misreporting and the upcoming release of bad news, while investors do not. Eventually, applying a five quarter pre-restatement periods aligns our research to Wilson (2008) and Chen et al. (2014), who both a apply a 5 quarter pre-period in their ERC analyses for restatement firms. As we apply the identical ERC-design, we increase the comparability to prior literature (Wilson 2008; Chen et al. 2014).

[44] Attributable to missing data, we do not have five pre-restatement quarters for each firm. However, we require at least two firm-quarter observations in the pre- and post-restatement period.

Figure 1 EPS Version

EPS Version	EPS ($)	Exclusions	EPS ($)
Non-GAAP EPS[45]	0.20		
		– Recurring items[46] (*RECURRING_EXP* unscaled)	0.01
Operating GAAP EPS[47]	0.19		
		– Special items[48]	0.03
GAAP EPS[49]	0.16		
		– Below the line items	0.01
NET GAAP EPS[50]	0.15		

This figure illustrates a hypothetical example in which a firm excludes below-the-line items ($ 0.01 EPS), special items ($ 0.03 EPS), and recurring expenses ($ 0.01 EPS). These expense exclusions have an income increasing effect (from $ 0.15 EPS to $ 0.20 EPS). Recurring expenses exclusions are present whenever non-GAAP earnings are higher than operating earnings.

For example, if a firm excludes recurring expenses in four out of five pre-restatement quarters, the average exclusion rate will be 0.8. Based on the exclusion rate quartiles, we assign firms to the non-aggressive (1st quartile of the exclusion rate), mixed (2nd and 3rd quartile) or aggressive (4th quartile) group. Once a firm is assigned to one of the three groups (aggressive, mixed, non-aggressive), the firm remains in the same group throughout the pre- and post-period, regardless of the ex-post changes of non-GAAP reporting behavior. Our calculation of recurring expense exclusions follows prior literature (Black and Christensen 2009; Doyle et al. 2013) and is illustrated in Figure 1.

Identification of Managerial Non-GAAP Reporting Choices – Pro-Forma Earnings

Non-GAAP earnings may refer to both pro-forma earnings and street earnings. While street earnings describe the core earnings as defined by analysts, pro-forma earnings reflect the adjustments made by managers, suggesting that pro-forma earnings suit best to capture the managerial adjustment choice. However, since until recently no archival pro-forma data were available (Bentley et al. 2018) and since hand collection is costly, most studies applied street earnings (e.g., from I/B/E/S) as a proxy for pro-forma earnings (Doyle et al. 2003; Heflin and Hsu 2008; Kolev et al. 2008; Doyle et al. 2013; Bradshaw and Sloan 2002; Brown and

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[45] Non-GAAP EPS is the "actual" number from I/B/E/S. Non-GAAP EPS is an umbrella term for pro-forma EPS and Street EPS (Black et al. 2018).

[46] Recurring expenses are excluded whenever the non-GAAP EPS exceeds the EPS from Operations. According to Black and Christensen (2009), "[w]henever the I/B/E/S actual EPS number is higher than Compustat's operating EPS, we can assume that analysts have excluded recurring items from both their forecasts and the actual EPS figure."

[47] Operating GAAP EPS is "opepsq" from Compustat, as defined by Curtis et al. (2013) and Doyle et al. (2013).

[48] "Special Items are defined as operating income per share (Compustat item opepsq) less GAAP EPS before extraordinary items (Compustat item epspxq or epsfxq)" (Doyle et al. 2013). Special items present non-recurring items.

[49] GAAP EPS refers to the GAAP EPS excluding extraordinary items and is "epsfxq" from Compustat. This metric is defined as GAAP EPS by Doyle et al. (2013).

[50] GAAP EPS including extraordinary items.

Sivakumar 2003).[51] We follow this approach and apply I/B/E/S earnings data as a proxy for pro-forma earnings.

We acknowledge that our approach is not without constraints and debated frequently as both measures (street and pro-forma earnings) may deviate (Beyer et al. 2010; Berger 2005; Bradshaw and Soliman 2007; Easton 2003). While these debates are yet unsettled, Bentley et al. (2018) shed light on the magnitude and implications of the differences between street and pro-forma earnings. They document that in cases in which both street earnings and pro-forma earnings are available, deviations between both metrics exist in (only) 3.8 percent of all cases, suggesting that in most cases street earnings perform well as a proxy for pro-forma earnings. Bentley et al. (2018) indicate that managers exclude more expenses, on average, indicating that the use of street earnings as a proxy for pro-forma earnings will underestimate the aggressiveness of managerial non-GAAP reporting choices. Finally, in 22.9 percent of all observed cases, I/B/E/S provides street earnings, while managers do not communicate the pro-forma earnings (Bentley et al. 2018). For these cases, we argue that using I/B/E/S can be advantageous as street earnings capture a broader spectrum of non-GAAP reporting behavior, in particular, because "even when a street earnings figure does not have a corresponding pro forma press release figure, it would still represent management's attempt to spotlight a non-GAAP earnings number" (Berger 2005, p. 968).[52]

While I/B/E/S earnings have become a common and widely accepted proxy for pro-forma earnings, we also acknowledge recent contributions by Bentley et al. (2018), who provide data on actual pro-forma earnings for years 2003 to 2015 (our data requires non-GAAP earnings data from 1993 to 2015).[53] While our paper reports all findings on the basis of I/B/E/S earnings in order assure that aggressiveness is identified uniformly throughout all periods (1995-2015), we additionally provide the entire set of tables using pro-forma data as provided by Bentley et al. (2018). These supportive tables can be found in our appendix (attached to this document). Replacing non-GAAP metrics with Bentley et al. (2018) data yields qualitatively similar results throughout all tables, suggesting that our findings are not sensitive to the application of actual

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[51]   Doyle et al. (2013) find that out of 969 pro-forma EPS, 915 (94.4%) overlap with the Street EPS from I/B/E/S, suggesting that in "the vast majority of cases, analysts are in agreement with the inclusion/exclusion reporting basis used by management in the press release" (p. 43).

[52]   Given that the appliance of I/B/E/S data will underestimate the aggressiveness of managerial exclusions (Bentley et al. 2018), we likely bias results against our predictions. Also, given that on average deviation between pro-forma and street earnings were found in 3.8% of all cases (Bentley et al. 2018), our identification of aggressiveness will likely not be significantly impacted by using street earnings instead of pro-forma earnings. Finally, in cases in which I/B/E/S and actual pro-forma earnings may deviate, the use of a binary indicator variable for aggressiveness will mitigate potential measurement errors that arise from the disconformity between I/B/E/S and actual pro-forma earnings.

[53]   We thank Bentley et al. (2018), who made pro-forma data available: https://sites.google.com/view/kurthgee/data.

pro forma earnings. Further, our robustness tests support findings by Bentley et al. (2018), who document that I/B/E/S earnings align closely with pro-forma earnings.[54]

The Outlook of Applied Models for Testing Hypotheses

Consistent with the theory of Hirshleifer and Teoh (2003), we assume that investors will be misled by firms with aggressive ex-ante non-GAAP reporting due to investors' lack of attention. Consequently, we assume that investors' responsiveness to aggressive reporting choices (the exclusions of recurring expenses) will be different before and after investor attention has increased due to a material restatement (Model 1). In other words, we predict that investors will become less responsive towards aggressively reported non-GAAP earnings after the restatement announcement as this event leads to heightened investor attention and scrutiny.

Most importantly, for our main hypotheses, we predict that once investors' attention increases, the prior ex-ante mispricing will be reversed. We capture investors' revision in the following three dimensions: i) change in perceived financial reporting quality (ERC: earnings response coefficient, Model 2A and 2B) ii) change in market value (CAR: cumulative abnormal return, Model 3) and iii) change in overvaluation (OVER: overvaluation, Model 4). Consistent with the assumption that investors fail to account for inappropriate expense exclusions, we predict that revisions in all three measures (ERC, CAR, and OVER) will be more pronounced for firms with aggressive ex-ante non-GAAP reporting. Throughout all the tests, we follow the prior restatement literature. In Model 1, 2A, and 2B, we apply the ERC-design (Wilson 2008; Chen et al. 2014). In Model 3, we investigate the short-term market reaction around the restatements announcements using a CAR-design (Gordon et al. 2013; Palmrose et al. 2004). In Model 4, we investigate overvaluation before the restatement announcement (Badertscher 2011; Frankel and Lee 1998). In line with prior literature we apply five preceding quarters to the pre-period (Wilson 2008; Chen et al. 2014) and twelve quarters to the post-period (Chen et al. 2014) for our ERC-regressions.

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[54] Our final sample in this paper comprises 3,471 firm-quarter observations, out of which 2,362 observations fall into the time-frame that is covered by Bentley et al. (2018) (2003-2015). Out of these 2,362 observations, Bentley et al. (2018) data is available for 1,594 (65.35%) observations. Out of these 1,594 firm-quarter observations, management reports pro-forma earnings in 631 (39.85%) cases. Out of these 631 pro-forma announcements, earnings deviate in 109 (17.24%) cases from I/B/E/S earnings. For these cases, pro-forma earnings are on average $ 0.086 (Median: $ 0.01) higher than I/B/E/S earnings, which supports the view that managers exclude more expenses than analysts do (Bentley et al. 2018). Overall, the application of Bentley et al. (2018) data would refine 3.21% (109/3,471) of all I/B/E/S data applied in our analyses. If we compare pro-forma and street earnings for cases in which pro-forma was reported (631 obs.), pro-forma earnings are on average $ 0.015 (Median: $ 0.01) higher than I/B/E/S earnings.

Empirical Model 1: Investors' Ability to Detect Aggressive Non-GAAP Reporting

In our first analysis, we compare the investor's responsiveness to aggressively reported earnings in the pre- and the post-period by applying an earnings response coefficient (ERC) model (Chakravarthy et al. 2014; Hennes et al. 2008; Chen et al. 2014; Hirschey et al. 2015; Wilson 2008). In the ERC model, we regress investors' reaction (*UR*) on unexpected earnings (*UE*) around quarterly earnings announcements. Unexpected earnings are commonly also referred to as earnings surprises and/or analyst forecast errors. We assume that the unexpected returns are positively correlated with unexpected earnings, meaning that investors respond negatively to negative earnings surprises and positively to positive earnings surprises. The coefficient on *UE* (the ERC) represents the investor's responsiveness to non-GAAP earnings when recurring expenses are NOT excluded. To capture investor's ERC adjustment to aggressive reporting choices, we introduce *UE X EXCLUDE*. *EXCLUDE* equals 1 if the firm excludes recurring expenses.[55] Since we predict that investors' attention is a key determinant of investors' ability to detect aggressive non-GAAP adjustments, we assume that investors' responsiveness to inappropriate non-GAAP adjustments will change once investor attention increases. In particular, we expect that investors will find aggressive non-GAAP reporting informative in the pre-period (positive coefficient on *UE X EXCLUDE*), but punish the same reporting choices under heightened investor attention and scrutiny in the post-period (negative coefficient on *UE X EXCLUDE* in the post-period). We run the regressions separately for the pre- and post-restatement period.[56]

$$UR_{i,t} = \alpha + \beta_1 UE_{i,t} + \beta_2 EXCLUDE_i + \beta_3 UE_{i,t} \times EXCLUDE_i + \beta_4 NONLINEAR_{i,t}$$
$$+ \sum_{k=5}^{11} \beta_k CNTRLS_{i,t} + \sum_{k=12}^{18} \beta_k \left[UE_{i,t} \times CNTRLS_{i,t} \right] + \varepsilon_{i,t}, \tag{1}$$

where: $\quad CNTRLS_{i,t} = \left\{ MTB_{i,t}, BETA_{i,t}, SIZE_{i,t}, LOSS\_NONGAAP_{i,t}, Q4_{i,t}, PREDICT_{i,t}, PERSIST_{i,t} \right\}$

UR are the cumulative abnormal returns in the three-day window (–1; +1) around the earnings announcement date for each firm *i* in each quarter *t*. The daily abnormal return is calculated by subtracting the CRSP value-weighted market return from the firm's actual return. *UE* are calculated by subtracting the expected earnings per share from the actual earnings per share and then scaling by price at the end of the fiscal quarter. The expected earnings are measured

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[55] The identification is consistent with Doyle et al. (2013).

[56] We note that the variable *NONLINEAR* is not included in the set of control variables (*CNTRLS*), because *NONLINEAR* is defined as *UE* X |*UE*| and the inclusion would yield *UE* X *UE* X |*UE*| (see: *UE X CNTRLS*). To overcome this issue, we follow prior literature (Chen et al. 2014; Wilson 2008) and include *NONLINEAR* as a separate variable outside the set of control variables (*CNTRLS*).

as the median of the analysts' earnings forecasts issued within 90 days before quarter $t's$ earnings announcement.[57] Consistent with Wilson (2008), we include seven control variables (*MTB, BETA, SIZE, LOSS, Q4, PREDICT, PERSIST*) and their interactions with *UE* to control for the impact of other factors on the ERC. The *MTB* (market-to-book ratio) is measured at the end of the fiscal quarter for which the earnings announcement is made. We expect that the coefficient on *MTB X UE* will be positive (Collins and Kothari 1989). *BETA* is the market-model beta estimated over the previous year ending two days before the earnings announcement date. We expect that the coefficient of *BETA X UE* will be negative (Collins and Kothari 1989; Easton and Zmijewski 1989). *SIZE* (the natural log of market value of equity) is measured at the end of the quarter for which the earnings announcement is made and is included to control for the impact of firm size. Since *SIZE* is likely correlated with other firm-level characteristics, we make no prediction on the direction (Wilson 2008). *LOSS_NONGAAP* is equal to 1 if the reported non-GAAP earnings per share are negative. We expect that the coefficient of *LOSS_NONGAAP X UE* will be negative, as the earnings have a lower information content if the reported earnings per share value is negative (Hayn 1995). *Q4* is equal to 1 if the earnings announcement is for the fourth quarter of the fiscal year. We expect that the coefficient of *Q4 X UE* will be negative because of the lower information content of fourth-quarter earnings reports (Mendenhall and Nichols 1988). *PREDICT* is measured as the variance of the absolute value of unexpected earnings over the two-year period prior to the earnings announcement, where unexpected earnings are based on a seasonal random walk. We predict a negative sign of *PREDICT X UE,* as the higher the variance of unexpected earnings is, the lower the ERC is expected to be (Lipe 1990). *PERSIST* is the autoregressive coefficient from the Foster (1977) model estimated over the two-year period prior to the earnings announcement. We expect the coefficient of *PERSIST X UE* to be positive (Kormendi and Lipe 1987; Easton and Zmijewski 1989). Eventually, we also include *NONLINEAR*, which is defined as *UE X |UE|*. *NONLINEAR* will control for the nonlinearity in the price-earnings relation (Freeman and Tse 1989; Subramanyam 1996). We expect the coefficient of this variable to be negative, as extreme values of unexpected earnings are less value-relevant. We collect firm data, report dates and GAAP earnings from Compustat, price data from CRSP, and the actual and estimated non-GAAP earnings from I/B/E/S.

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[57] Chen et al. (2014) applied 60 days. We follow Dehaan et al. (2013) and apply 90 days to lose fewer observations due to missing data.

Empirical Model 2A: Perceived Financial Reporting Quality (Magnitude)

To capture the change in the perceived financial reporting quality, we apply the ERC model, as applied by the prior literature (Chakravarthy et al. 2014; Hennes et al. 2008; Chen et al. 2014; Hirschey et al. 2015; Wilson 2008). In our regression model, the coefficient on *UE* constitutes the base ERC in the pre-period. We capture the change in the ERC between the pre- and post-restatement period with the interaction variable *UE X POST*. We run the regressions separately for aggressive and non-aggressive firms and predict that the ERC-decline will be more pronounced for firms with aggressive ex-ante non-GAAP reporting. Consequently, we assume a more negative coefficient of *UE X POST* for the sample of aggressive firms.[58]

$$UR_{i,t} = \alpha_1 + \alpha_2 POST_{i,t} + \beta_1 UE_{i,t} + \beta_2 \left[UE_{i,t} \times POST_{i,t} \right] + \beta_3 NONLINEAR_{i,t}$$
$$+ \sum_{k=4}^{10} \beta_k CNTRLS_{i,t} + \sum_{k=11}^{17} \beta_k \left[UE_{i,t} \times CNTRLS_{i,t} \right] + \varepsilon_{i,t}, \tag{2}$$

where: $CNTRLS_{i,t} = \left\{ MTB_{i,t}, BETA_{i,t}, SIZE_{i,t}, LOSS\_NONGAAP_{i,t}, Q4_{i,t}, PREDICT_{i,t}, PERSIST_{i,t} \right\}$

Empirical Model 2B: Perceived Financial Reporting Quality (Duration)

To provide insights on the duration of the ERC-decline, we disaggregate the post-period into 12 post-quarters. We apply the same model used by Chen et al. (2014) and capture the difference between the pre-period ERC and the post-quarter ERC with *UE X QTR*.[59] We run this regression separately for non-aggressive and aggressive firms and predict a longer lasting decline in the ERC for aggressive firms compared to non-aggressive firms.

$$UR_{i,t} = \alpha_1 + \sum_{t=1}^{12} a_{2,t} QTR_{i,t} + \beta_1 UE_{i,t} + \sum_{t=1}^{12} \beta_{2,t} \left[UE_{i,t} \times QTR_{i,t} \right] + \beta_3 NONLINEAR_{i,t}$$
$$+ \sum_{k=4}^{10} \beta_k CNTRLS_{i,t} + \sum_{k=11}^{17} \beta_k \left[UE_{i,t} \times CNTRLS_{i,t} \right] + \varepsilon_{i,t}, \tag{3}$$

where: $CNTRLS_{i,t} = \left\{ MTB_{i,t}, BETA_{i,t}, SIZE_{i,t}, LOSS\_NONGAAP_{i,t}, Q4_{i,t}, PREDICT_{i,t}, PERSIST_{i,t} \right\}$

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[58] To simplify the interpretation, we follow Chen et al. (2014) and opt against a differences-in-differences design and instead run the ERC regression separately for aggressive and non-aggressive firms separately. However, the difference-in-difference design is provided in the robustness check section (see Table 10), yielding qualitatively similar results.

[59] Chen et al. (2014) find that the sign on *UE X QTR* is significantly negative for the first 11 quarters for material restatement firms but only for 1 quarter for other (non-material) restatement firms. Chen et al. (2014) do not condition on pre-disclosure. Further, in their main analysis, they include subsequent restatements, perhaps inducing noise, as the post-periods may overlap with the pre-periods from subsequent restatement announcements.

Empirical Model 3: Market Reaction around the Restatement Announcement Date

To capture investors' immediate market value revision, we employ a short-window event study around the restatement announcement date. *CAR* is the cumulative abnormal return in the seven-day window (–3; +3) around the restatement announcement date, and *AGGRESSIVE_GROUP* is one if the firm reported non-GAAP earnings aggressively before the restatement announcement (fourth quartile). *MIXED_GROUP* represents the third and second quartile of ex-ante mean non-GAAP reporting aggressiveness. The base group *(NON_AGGRESSIVE_GROUP)* represents firms with non-aggressive ex-ante non-GAAP reporting (first quartile). We predict that the coefficient of *AGGRESSIVE_GROUP* is significantly negative, suggesting that market reactions will be more negative for firms with aggressive ex-ante non-GAAP reporting compared to those with non-aggressive ex-ante reporting. Our applied model follows Palmrose et al. (2004) but is extended with the restatement disclosure type (Gordon et al. 2013) and the post-SOX effect (Hirschey et al. 2010).

$$
\begin{aligned}
CAR_i = \alpha\ &+ \beta_1 MIXED\_GROUP_i + \beta_2 AGGRESSIVE\_GROUP_i + \\
&\beta_3 PROMPTER\_COMPANY_i + \beta_4 PROMPTER\_AUDITOR_i + \beta_5 PROMPTER\_OTHER_i + \\
&\beta_6 REVENUE_i + \beta_7 IMPACT_i + \beta_8 PERVASINESS_i + \beta_9 DURATION_i + \\
&\beta_{10} IMPACT\_SIZE_i + \beta_{11} IMPACT\_LEVERAGE_i + \beta_{12} RETURN120_i + \\
&\beta_{13} PRESS\_RELEASE_i + \beta_{14} POST\_SOX_i + \varepsilon_i,
\end{aligned}
\tag{4}
$$

PROMPTER_COMPANY, *PROMPTER_AUDITOR,* and *PROMPTER_OTHER* refer to the party that the restatement is attributed to. Palmrose et al. (2004) find larger market value declines when the restatement is prompted by the company or the auditor. *PROMPTER_SEC* is the base group as restatements initiated by the SEC have been associated with the least adverse market reactions (Palmrose et al. 2004). *REVENUE* identifies firms that were involved in the manipulation of revenues. Agrawal and Chadha (2005) show larger market value declines if the restatements are revenue related. *IMPACT* controls for the magnitude of the restated amount, *PERVASINESS* controls for the number of accounts affected by the restatement and *DURATION* reflects the number of years that were restated. Further, we control for firm characteristics (size, leverage, and return) with *IMPACT_SIZE*, *IMPACT_LEVERAGE* and *RETURN120* (past returns over 120 days). *PRESS_RELEASE* and *POST_SOX* account for more negative market reactions with more prominent disclosure (Gordon et al. 2013) and less negative market reactions to restatements that were announced after the SOX-Act (Hirschey et

al. 2010).[60] In particular, we want to rule out the possibility that our findings are driven by heterogeneous increases of investor attention. Put differently, we may observe most adverse market reactions for the aggressive group not because of aggressive ex-ante non-GAAP reporting, but because these restatements were disclosed most prominently. Hence, controlling for the disclosure type (*PRESS_RELEASE*) is a crucial extension to the model by Palmrose et al. (2004).[61]

Empirical Model 4: Corrections of Overvaluation

In this section, we aim to identify whether firms with aggressive ex-ante non-GAAP reporting are more overvalued than non-aggressive firms in the pre-restatement period. Further, we are interested in the change in overvaluation after the firm reveals prior misreporting. We calculate the overvaluation (valuation error) from market's perspective as (*PRICE – VALUE*)/*PRICE*. The estimation of a firm's intrinsic value (*VALUE*) is based on the residual income approach, following Ohlson (1995). The empirical implementation follows Frankel and Lee (1998), where the value is measured as follows:

$$VALUE_{i,t} = B_{i,t} + \frac{(FROE_{i,t+1} - r_{e,i,t})}{(1+r_{e,i,t})} B_{i,t} + \frac{(FROE_{i,t+2} - r_{e,i,t})}{(1+r_{e,i,t})^2} B_{i,t+1} + \frac{(FROE_{i,t+3} - r_{e,i,t})}{(1+r_{e,i,t})^2 (r_{e,i,t})} B_{i,t+2}, \qquad (5)$$

where B_t is the book value of equity at date t, $FROE_{t+j}$ is the forecasted return on equity (forecasted *ROE*) at date $t+j$, and r_e is the cost of equity capital for firm i. We estimate the intrinsic value based on a no growth assumption (no growth in the residual income in the terminal value period) because we are primarily interested in a *relative* valuation (the comparison between aggressive and non-aggressive firms). To estimate the future book value of equity and the future ROE, we follow the sequential process by Frankel and Lee (1998). The cost of equity capital is estimated using the industry cost of capital based on the Fama-French four-factor risk model using rolling averages of factors starting in 1963 (Carhart 1997; Fama and French 1993).[62] The industries are formed using the Fama-French 48 industry classification as in Fama and French (1997). The cost of equity capital is estimated using a monthly rolling

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[60] All variable descriptions are additionally provided in the appendix (including full variable descriptions, computational details, and data sources).

[61] Similar to our explanation, Files et al. (2009) highlight that "limited attention theory (Hirshleifer and Teoh 2003) predicts that the speed and completeness of price reactions are both reduced when information is disclosed in a less noticeable format that some investors may overlook."

[62] We start in 1963 because the Fama-French factors (Fama and French 2015) date back to 1963. We use the Fama-French five factor model as a robustness check, which yields very similar results. The monthly data of the factors and the industry returns are obtained from Kenneth French's data library (https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

regression starting in July 1963. This valuation technique is also applied in Badertscher (2011), who analyzes overvaluation before the restatement related misreporting period starts and concludes that overvaluation triggers intentional misreporting. We highlight that Badertscher (2011) use the term "non-GAAP reporting" to describe reporting outside GAAP, meaning fraud. They do not refer to non-GAAP reporting as we and most literature in accounting and finance does. Instead of the annual book value of equity, we use the most recent quarterly book value of equity. To identify overvaluation, we calculate the valuation error *OVER* as the deviation of the market price (*PRICE_t*) from the intrinsic value (*VALUE_t*) as follows:

$$OVER_{i,t} = \frac{(\ PRICE_{i,t} - VALUE_{i,t}\ )}{PRICE_{i,t}}. \tag{6}$$

Recall that empirical studies (Francis et al. 2000; Heinrichs et al. 2013) find that firms are on average, overvalued (*PRICE* is higher than *VALUE*). Hence, finding an overvaluation for both aggressive and non-aggressive firms is something one should expect. The magnitude of the overvaluation, however, is an empirical question in our research.

V. SAMPLE AND RESULTS

Sample Selection

Our research question demands a setting in which executives are likely to exclude recurring expenses for self-serving purposes, and investors become more attentive to the firm's financial credibility through an exogenous shock. To account for these requirements, we chose a restatement setting in which executives have substantial informational advantages ex-ante and investors increase their attention upon the announcement of the restatement. To ensure that we identify a substantial increase in investors' attention, we exclude restatements that relate to technical errors and focus only on material restatements, as these are found to trigger most adverse market consequences (Hennes et al. 2008). Further, to limit the concern that subsequent restatement announcements will introduce noise to our post-period, we keep only firms with one restatement announcement in our sample. A further argument for keeping only one-time restatement firms is that multiple restatement firms are associated with lower ex-ante accounting quality (Files et al. 2014). Hence, we mitigate the concern that we do not control for ex-ante audit quality.[63] To increase the comparability between the pre- and post-restatement period, we require at least two firm-quarter observations for the pre-and post-restatement period, meaning that our sample includes at least four quarterly observations for each firm.[64] Taken together, while the overall sample is relatively small due to common restrictions in the restatement literature (264 firms with 3,471 firm-quarter observations), we ensure that the increase in investor attention takes place following the restatement announcement and not before.[65] Given that Gordon et al. (2013), who also focus on pre-restatement disclosure, investigate 365 firms (73 material and 292 less severe restatements), our sample consisting out of 264 material restatements firms compares well.

We obtain the restatement data from GAO reports (GAO 2002, 2007) and the Audit Analytics (AA) database, which cover restatements announced from January 1997 to June 2006 (GAO) and 1994 to present (AA), respectively.[66] Starting with 2,705 (16,086) restatements from the

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[63] Our selection and identification process is supported by Yu et al. (2018), who note that a sample including only the earliest observation for each firm will reduce noise and yield better empirical results when the pre- and post-restatement information environment is compared.

[64] Chen et al. (2014) and Hirschey et al. (2015) require firms to have at least one earnings announcement in each period. By contrast, we require at least two firm-quarter observations to increase the reliability that our results are not driven by special cases and to identify the ex-ante aggressiveness better. In other words, if a firm has one of one aggressive firm quarters, the misidentification of being aggressive is higher than if the firm has two out of two quarters with excluded recurring expenses.

[65] The essential advantage of restatements, compared to AAERs, is that restatements take place relatively early within a financial misconduct case. In other words, in the pre-AAER period, market participants are likely already attentive, as many other events (e.g., restatements, Class Action Lawsuits) forego the AAERs (Karpoff et al. 2017).

[66] Retrieving restatement data from GAO and AA is common in the prior literature (Amel-Zadeh and Zhang 2015; Badertscher 2011; Carver 2014; Ettredge et al. 2012). Our AA data covers the period from 1994 to 2014, as we require 12 post-quarters.

GAO (AA), we exclude 357 (9,239) restatements due to the lack of coverage in Compustat, CRSP and I/B/E/S. We further exclude 0 (103) restatements because of missing data. As we focus on firms that have only one restatement in each database and are material we lose 2,057 (6,390) restatement cases that refer to less severe restatements and firms with multiple restatement announcements. These excluded restatements would otherwise introduce noise to the post-period, making it difficult to judge whether our findings are driven by subsequent restatements. Our aggregated pre-final sample includes 291 firms from GAO and 354 firms from AA, resulting in 645 restatements that are marked as one-time material restatement firms in each database (GAO and AA). Next, we omit redundant firms that appear in both datasets. Therefore, we exclude 100 firms with uniform restatement dates in each database and 6 firms for restatement dates that deviate by more than 90 days. The remaining 539 firms are further reduced by cases in which calculated variables are missing (117), and common equity is negative (6). In the last step, we omit 152 firms for which we do not have at least 2 observations in the pre- and the post-period. Our final sample comprises 264 firms with at least four firm-quarter observations for each firm. We note that the Audit Analytics (AA) data does not provide the prompter of the restatement and U.S. Government Accountability Office (GAO) data does not provide the restatement amount and period restated. Since this data is necessary for the CAR analysis, we collected this data manually using EDGAR filings and whistleblowing data from Dyck et al. (2010).

The 264 firms in our final sample translate to 3,471 firm-quarter observations across 5 pre- and 12 post-restatement quarters (on average, 13.15 firm-quarter observations per firm) for years 1993 to 2018. Because we require 5 pre- and 12 post-restatement quarters, our sample data extend from 1993 to 2018 for restatements announced between 1995 and 2015.

Table 1 Sample Selection and Earnings Announcement Frequency

Panel A: Restatement Sample Selection

U.S. Government Accountability Office (GAO) Database		Number of Restatement Announcements
Accounting restatement cases in the period 1997–2006 (GAO)		2,705
Less: – Restatement cases by firms not covered in Compustat	90	2,615
Less: – Restatement cases by firms not covered in CRSP & I/B/E/S	267	2,348
Less: – Restatements cases with missing data throughout either the pre-restatement period (quarters –4 to 0) or the post-restatement period (quarters 1 to 12)[a]	0	2,348
Less: – Restatements by firms that restated multiple times	995	1,353
Less: – Other restatements (not material)	1,062	291
Total GAO Restatement Sample (Number of Firms)		**291**

Audit Analytics (AA) Database

Accounting restatement cases in the period 1995–2015 (AA)		16,086
Less: – Restatement cases by firms not covered in Compustat	2,729	13,357
Less: – Restatement cases by firms not covered in CRSP and I/B/E/S	6,510	6,847
Less: – Restatements cases with missing data throughout either the pre-restatement period (quarters –4 to 0) or the post-restatement period (quarters 1 to 12)[a]	103	6,744
Less: – Restatements by firms that restated multiple times	4,594	2,150
Less: – Other restatements (not material)	1,796	354
Total Audit Analytics Restatement Sample (Number of Firms)		**354**

Pooled Sample (GAO & Audit Analytics Database)

Combined Databases (GAO & Audit Analytics)			
	Accounting restatement cases in the period 1995–2015 (GAO+AA)	**291** **+354**	645
Less:	Overlaps: Restatements firms that are redundant in the pooled sample (GAO + AA) with the exact restatement date	100	554
Less:	Overlaps: Restatements firms that are redundant in the pooled sample (GAO + AA) with the restatement dates that fall apart by not more than 90-days[a]	16	539
Less:	Restatements cases with missing variables	117	422
Less:	Restatements with negative common equity	6	416
Less:	Restatements without at least two observations in each period (pre- and post-restatement period)	152	264
Final GAO and AA Restatement Sample (Number of Firms)			**264**

Panel A reports our selection process in which we combine restatement data from GAO and AA. Most importantly, we reduce our sample through the exclusion of less severe restatements and restatements with subsequent restatements. Relying on analyst forecast and market reaction we lose a substantial number of observations.

[a] In some cases the AA and GAO database include only one material restatement case per firm but provide different restatement dates (e.g. AA: 1st Sep. 2000, GAO: 8th Sep. 2000). In such cases, we take the earlier date as the initial attention grabbing signal as long as both dates do not fall apart by more than 90 days. In other cases, in which both dates fall apart by more than 90 days (e.g. AA: 1st Sep. 2000, GAO: 8th Dec. 2002) we exclude both observations as we cannot identify these firms reliably as one-time restatement firms.

Panel B: Industry Distribution of Restatement Firms

Industry (per Fama and French Classification)	Number of Firms	Percentage of Total
Business Equipment	73	27.66%
Consumer Durables	6	2.27%
Consumer Non-Durables	5	1.89%
Healthcare, Medical Equipment, and Drugs	28	10.61%
Manufacturing	32	12.12%
Oil, Gas, and Coal Extraction and Products	9	3.41%
Other (including Financial Firms)	70	26.52%
Telephone and Television	5	1.89%
Utilities	5	1.89%
Wholesale, Retail, and Some Services	31	11.74%
Total Restatement Firms	**264**	100%

Panel B reports the industry distribution for the restatement sample.

Panel C: Yearly Distribution of Restatement Announcements

	Firm Observations			
Restatement Year	**All**	**Non-Aggressive Group**	**Mixed Group**	**Aggressive Group**
1995	1	1	0	0
1996	2	1	0	1
1997	8	0	5	3
1998	10	1	3	6
1999	15	3	7	5
2000	17	4	7	6
2001	15	1	7	7
2002	28	7	14	7
2003	17	3	10	4
2004	23	6	10	7
2005	40	7	26	7
2006	33	5	24	4
2007	15	4	5	6
2008	5	1	4	0
2009	4	1	1	2
2010	6	3	2	1
2011	4	3	1	0
2012	4	1	3	0
2013	3	0	2	1
2014	6	1	4	1
2015	8	1	5	2
Total Restatement Firms	**264**	**54**	**140**	**70**

Panel C reports the yearly distribution of restatement announcements. Consistent with the observed decline of restatements after 2006 (Scholz 2014), we as well identify a decrease in the number of material restatements after 2006. This decrease may be attributable to increased financial reporting quality or executive's reluctance to disclose restatements in separate reports (Myers et al. 2013). Further, GAO stops providing data on restatements in 2006. Hence, we extend our sample with AA restatement data until 2015. This change in data source leads to a slightly deviating identification process of "material" restatements. While GAO data relies on the classification provided by Hennes et al (2008), for AA data we follow prior literature to identify material restatements alternatively. Eventually, the final sample of material restatements is partitioned into three groups (aggressive, mixed, and non-aggressive) based on prior non-GAPP reporting aggressiveness. The sub-samples yield 54 non-aggressive, 140 mixed and 70 aggressive firms.

Panel D: Earnings Announcement Frequency

Quarter	All	Non-Aggressive Group	Mixed Group	Aggressive Group
		Firm-Quarter Observations		
Pre-Period				
–4	225	46	116	63
–3	234	42	126	66
–2	234	44	123	67
–1	236	48	123	65
0	235	46	124	65
Sum Pre-Period	1,164	226	612	326
Post-Period				
1	200	44	104	52
2	209	45	109	55
3	205	50	105	50
4	197	44	103	50
5	197	45	98	54
6	200	47	101	52
7	191	41	101	49
8	194	44	103	47
9	182	40	95	47
10	182	43	98	41
11	182	45	94	43
12	168	41	89	38
Sum Post-Period	2,307	529	1,200	578
Total Firm-Quarter Observations	**3,471**	**755**	**1,812**	**904**

Panel D reports the number of firm-quarter observations with available data for the variables used in the ERC, CAR, and OVER analyses. The sample includes 264 restatements and comprises 3,471 firm quarter observations. Quarter 0 refers to the last fiscal quarter with the earnings announcement date before the restatement announcement. Quarter 1 refers to the first fiscal quarter with the earnings announcement date after the restatement announcement.

Based on the ex-ante frequency of recurring expense exclusions, we decompose the final sample of 264 firms (to 3,471 firm-quarter observations) into three groups (non-aggressive, mixed, and aggressive). These groups comprise 54 non-aggressive (755 firm-quarter observations), 140 mixed (1,812 firm-quarter observations) and 70 aggressive firms (904 firm-quarter observations). Panel A of Table 1 shows the sample selection process. Panel B contains the industry composition of our sample, and Panel C reports the number of restatement announcements by year. The firm distribution per quarter and by group is shown in Panel D.

Descriptive Statistics

Table 2 presents frequency thresholds of recurring expense exclusions for firms with non-aggressive (0)[67], mixed (0.2 to 0.75), and aggressive (0.8 to 1.0) pre-restatement non-GAAP reporting. The non-aggressive group comprises 54 firms and reflects firms that did not exclude any recurring expenses before the restatement. By contrast, the aggressive group comprises 70 firms and represents firms that excluded recurring expenses in 91.4 percent of all firm-quarter observations before the restatement announcement. The mixed group covers 140 firms and has an average exclusion rate of 42.6 percent. The aggressive and non-aggressive groups reflect the upper and the lower quartiles of the recurring expense exclusion frequency and are of major interest to our research questions.[68]

Table 2 Sub-Groups Based on Ex-Ante Non-GAAP Reporting

Group	Ex-ante Mean of *EXCLUDE*			# Quarter Obs.	# Firm
	Min	**Max**	**Mean**		
Non-Aggressive Group	0.000	0.00[a]	0.000	755	54
Mixed Group	0.200	0.75	0.426	1,812	140
Aggressive Group	0.800	1	0.914	904	70
Total	0.000	1	0.480	3,471	264

Variable Definitions:
Non-Aggressive Group = 1 ex-ante mean of *EXCLUDE* for the firm is < 25th percentile, 0 otherwise
Mixed Group = 1 if ex-ante mean of *EXCLUDE* for the firm is >= 25th & < 75th percentile, 0 otherwise.
Aggressive Group = 1 ex-ante mean of *EXCLUDE* for the firm is >= 75th percentile, 0 otherwise.
The mean of ex-ante non-GAAP reporting aggressiveness (ex-ante mean of *EXCLUDE*) is calculated by counting the frequency of pre-restatement quarters in which a firm excludes recurring expenses in the five quarter preceding the restatement announcement and dividing the number by the number of observations. For example, if a firm excludes recurring expenses in 5 out of 5 quarters the ex-ante mean non-GAAP reporting aggressiveness is 1 (5/5). By contrast if a firm excludes recurring expenses in 2 out of 4 quarters the ex-ante mean non-GAAP reporting aggressiveness is 0.5 (2/4). We note that not all companies have full data (at least 2 pre-restatements quarter observations per firm). Based on the ex-ante mean non-GAAP reporting aggressiveness we identify whether firms have aggressive, mixed, and non-aggressive ex-ante non-GAAP reporting. It is important that a firm is indicated with the same indicator variable throughout all quarters, as otherwise a pre- and post-period comparison would not be possible. The disclosure after the restatement is of none relevance for firm classification, as only the pre-disclosure assigns each firm to the corresponding reporting group. We condense the 2nd and 3rd quartile to the subsample labeled as "Mixed Group." We focus on the first (Non-Aggressive Group) and fourth quartile (Aggressive Group).
[a] Subsample minimum and maximum values may take the value of 1/5, 2/5,3/5, 4/5, 1/4, 2/4, 3/4, 1/3, 2/3, 3/3, 1/2 (2/4), 0 and 1 as we observe in how many quarters out of five pre-restatement quarters recurring expenses were excluded. Therefore, in some cases cut off values will seem to lack continuity (e.g. cut-off values between the non-aggressive and the mixed group, which are 0.0 and 0.2).

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[67] Since we observe non-GAAP reporting choices over five pre-restatement quarters, quartile cut-off values do not take values in between zero (firms do not exclude recurring expenses in the pre-period; 0/5) and 0.2 (firms exclude recurring expenses once in the pre-period; 1/5).
[68] We highlight that once a firm is assigned to the aggressive, mixed, or non-aggressive group, it remains in this group throughout all 17 quarters (pre-and post-period). Further, we opt against the median cut-off value to assure that our findings are not driven by firms in the mixed group. In one robustness check, however, we apply the median as the cut-off value and separate our entire sample into two groups only. The results are confirmed.

Univariate Tests

Table 3 and 4 provide the summary statistics and univariate tests for variables applied in the analyses of the ERC (H1, H2A, H2B), CAR (H3), and OVER (H4A, H4B).[69] In Table 3, we compare aggressive and non-aggressive firms in the pre- and post-restatement period. Focusing on the pre-restatement period, we document that aggressive and non-aggressive firms are not significantly different regarding many control variables (*UR, UE, NONLINEAR, MTB, SIZE, LOSS_NONGAAP, Q4, OVER, PRICE*).[70] Significant differences between aggressive and non-aggressive firms exist by construction in the frequency of recurring expense exclusions (*EXCLUDE* p-value: 0.0000) and the amount of recurring expense exclusions (*RECURRING_EXP:* p-value: 0.0000), indicating mechanically that aggressive firms exclude recurring expenses more often and to a higher degree than non-aggressive firms. Noteworthy, we find that while non-GAAP based loss is not significantly different between both groups (*LOSS_NONGAAP*: 0.212 for aggressive vs. 0.177 for non-aggressive), GAAP-based loss is more than twice as high for aggressive firms (*LOSS_GAAP*: 0.423 for aggressive vs. 0.181 for non-aggressive). Being more precise, aggressive firms turn about every second GAAP loss into a non-GAAP profit (*LOSS_NONGAAP:* 0.212 and *LOSS_GAAP:* 0.423, p-value: 0.0000), while non-aggressive firms report non-GAAP losses that are not significantly different from GAAP loss (0.181 and 0.177, p-value: 0.7397).[71] These tests support the concern that some managers might exploit non-GAAP reporting to distract investors from poor GAAP performance as proposed by Ciccone (2002). Eventually, aggressive firms have a higher beta (*BETA*: 1.353 for aggressive vs. 1.135 for non-aggressive firms), suggesting a higher risk.

Focusing on changes from the pre- to the post-period, we find that non-aggressive firms experience changes in only five variables (*SIZE, PREDICT, EXCLUDE, RECURRING_EXP, VALUES*), while aggressive firms are exposed to changes in ten variables (*UE, NONLINEAR, MTB, BETA, SIZE, LOSS_NONGAAP, EXCLUDE, OVER, PRICE, VALUE*). Without addressing each one of these changes for aggressive firms separately, we note that all changes, except *EXCLUDE, RECURRING_EXP* and *BETA*, are to the disadvantage of the aggressive firm. In particular, declines in the market to book ratio (*MTB*: 3.926 for pre-period vs. 2.734 for post-period), market capitalization (*SIZE*: 7.177 for pre-period vs. 6.930 for post-period),

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[69]   We winsorize all variables at 1% and 99%. Chen et al. (2014) do not state whether variables are winsorized. Wilson (2008) notes that *UE* are winsorized at 1% and 99%. Dehaan et al. (2013) winsorize all continuous variables at 1 percent and 99 percent.

[70]   Since, in the pre-period, the statistics are not significantly different in most base control variables, non-aggressive firms could even serve as a matched-sample (control group). In these cases, the treatment would be the restatement paired with the information about prior aggressive non-GAAP reporting, while the control group is exposed to a restatement without prior ex-ante aggressive non-GAAP reporting.

[71]   This finding derives from a within-group comparison between GAAP and non-GAAP loss and is tabulated in the appendix (Table D1).

overvaluation (*OVER*: 0.412 for pre-period vs. 0.340 for post-period), price (*PRICE*: 28.429 for pre-period vs. 20.911 for post-period), and value (*VALUE*: 13.177 for pre-period vs. 10.690 for post-period) suggest substantial downward revisions. Given that we do not find such reversals for firms with non-aggressive ex-ante non-GAAP reporting, univariate tests suggest that ex-ante non-GAAP reporting is a potential determinant for revisions of mispricing. Overvaluation (*OVER*), prices (*PRICE*), and values (*VALUE*) will be discussed in more detail in later sections, in which we test Hypotheses 4A and 4B.

In Table 4 (Panel A), we see that the average short-term market reaction (*CAR*) for the entire sample is – 6.6 percent, suggesting that our sample, as constructed, includes rather influential restatements (that are on average more attention grabbing than technical restatements). When we partition the sample into aggressive and non-aggressive firms based on ex-ante non-GAAP reporting (Panel B), we reveal that firms with aggressive ex-ante reporting experience more adverse short-term market reactions compared to firms with non-aggressive ex-ante non-GAAP reporting (*CAR*: – 10.9 percent for aggressive vs. – 3.8 percent for non-aggressive, p-value: 0.029).[72] Nevertheless, we highlight that the market reaction for non-aggressive firms is still economically significant (– 3.8 percent), which is no surprise since we investigate material restatements. Further, firms with aggressive ex-ante non-GAAP reporting restate higher amounts downwards (*IMPACT*: – 3.1 percent for aggressive vs. – 0.8 percent for non-aggressive) and are more often involved in restating revenues (*REVENUE*: 47.1 percent for aggressive vs. 24.1 percent for non-aggressive). The later observations might suggest that executives are more inclined to report non-GAAP earnings aggressively when they anticipate revenue related restatements and larger restated amounts. To account for this potential correlation, we control for both variables in the multivariate analyses.

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[72]   The mixed group has a CAR of –5.7%.

Table 3 Firm-Quarter Observations

Descriptive Statistics on Pre- and Post-Restatement Firm-Quarter Observations for the ERC-Regression

	Aggressive Group 70 firms		Non-Aggressive Group 54 firms		Mean Test	
	Mean	Std.	Mean	Std.	Dif.	p-Value
Pre-Period (5quarters)	n = 326 quarter-firm obs.		n = 226 quarter-firm obs.			
UR	-0.004	0.111	-0.001	0.074	-0.003	0.7159
UE	-0.001	0.011	0.000	0.007	-0.001	0.2708
NONLINEAR	0.000	0.001	0.000	0.000	0.000	0.1801
MTB	3.926	3.846	3.618	3.167	0.308	0.3208
BETA	1.353	0.683	1.135	0.507	0.218	0.0001†††
SIZE	7.177	1.620	7.097	1.875	0.081	0.5896
LOSS_NONGAAP	0.212	0.409	0.177	0.383	0.035	0.3153
LOSS_GAAP	0.423	0.495	0.181	0.386	0.242	0.0000†††
Q4	0.242	0.429	0.221	0.416	0.021	0.5656
PREDICT	0.026	0.117	0.009	0.033	0.017	0.0327††
PERSIST	0.195	0.424	0.130	0.366	0.065	0.0636†
EXCLUDE	0.914	0.281	0.000	0.000	0.914	0.0000†††
RECURRING_EXP	0.035	0.084	-0.003	0.011	0.037	0.0000†††
OVER	0.412	0.449	0.427	0.360	-0.0156	0.6636
PRICE	28.429	22.179	28.935	22.083	-0.505	0.7921
VALUE	13.177	10.871	15.737	13.538	-2.560	0.0143††
Post-Period (12 quarters)	n = 578 quarter-firm obs.		n = 529 quarter-firm obs.			
UR	-0.008	0.103	0.002	0.091	-0.0105	0.0732†
UE***	-0.006	0.028	-0.001	0.015	-0.0051	0.0002†††
NONLINEAR***	-0.001	0.003	0.000	0.002	-0.0005	0.0004†††
MTB***	2.734	3.049	3.252	2.972	-0.5180	0.0043†††
BETA*	1.264	0.643	1.176	0.528	0.0878	0.0137††
SIZE**/##	6.930	1.917	7.390	1.857	-0.4592	0.0001†††
LOSS_NONGAAP***	0.315	0.465	0.151	0.359	0.1637	0.0000†††
LOSS GAAP	0.457	0.499	0.174	0.379	0.2828	0.0000†††
Q4	0.232	0.422	0.221	0.415	0.0107	0.6725
PREDICT#	0.033	0.114	0.005	0.024	0.0282	0.0000†††
PERSIST	0.181	0.413	0.149	0.414	0.0318	0.2004
EXCLUDE***/###	0.495	0.500	0.185	0.389	0.3096	0.0000†††
RECURRING_EXP***/##	0.015	0.066	0.001	0.027	0.0134	0.0000†††
OVER**	0.340	0.553	0.399	0.395	-0.0590	0.0428††
PRICE***	20.911	23.087	31.849	31.071	-10.938	0.000†††
VALUE***/##	10.690	10.879	18.582	18.901	-7.893	0.000†††

†††/††/† Significantly different between aggressive and non-aggressive firms at the 0.01/0.05/0.10 level (two-sided).
***/**/* Aggressive Group: Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided)
###/##/# Non-Aggressive Group: Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided)

Table 3 reports the descriptive statistics on the variables used in the regression analyses for all restatements included in the sample, separately for the pre- and post-restatement period. The descriptive statistics are based on 3,471 firm quarters with required data from 264 restatements announced in the period 1995–2015. The pre-restatement period includes quarter –4 to quarter 0 and the post-restatement period includes quarter 1 to quarter 12. Variables above the dashed line are used in the ERC-regressions (*UR, UE, NONLINEAR, MTB, BETA, SIZE, LOSS_NONGAAP, LOSS_GAAP, Q4, PREDICT, PERSIST*); (Equation 1 – 3, H1 to H3). Variables below the dashed line are used to partition the sample *(EXCLUDE, RECURRING_EXP)* and for investigating overvaluation *(OVER, PRICE, VALUE)*

Variable Definitions:
UR = cumulative abnormal returns in the three-day window (-1;1) around the earnings announcement date, where the abnormal
return is calculated as the firm's return less the CRSP value-weighted market return;
UE = unexpected quarterly earnings at the earnings announcement date, scaled by price at the end of the fiscal quarter, with expected earnings
proxied by the median of analysts' forecasts issued within 90 days before the earnings announcement date;
NONLINEAR = *UE** Absolute(*UE*);
MTB = market-to-book ratio;
BETA = Market-model beta estimated over 250 days ending two days before the earnings announcement date;

SIZE = natural log of the market value of equity;
LOSS_NONGAAP = indicator variable equal to 1 if non-GAAP EPS are negative;
LOSS_GAAP = indicator variable equal to 1 if GAAP EPS share are negative;
Q4 = indicator variable, equal to 1 if the earnings announcement is for the fourth quarter of the fiscal year;
PREDICT = variance of the absolute values of unexpected earnings over the two-year period prior to the earnings announcement, where unexpected earnings are based on a seasonal random walk;
PERSIST = autoregressive coefficient from Foster's (1977) model estimated over the two-year period prior to the earnings announcement;
EXCLUDE = 1 if non-GAAP EPS > operating GAAP EPS;
RECURRING_EXP = (non-GAAP EPS – operating GAAP EPS) / total assets quarter-end.
OVER = Deviation of the intrinsic value (*VALUE*) from the market price (*PRICE*), calculated as: (*PRICE-VALUE*)/*PRICE* (not used for the ERC-regression)
PRICE = Share price of the firm (not used for the ERC-regression)
VALUE = Estimation of the intrinsic value (see equation (4)) (not used for the ERC-regression)

Additionally, in Table 3 we reveal that aggressive firms reduce the frequency (*EXCLUDE*: 0.914 for pre-period vs. 0.495 for post-period), and the magnitude of recurring expense exclusions after the restatement, signaling firms effort in restoring trust.[73] We note that identifying variation in non-GAAP exclusions, in particular for aggressive firms, is crucial, as otherwise, one could argue that we partition our sample based on other factors, and hence our findings could alternatively be explained by, e.g., firms' business model. In other words, given that firms with a specific business model may require more aggressive non-GAAP adjustments to offset the shortcomings of GAAP reporting, it could be possible that we partition our sample based on the business model, rather than managers' intention to mislead the market through inappropriate adjustments. Given that aggressive firms reduce the frequency substantially after the restatement (*EXCLUDE* from 0.914 to 0.495), supports the view that we rather capture conscious managerial decisions that can vary from quarter to quarter.

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[73] Farber (2005) finds that firms engaging in fraud improve their governance subsequent to the discovery of the fraud, suggesting that they intend to restore trust. Christensen et al. (2019) find that after debt covenant non-GAAP reporting improves in reporting recurring items.

Table 4 Firm Observations

Descriptive Statistics on Firm Observations for the CAR-Regression

Panel A: All Firms (264 firms)

	Mean	Median	Std.	Minimum	Maximum
CAR	-0.066	-0.030	0.159	-0.722	0.283
DURATION	2.453	2.025	2.141	0.247	12.422
IMPACT	-0.020	-0.005	0.054	-0.331	0.112
IMPACT_SIZE	-0.124	-0.033	0.310	-1.917	0.430
IMPACT_LEVERAGE	-0.008	-0.002	0.019	-0.112	0.040
RET_120	-0.086	-0.097	0.366	-0.860	1.726
PROMPTER_COMPANY	0.636	1.000	0.482	0.000	1.000
PROMPTER_SEC	0.186	0.000	0.390	0.000	1.000
PROMPTER_AUDITOR	0.076	0.000	0.265	0.000	1.000
PROMPTER_OTHER	0.144	0.000	0.352	0.000	1.000
REVENUE	0.356	0.000	0.480	0.000	1.000
PERVASIVENESS	2.083	2.000	1.603	1.000	10.000
PRESS_RELEASE	0.242	0.000	0.429	0.000	1.000
POST_SOX	0.686	1.000	0.465	0.000	1.000

Table 4, Panel A reports descriptive statistics on the variables used in the cumulative abnormal returns (CAR) regression for returns around the restatement announcement day. Variables are defined below Panel B.

Panel B: Aggressive (70 Firms) vs. Non-Aggressive Group (54 Firms)

	Aggressive Group 70 firms		Non-Aggressive Group		Mean Test	
	Mean	Std.	Mean	Std.	Dif.	p-Value
CAR	-0.109	0.208	-0.038	0.122	-0.070	0.029[††]
DURATION	2.406	1.862	2.531	2.355	-0.125	0.742
IMPACT	-0.031	0.068	-0.008	0.031	-0.024	0.019[††]
IMPACT_SIZE	-0.194	0.394	-0.055	0.171	-0.139	0.017[††]
IMPACT_LEVERAGE	-0.012	0.023	-0.003	0.009	-0.009	0.007[†††]
RET_120	-0.085	0.555	0.000	0.267	-0.085	0.302
PROMPTER_COMPANY	0.643	0.483	0.611	0.492	0.032	0.719
PROMPTER_SEC	0.171	0.380	0.204	0.407	-0.032	0.650
PROMPTER_AUDITOR	0.086	0.282	0.111	0.317	-0.025	0.639
PROMPTER_OTHER	0.114	0.320	0.130	0.339	-0.015	0.797
REVENUE	0.471	0.503	0.241	0.432	0.231	0.008[†††]
PERVASIVENESS	2.114	1.450	1.907	1.404	0.207	0.426
PRESS_RELEASE	0.329	0.473	0.222	0.420	0.106	0.195
POST_SOX	0.543	0.502	0.741	0.442	-0.198	0.024[††]

†††/††/† Significantly different between aggressive and non-aggressive firms at the 0.01/0.05/0.10 level (two-sided).

Table 4, Panel A reports descriptive statistics on the variables used in the cumulative abnormal returns (CAR) regression for returns around the restatement announcement day. In Panel B, the aggressive group, indicates firms with aggressive ex-ante non-GAAP reporting, and the non-aggressive group indicates firms with non-aggressive ex-ante non-GAAP reporting.
Variables are defined as follows:
Variable Definitions:
CAR = Cumulative abnormal returns in the three-day window [-3;3] around the restatement announcement date
Prompter:
PROMPTER_COMPANY = The restatement was prompted by the company;
PROMPTER_AUDITOR = The restatement was prompted by the auditor;
PROMPTER_SEC = The restatement was prompted by the SEC;
PROMPTER_OTHER = The restatement was prompted by another party than the SEC, company or auditor or was not known;

Accounts:
REVENUE = The restatement affected revenue;
Further Controls:
IMPACT = Total restated income (loss) less originally reported income (loss) accumulated over the restatement period scaled by the book value of total assets reported at quarter end prior to restatement announcement;
PERVASIVENESS = The number of accounts affected.
DURATION = Number of days between the beginning and end of misreporting scaled by 360.
IMPACT_SIZE = Natural log of book value of total assets reported at year end prior to the restatement announcement, times *Change in net income/assets*;
IMPACT_LEVERAGE = Book value of long-term debt divided by book value of total assets, reported at year end prior to the restatement announcement, times Change in net income/assets;
RET_120 = Buy and hold returns over 120 days prior to the restatement announcement;
Non-GAAP Disclosure:
NON_AGGRESSIVE_GROUP= Firms with non-GAAP reporting that belong to the first quartile of ex-ante mean *EXCLUDE (54 firms, base group)*;
MIXED_GROUP = Firms with non-GAAP reporting that belong to the second and third quartile of ex-ante mean *EXCLUDE (75+65 firms)*;
AGGRESSIVE_GROUP = Firms with non-GAAP reporting that belong to the fourth quartile of ex-ante mean *EXCLUDE (70 firms)*;
Additional Controls (not applied by Palmrose et al. (2004)):
PRESS_RELEASE = The restatement was published through a press release;
POST_SOX = The restatement was published after the SOX-Act became effective.
All variables are described in Table 19 in detail.

Taken together, while the managerial intention behind recurring expense exclusions is unobservable, our univariate tests of GAAP and non-GAAP based losses and the variability of non-GAAP reporting adjustments support our view that executives may deliberately distract investors from low GAAP performance by excluding inappropriate expenses.

Multivariate Tests

Turning to multivariate tests, we investigate whether increased investor attention has an impact on how investors respond to the exclusion of dubious adjustments (H1). Subsequently, we will partition our restatement sample into a non-aggressive, mixed and aggressive group based on firms' pre-restatement non-GAAP reporting choices and test whether market revisions in the perceived financial reporting quality (H2: ERC-design), market value (H3: CAR-design) and overvaluation (H4: Valuation-model) vary across groups (aggressive group, mixed group, non-aggressive group). We will focus on the difference between firms with ex-ante aggressive and ex-ante non-aggressive non-GAAP reporting.[74]Addressing the ERC-design (H1 and H2), we exclude the observations with studentized residuals greater than 2.5 in absolute value, as performed by Chen et al. (2014).[75] Further, for ease of interpretation, we follow Chen et al. (2014) and standardize each control variable (e.g., *MTB, BETA, etc.*) by subtracting its sample mean and then scale the difference by its standard deviation (e.g., the coefficient on *UE* can be interpreted as the ERC for a firm with average firm characteristics).[76] We do not standardize the indicator variables (e.g., *Q4*, *LOSS, etc.*). The reported p-values are based on standard errors adjusted for firm-level clustering as performed by Chen et al. (2014).

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[74] To investigate whether non-GAAP reporting has improved following debt covenant violations, Christensen et al. (2019) regress future GAAP earnings on current non-GAAP exclusions. They document that the negative association between current expense exclusions and future GAAP disappears after the debt covenant violations, suggesting "an improvement in non-GAAP exclusion quality" that is likely attributable to higher creditor scrutiny. Following Christensen et al. (2019), we regress the sum of four succeeding GAAP earnings on current non-GAAP EPS and brake down exclusions into recurring items, special items, and below-the line items. Our results align closely with findings by Christensen et al. (2019), however, in a restatement setting, suggesting that non-GAAP reporting improve due to higher investor attention (scrutiny) after material restatements. Findings and corresponding tables are provided in our appendix (attached to this document). We opt against including these corresponding tables in the main part of the paper, as we focus on receivers` perception and valuation of non-GAAP reporting (e.g., "Are investors misled by non-GAAP reporting?") and not the sender (e.g., "Are managerial non-GAAP reporting choices of high quality?").

[75] This procedure will mitigate the impact of outliers. Hence, for the ERC-regressions firm-quarter observations will not add up the initial sample size of 3,471 observations. Our findings remain qualitatively similar if we do not exclude observations with studentized residuals greater than 2.5 in absolute value.

[76] We standardize each control variable for the ERC-regressions following Chen et al. (2014). For the CAR-regression we do not standardize control variables following Palmrose et al. (2004) and Gordon et al. (2013). We follow prior literature closely in terms of regression models because we want to offer the reader the possibility to reconcile our findings to existing research and increase comparability (Palmrose et al. 2004; Gordon et al. 2013).

H1: Responsiveness to Aggressive Reporting Choices

To put our results into perspective with Doyle et al. (2003), who find a lower ERC when recurring expenses are excluded, we introduce the indicator variable *EXCLUDE*, which equals 1 if recurring expenses are excluded from quarterly released earnings. The results for the pre- and post-period are shown in Table 5. Focusing on the pre-period first, we document an ERC premium when inappropriate expenses are excluded (*UE X EXCLUDE*: 4.358, p-value: 0.00), indicating that investors reward the exclusion of recurring expenses. While this finding does not reconcile to prior findings by Doyle et al. (2013), it aligns with the propositions by Hirshleifer and Teoh (2003), who state that opportunistic managers are more inclined to exclude inappropriate expenses when the information content of earnings is high.

Turning to the post-period, we find that investors are less responsive to earnings news when recurring expenses are excluded (column 2) (*UE X EXCLUDE*: – 0.441, p-value: 0.01). This finding aligns with Doyle et al. (2013) and suggests that investors punish the exclusion of recurring expenses after the restatement announcement. Our findings are consistent with inattentive investors in the pre-period being misled, and attentive investors in the post-period seeing through the quality of exclusions. Interestingly, the adjusted R^2 decreases from 0.18 to 0.09 after the restatement, suggesting that investors perhaps use alternative sources of information after the restatement. Our results provide strong empirical evidence that once attention increases, investors are able to disentangle aggressive from non-aggressive non-GAAP reporting choices.[77] Taken together, our findings suggests that attention and scrutiny are key determinants in investors' ability to assess the quality of non-GAAP exclusions adequately.

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[77] Consistent with the assumption that financial information is perceived as less value relevant after the restatement, we document a decrease in the R^2 (pre-period 0.18, post-period: 0.09).

Table 5 ERC-Discount by Period for Aggressive Reporting Choices

Variable	Pre-Period (1)		Post-Period (2)	
	Coeff.	p-value	Coeff.	p-value
UE	2.811	0.00***	3.836	0.00***
UE X EXCLUDE	**4.358**	**0.00*** **	**-0.441**	**0.01** **
EXCLUDE	-0.008	0.06*	-0.014	0.00***
NONLINEAR	-33.081	0.00***	-8.067	0.00***
MTB	0.005	0.09*	0.002	0.28
BETA	-0.002	0.40	-0.001	0.52
SIZE	0.000	0.89	0.003	0.10*
LOSS	0.010	0.11	-0.007	0.13
Q4	-0.002	0.69	0.001	0.74
PREDICT	0.002	0.35	-0.003	0.24
PERSIST	-0.008	0.00***	0.000	0.90
UE X MTB	-1.860	0.00***	-0.254	0.01***
UE X BETA	1.525	0.00***	0.016	0.83
UE X SIZE	0.156	0.74	0.061	0.68
UE X LOSS	-0.753	0.41	-2.684	0.00***
UE X Q4	0.863	0.17	-0.373	0.19
UE X PREDICT	-0.586	0.02**	-0.019	0.66
UE X PERSIST	0.407	0.27	-0.094	0.11
CONSTANT	0.017	0.14	-0.014	0.24
Quarter-fixed effects	Yes		Yes	
Industry-fixed effects	Yes		Yes	
Adj. R^2	0.18		0.09	
N	1,117		2,228	
Firms	264		264	

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the change in the ERC when recurring expenses are excluded in the pre- (1) and the post-restatement period (2). The coefficient on *UE* is the ERC (investors' responsiveness) when the earnings are not exposed to recurring expense exclusions. The coefficient on *UE X EXCLUDE* captures the change in the ERC when recurring expenses are excluded from quarterly earnings. The remaining control variables are described in Table 19. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

H2A: Revision of the Perceived Financial Reporting Quality (Magnitude)

To identify changes in investors' perceived financial reporting quality, we apply Model 2 for the magnitude (*UE X POST*) and Model 3 for the duration (*UE X QTR$_i$)* of the ERC-change. Table 6 documents the magnitude of the ERC-change on the coefficient on *UE X POST*. In Table 6 (column 1), we see that firms with non-aggressive ex-ante non-GAAP reporting do not experience any significant decline in the ERC (0.063/3.568: p-value: 0.90), while aggressive firms (column 3) undergo an ERC-decline of 43.93 percent (– 2.586/5.886, p-value: 0.00). The ERC analysis suggests that investors revise the perceived financial reporting quality downwards mostly for aggressive firms. Turning to the pre-ERC (*UE*), we document a higher ERC for aggressive firms relative to non-aggressive (5.886 vs. 3.568). In light of the research by Doyle et al. (2013), who find an ERC-discount when recurring expenses are excluded for a very large sample not conditioning on restatements[78], our finding indicates the opposite in a restatement setting, when information asymmetry is severe. Here, investors reward aggressive firms with a higher ERC. This interpretation relies on the assumption that investors respond to managerial reporting choices. However, we cannot rule out the scenario in which executives track investor's responsiveness (i.e., investors' perception of financial reporting quality) and are more inclined to exclude recurring expenses when investors are highly responsive, yet pay limited attention to non-GAAP adjustments. The latter causal direction is analytically supported by Hirshleifer and Teoh (2003) and may explain the higher ERC for aggressive firms given that investors are inattentive, i.e., meaning that investors do not adjust their responsiveness downwards when recurring expenses are excluded. This finding reconciles to findings from Model 1, which shows that investors are more responsive to aggressively reported earnings in the pre-restatement period.

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[78] We note that the findings by Doyle et al. (2013) derive from a non-restatement sample and identify the exclusion of recurring expenses quarter by quarter and not in a multi-period setting. Additionally, the control variables are different from the well-established ERC-setting by Wilson (2008).

Table 6 ERC-Regression: Magnitude (Dependent Variable: *UR*)

Variable	Non-Aggressive Group (1) Coeff.	Non-Aggressive Group (1) p-value	Mixed Group (2) Coeff.	Mixed Group (2) p-value	Aggressive Group (3) Coeff.	Aggressive Group (3) p-value	(1) – (3) p-value
UE	3.568	0.00***	4.637	0.00***	5.886	0.00***	0.0208##
UE X POST	0.063	0.90	**-0.663**	**0.09***	**-2.586**	**0.00***	0.0014###
NONLINEAR	2.667	0.68	-17.125	0.00***	-16.418	0.00***	
MTB	0.002	0.52	0.002	0.26	0.006	0.03**	
BETA	-0.000	0.96	0.000	0.88	-0.009	0.01***	
SIZE	0.000	0.97	0.002	0.29	0.006	0.21	
LOSS	-0.001	0.92	0.003	0.55	-0.005	0.55	
Q4	0.006	0.30	-0.003	0.53	-0.006	0.39	
PREDICT	0.005	0.42	-0.002	0.58	-0.004	0.18	
PERSIST	-0.001	0.75	-0.001	0.53	-0.007	0.03**	
UE X MTB	0.025	0.70	-0.540	0.00***	-0.240	0.02**	
UE X BETA	0.135	0.69	0.153	0.19	0.289	0.14	
UE X SIZE	0.543	0.09*	-0.177	0.36	-0.407	0.17	
UE X LOSS	-3.150	0.00***	-2.242	0.00***	-1.928	0.00***	
UE X Q4	0.575	0.16	-1.349	0.00***	0.330	0.50	
UE X PREDICT	0.005	0.98	0.005	0.95	-0.190	0.02**	
UE X PERSIST	0.042	0.78	0.012	0.90	-0.158	0.23	
POST	0.004	0.45	0.002	0.63	-0.017	0.02**	
CONSTANT	-0.002	0.72	0.000	0.92	0.016	0.02**	
Industry-fixed effects	Yes		Yes		Yes		
Adj. R^2	0.05		0.10		0.12		
N	731		1,751		879		
Firms	54		140		70		
Mean *EXCLUDE*	0		0.426		0.914		

* p<0.1; ** p<0.05; *** p<0.01; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.
# p<0.1; ## p<0.05; ### p<0.01; for *UE X POST*, we use seemingly unrelated estimation to test coefficients between non-aggressive (1) and aggressive firms (3).
This table reports the ERC change magnitude from the pre- to the post-restatement period through the coefficient on *UE X POST* for firms with non-aggressive (1), mixed (2), and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in Table 19. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

H2B: Revision of the Perceived Financial Reporting Quality (Duration)

In Model 3 (Table 7), we investigate the duration of the ERC-decline, which is captured in the 12 coefficients of *UE X QTR*. We note that we use the same model as applied by Chen et al. (2014), who find a long-lived ERC-decline after material restatements without conditioning the market reaction on ex-ante non-GAAP reporting. In Table 7 (column 3), we show that firms with aggressive pre-restatement non-GAAP reporting experience a long-lasting drop in the ERC, with 11 out of 12 quarters having statistically significant lower ERCs compared to the pre-restatement ERC. By contrast, firms with non-aggressive ex-ante non-GAAP reporting do not experience any decline in the informativeness of earnings (Table 7, column 1). The long-lived ERC-decline is exclusive to firms with aggressive ex-ante non-GAAP reporting and suggests that investors' revision of their responsiveness to earnings news is persistent.[79] Given that the pre-restatement ERC for aggressive firms is approximately twice as high compared to non-aggressive firms (Table 7: *UE* is 3.017 for non-aggressive and 6.697 for aggressive firms), the reason for the decline seems to be rooted in the pre-period. This observation is consistent with the idea that aggressive non-GAAP reporting misleads investors in the pre-period (see Fig. 2 for the compound ERC across all 12 post-quarters).

In light of the non-GAAP reporting literature, the ERC-decline for firms with aggressive ex-ante non-GAAP reporting is surprising as it supports the view that ex-ante investors are misled by inappropriate non-GAAP adjustments. Considering the same results in the context of the restatement literature, finding the opposite (no ERC-decline for non-aggressive firms) is surprising, as it suggests that the market "forebears" firms when they have not excluded recurring expenses ex-ante and punishes material restatement firms otherwise. So far, Chen et al. (2014) find that material restatements cause a long-lived decline without addressing ex-ante non-GAAP reporting. Turning to the interpretation of our findings, if both groups had a similar pre-ERC, we would have interpreted the ERC-change for non-aggressive firms as forbearance and the ERC-change for aggressive firms as punishment. However, since the pre-ERC is substantially higher for aggressive firms and ex-post the ERC-decreases to a level that is similar to non-aggressive firms, we propose that the ERC-decline reflects a revision, which is rooted in ex-ante mispricing. Figure 2 illustrates the compound ERC for our entire observation period.

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[79] We note that the prior literature that applies the same ERC regression using restatement firms finds similar levels of the ERC in the pre-restatement period (Chakravarthy et al. 2014; Chen et al. 2014).

Table 7 ERC-Regression: Duration (Dependent Variable: *UR*)

Variable	Non-Aggressive Group (1) Coeff.	Non-Aggressive Group (1) p-value	Mixed Group (2) Coeff.	Mixed Group (2) p-value	Aggressive Group (3) Coeff.	Aggressive Group (3) p-value	(1) – (3) p-value
UE	3.017	0.00***	5.068	0.00***	6.697	0.00***	0.0037###
UE X QTR₁	0.567	0.53	**-1.672**	**0.01***	**-3.661**	**0.00***	0.0004###
UE X QTR₂	0.020	0.98	-0.541	0.31	**-1.862**	**0.00***	0.0553###
UE X QTR₃	-0.543	0.37	-0.577	0.30	**-1.561**	**0.01**	0.2252
UE X QTR₄	0.361	0.83	-0.590	0.32	-1.317	0.15	0.3641
UE X QTR₅	0.388	0.67	-0.784	0.13	**-2.089**	**0.01***	0.0269##
UE X QTR₆	-1.366	0.37	**-1.740**	**0.00***	**-3.735**	**0.01***	0.2244
UE X QTR₇	**2.125**	**0.02**	-0.020	0.97	**-2.988**	**0.00***	0.0001###
UE X QTR₈	-0.148	0.85	**-1.358**	**0.01**	**-1.398**	**0.08***	0.2383
UE X QTR₉	2.081	0.15	-0.413	0.40	**-3.223**	**0.00***	0.0018###
UE X QTR₁₀	0.549	0.86	**-1.300**	**0.02**	**-4.043**	**0.00***	0.1241
UE X QTR₁₁	1.271	0.21	0.524	0.51	**-3.572**	**0.00***	0.0002###
UE X QTR₁₂	0.520	0.78	**-1.792**	**0.00***	**-3.079**	**0.01**	0.0885#
NONLINEAR	-2.310	0.69	-19.443	0.00***	-24.369	0.00***	
MTB	0.001	0.61	0.002	0.31	0.007	0.02**	
BETA	0.002	0.57	0.000	0.84	-0.009	0.00***	
SIZE	-0.000	0.93	0.001	0.55	0.005	0.23	
LOSS	-0.005	0.48	0.001	0.91	-0.005	0.53	
Q4	0.006	0.29	-0.001	0.73	-0.004	0.53	
PREDICT	0.008	0.16	-0.002	0.52	-0.004	0.21	
PERSIST	-0.001	0.69	-0.001	0.52	-0.006	0.06*	
UE X MTB	0.021	0.85	-0.324	0.07*	-0.303	0.00***	
UE X BETA	-0.158	0.70	0.092	0.47	0.608	0.00***	
UE X SIZE	0.157	0.70	-0.175	0.42	0.056	0.87	
UE X LOSS	-2.547	0.01**	-2.269	0.00***	-1.559	0.04**	
UE X Q4	-0.020	0.96	-1.425	0.00***	-0.160	0.79	
UE X PREDICT	-0.277	0.32	0.031	0.60	-0.239	0.01**	
UE X PERSIST	0.131	0.49	0.007	0.96	-0.051	0.73	
CONSTANT	-0.003	0.65	-0.001	0.84	0.015	0.02**	
Quarter-fixed	Yes		Yes		Yes		
Industry-fixed	Yes		Yes		Yes		
Adj. R²	0.08		0.11		0.15		
N	728		1,748		875		
Firms	54		140		70		
Mean *EXCLUDE*	0		0.426		0.914		

* p<0.1; ** p<0.05; *** p<0.01; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.
\# *p*<0.1; \#\# *p*<0.05; \#\#\# *p*<0.01; for each quarter, we use seemingly unrelated estimation (SUEST) to test coefficients between non-aggressive (1) and aggressive firms (3).
This table reports the ERC change duration through the coefficient on *UE X QTR* for firms with non-aggressive (1), mixed (2) and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in Table 19. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

In sum, the ERC-based results indicate that revisions of the ERC are more pronounced and longer lived for firms with aggressive pre-restatement non-GAAP reporting, suggesting that attention is a determinant factor in investors' ability to see through the quality of non-GAAP exclusions (H1) and that investors were misled by firms with aggressive non-GAAP reporting before the restatement announcement (H2A, H2B).

Contributing to prior literature, we extent findings by Chen et al. (2014), who find a long-lasting decline in the ERC. Importantly, we find no ERC-decline when firms reported non-GAAP earnings non-aggressively before the restatement. Moreover, we refine findings by Doyle et al. (2013), who show that investors are, on average less responsive to aggressively reported non-GAAP earnings. We support these findings for the post-restatement period but find the opposite in the pre-period. Being precise, investors reward aggressive non-GAAP reporting choices before the announcement of the restatement, indicating that heightened investor attention is required to see through the quality of non-GAAP earnings.

Figure 2 ERC Development

ERC development across 5 pre and 12 post-restatement quarters
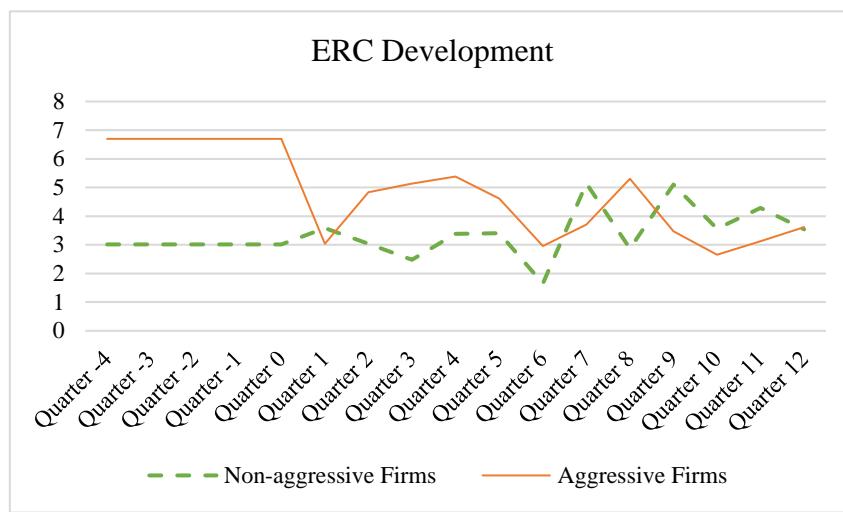
This figure illustrates the ERC based on aggregation of the pre-ERC (*UE*) and post-quarter changes (*UE X QTR*) for aggressive and non-aggressive firms. Values derive from Table 7. Quarter 0 is the last quarter before the restatement announcement. The red solid line reflects the aggressive firms. The dashed line shows non-aggressive firms.

H3: The Market Reaction to Material Restatement Announcements

Table 8 shows four regressions that refer to the determinants of short-term market reactions around the restatement announcement date. First, we do not control for ex-ante non-GAAP reporting and observe findings similar to Palmrose et al. (2004) and Gordon et al. (2013) (Table 8, column 1). Being precise, market reactions are more negative when restatements are initiated by the auditor (*PROMPTER_AUDITOR*: – 0.072, p-value: 0.09) or the company (*PROMPTER_COMPANY*: – 0.046, p-value: 0.03). Further, in line with prior literature (Agrawal and Chadha 2005), market reactions are more adverse when restatements are revenue-related (*REVENUE*: – 0.065, p-value: 0.01). Throughout columns 2 to 4, we add indicator variables that reflect firms' ex-ante non-GAAP reporting aggressiveness (*MIXED_GROUP* and *AGGRESSIVE_GROUP*). Firms with non-aggressive ex-ante non-GAAP reporting are included in the base group. In column 2, we see that firms with aggressive ex-ante non-GAAP reporting experience CARs that are by 5.5 percent more negative compared to non-aggressive firms (*AGGRESSIVE_GROUP:* – 0.055, p-value: 0.07). In column 3 and 4, we add further controls for the disclosure type (*PRESS_RELEASE*) and the post-SOX effect (*POST_SOX*). Consistent with prior literature (Files et al. 2009) CARs are more negative for restatements disclosed in a press release (column 3, *PRESS_RELEASE*: – 0.045, p-value: 0.07) and less negative when announced after the SOX-Act became effective (column 4, *POST_SOX*: 0.051, p-value: 0.03). Most importantly, in column 3 and column 4 we observe that firms that ex-ante reported non-GAAP earnings aggressively remain to have more negative CARs compared to the non-aggressive firms (*AGGRESSIVE_GROUP* in column 3: – 0.05, p-value: 0.09 and in column 4: – 0.046, p-value: 0.11).

Overall, our findings support prior literature (Palmrose et al. 2004; Gordon et al. 2013; Agrawal and Chadha 2005), which shows that market reactions are more negative when the restatement is i) initiated by the auditor, ii) initiated by the company, iii) revenue related, iv) disclosed through press releases and v) released before the SOX-Act. However, most importantly, we contribute to the restatement and non-GAAP reporting literature by showing that aggressive ex-ante non-GAAP reporting has an adverse effect on subsequent market reactions. Restatement firms with ex-ante aggressive non-GAAP reporting experience market reactions that are approximately 5 percent more negative compared to firms with non-aggressive ex-ante non-GAAP reporting.

Table 8 CAR-Regression: Market Reaction (Dependent Variable: *CAR*)

Variable	Palmrose et al. (2004) (1) Coeff.	p-value	Extended Palmrose et al. (2004) I (2) Coeff.	p-value	Extended Palmrose et al. (2004) II (3) Coeff.	p-value	Extended Palmrose et al. (2004) III (4) Coeff.	p-value
PROMPTER_COMPANY	-0.046	0.03**	-0.048	0.02**	-0.039	0.07*	-0.043	0.05**
PROMPTER_OTHER	-0.026	0.43	-0.030	0.36	-0.016	0.63	-0.020	0.55
PROMPTER_AUDITOR	-0.072	0.09*	-0.074	0.08*	-0.066	0.11	-0.067	0.10*
REVENUE	-0.065	0.01**	-0.062	0.02**	-0.054	0.03**	-0.048	0.06*
IMPACT	0.300	0.65	0.436	0.53	0.336	0.63	0.640	0.38
PERVASIVENESS	0.006	0.31	0.006	0.31	0.006	0.26	0.005	0.40
DURATION	0.004	0.29	0.003	0.35	0.004	0.24	0.002	0.65
IMPACT_SIZE	-0.118	0.34	-0.140	0.27	-0.127	0.32	-0.168	0.21
IMPACT_LEVERAGE	2.311	0.06*	2.138	0.08*	2.211	0.06*	1.979	0.09*
RET_120	-0.019	0.58	-0.020	0.57	-0.023	0.51	-0.029	0.41
MIXED_GROUP			-0.010	0.62	-0.012	0.55	-0.014	0.49
AGGRESSIVE_GROUP			**-0.055**	**0.07***	**-0.050**	**0.09***	-0.046	0.11
PRESS_RELEASE					-0.045	0.07*	-0.037	0.12
POST_SOX							0.051	0.03**
CONSTANT	-0.023	0.53	-0.001	0.98	-0.006	0.88	-0.028	0.50
Industry-fixed effects	Yes		Yes		Yes		Yes	
Adj. R^2	0.08		0.09		0.10		0.11	
N	264		264		264		264	
Firms	264		264		264		264	

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the potential determinants for the cumulative abnormal returns around the restatement announcement day without (1) and with pre-restatement ex-ante non-GAAP reporting aggressiveness. *AGGRESSIVE_GROUP* indicates firms with aggressive ex-ante non-GAAP reporting.

Variable Definitions:

CAR = Cumulative abnormal returns in the three-day window [-3;3] around the restatement announcement date

Prompter:

PROMPTER_COMPANY = The restatement was prompted by the company;

PROMPTER_AUDITOR = The restatement was prompted by the auditor;

PROMPTER_OTHER = The restatement was prompted by another party than the SEC, company or auditor or was not known;

PROMPTER_SEC = The restatement was prompted by the SEC (base group);

Accounts:

REVENUE = The restatement affected revenue;

Further controls:

IMPACT = Total restated income (loss) less originally reported income (loss) accumulated over the restatement period scaled by the book value of total assets reported at quarter end prior to restatement announcement;

PERVASIVENESS = The number of accounts affected.

DURATION = Number of days between the beginning and end of misreporting scaled by 360.

IMPACT_SIZE = Natural log of the book value of total assets reported at year end prior to the restatement announcement, times *Change in net income/assets*;

IMPACT_LEVERAGE = Book value of long-term debt divided by book value of total assets, reported at year end prior to the restatement announcement, times Change in net income/assets;

RET_120 = Buy and hold returns over 120 days prior to the restatement announcement;

Non-GAAP disclosure:

NON_AGGRESSIVE_GROUP= Firms with non-GAAP reporting that belong to the first quartile of ex-ante mean of *EXCLUDE (54 firms, base group)*;

MIXED_GROUP = Firms with non-GAAP reporting that belong to the second and third quartile of ex-ante mean of *EXCLUDE (75+65 firms)*;

AGGRESSIVE_GROUP = Firms with non-GAAP reporting that belong to the fourth quartile of ex-ante mean of *EXCLUDE (70 firms)*;

Additional controls (not applied by Palmrose et al. (2004)):

PRESS_RELEASE = The restatement was published through a press release;

POST_SOX = The restatement was published after the SOX-Act became effective.

All variables are described in Table 19 in detail.

H4A: The Ex-Ante Overvaluation

Table 9 refers to the comparison of the valuation errors (*OVER*), prices (*PRICE*) and values (*VALUE*) between the aggressive and non-aggressive firms in the pre- and post-period. Table 9, Panel A, shows the valuation errors (*OVER*) based on the intrinsic value estimation in equation (5). For all periods and groups, we document the well-known overvaluation by the market (the price is higher than the estimated intrinsic value). This finding is consistent with valuation studies, which apply the residual income model (Francis et al. 2000; Heinrichs et al. 2013) and find an overvaluation mean of 34.62 percent (Heinrichs et al. 2013). The question remains: which group of firms is more overvalued?

Since we are interested in whether ex-ante overvaluation is higher for firms with aggressive non-GAAP reporting, finding a higher overvaluation for aggressive firms would be a strong signal, suggesting that aggressive non-GAAP reporting causes investors to misprice (overvalue) shares. In light of our ERC- and CAR-related findings, one could assume that overvaluation will be higher for aggressive firms. However, we do not find a significant difference in overvaluation between aggressive and non-aggressive firms in the pre-restatement period (Panel A, aggressive: 41.17 percent vs. non-aggressive 42.47 percent, p-value: 0.6636). While this finding, at first sight, indicates that aggressive non-GAAP reporting does not mislead investors, this interpretation is only valid when we can assume that the intrinsic value (*VALUE*) is unbiased. We note that the valuation error is calculated as follows: (*PRICE-VALUE*)/*PRICE*. Since the intrinsic value heavily relies on analyst forecasts, we can only calculate the unbiased intrinsic value, when analysts provide unbiased forecasts.[80] Prior literature, however, yields ambiguous findings on whether analysts provide unbiased forecasts (Cotter and Young 2007; Ronen and Yaari 2008). Being precise, our finding (no higher overvaluation for aggressive firms) can derive from two very different scenarios, with vital implications for their interpretation. In the first scenario, prices and values are not biased upwards (meaning that neither investors nor analysts are misled), signaling that aggressive non-GAAP reporting does not mislead investors. In the second scenario, prices and values would be biased upwards for aggressive firms, yielding the same valuation error as if they were not biased such as for non-aggressive firms (e.g., biased prices and values of 60 and 30 will yield the same estimation errors as unbiased prices and values of 30 and 15; both yield an overvaluation error of 50 percent, making it difficult to compare aggressive to non-aggressive

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[80]   Analysts usually provide non-GAAP based forecasts.

firms). While both scenarios yield the same overvaluation error, conclusions differ significantly (scenario 1: investors and analysts are NOT misled by the non-GAAP reporting, scenario 2: investors and analysts are misled by the non-GAAP reporting). Potentially, scenario 1 reflects non-aggressive firms and scenario 2 reflects aggressive firms, with valuation errors not being significantly different, but with different implications about whether investors are misled.

Figure 3 Price and Value Revision

Price and values development across 5 pre and 12 post-restatement quarters

PRICE (investors' pricing)	*VALUE* (analysts' perceptions)
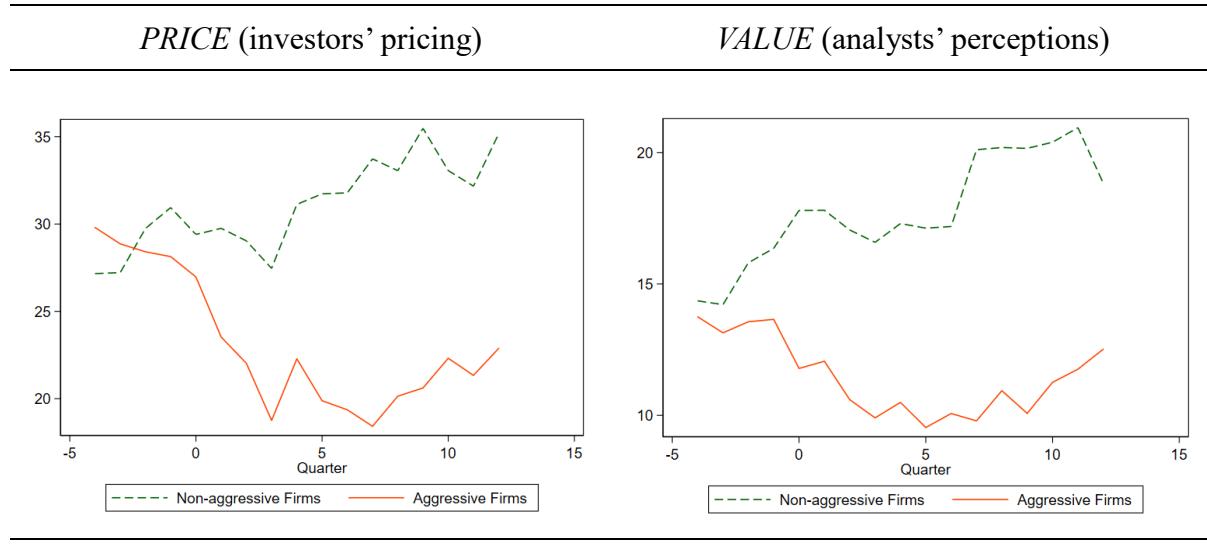
This figure illustrates the change in *PRICE* (left hand side) and *VALUE* (right hand side). *VALUE* is estimated using the residual income valuation model (RIM). Quarter 0 is the last quarter before the restatement announcement. The change for aggressive firms is illustrated through the solid line. The change for non-aggressive firms is reflected by the dotted line.

To resolve this interpretational issue, we decompose the valuation error into prices (*PRICE*) and values (*VALUE*). In Table 9, Panel B (*PRICE*) and Panel C (*VALUE*), we see that prices and values are revised downwards after the restatement announcement only for aggressive firms, suggesting that prices and values were biased upwards ex-ante for aggressive firms. Hence, we provide evidence that both investors and analysts were misled before the restatement announcement by aggressively reported non-GAAP earnings. Consequently, because ex-ante prices and values were upwardly biased for aggressive firms, the expected overvaluation arising from biased prices was offset by upwardly biased values in the pre-restatement period. For further insights, we also plot the price and value development for aggressive and non-aggressive firms across 5 pre- and 12 post-restatement quarters in Figure 3, and provide visual evidence that prices and values are revised downward for aggressive ex-ante non-GAAP reporting firms.

H4B: Change of the Overvaluation

Turning to the question of whether aggressive firms are exposed to larger changes in overvaluation compared to non-aggressive firms, we see that the overvaluation decreases for aggressive firms (from 41.17 percent to 33.98 percent) but not for non-aggressive firms (from 42.74 percent to 39.88 percent). As discussed and highlighted earlier, we document a decline in prices and values. If both investors and analysts revised their beliefs by the same magnitude, decreases in prices and values would be identical for aggressive firms, and we would not be able to see a change in overvaluation. However, since we see a decrease in overvaluation, prices were exposed to higher downward corrections. Consequently, we may conclude that investors were misled to a higher degree ex-ante compared to analysts, given more pronounced revisions of prices. This finding aligns well with the view that analysts are perceived as more sophisticated market participants (Roulstone 2003), which ex-ante were misled to a smaller degree compared to investors on average. The latter finding also provides evidence that sophistication may mitigate the mispricing of non-GAAP earnings (Frederickson and Miller 2004; Elliott 2006). Nevertheless, we also provide evidence that sophistication alone cannot avoid misperception of non-GAAP reporting choices. Hence, attention is crucial for investors and analysts.

Table 9 Overvaluation

Overvaluation: Statistics on Firms with Non-Aggressive Ex-Ante Non-GAAP

PANEL A: Overvaluation Error

OVER	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (70 firms, n = 904)	n = 326	n = 578		
Mean	**0.4117**	**0.3398**	0.0720	**0.0450****
Median	0.4914	0.4717	0.0197	0.2021
Std. Dev.	0.4493	0.5526		
Non-Aggressive Group (54 firms, n = 755)	n = 226	n = 529		
Mean	0.4274	0.3988	0.0286	0.3496
Median	0.4850	0.4504	0.0347	0.2391
Std. Dev.	0.3599	0.3946		
Dif. mean	-0.0156	-0.0590		
p-value	0.6636	0.0428**		

PANEL B: Price

PRICE	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (70 firms, n = 904)	n = 326	n = 578		
Mean	**27.7100**	**21.5603**	6.1497	**0.0004***
Median	22.7796	13.8067	8.9729	0.0000***
Std. Dev.	22.4961	26.1997		
Non-Aggressive Group (54 firms, n = 755)	n = 226	n = 529		
Mean	28.9599	32.8300	-3.8701	0.1127
Median	24.6567	21.6250	3.0317	0.6298
Std. Dev.	22.0853	33.6615		
Dif. mean	-1.2499	-11.2697		
p-value	0.5181	0.0000***		

PANEL C: Value

VALUE	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (70 firms, n = 904)	n = 326	n = 578		
Mean	**13.3262**	**10.7898**	2.5364	**0.0008***
Median	11.0609	8.0716	2.9893	0.0000***
Std. Dev.	10.8255	10.9865		
Non-Aggressive Group (54 firms, n = 755)	n = 226	n = 529		
Mean	**15.7460**	**19.2143**	-3.4682	**0.0211****
Median	14.4138	12.9372	1.4766	0.9106
Std. Dev.	13.5649	20.7411		
Dif. mean	-2.4199	-8.4245		
p-value	0.0204**	0.0000***		

***/**/* Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided). Panel A reports the mean and median overvaluation for aggressive and non-aggressive firms for the pre-and post-period. The valuation bias equals (PRICE–VALUE)/PRICE, where VALUE equals the estimated intrinsic value of equation (5) and P equals price. The cost of equity capital is estimated using the Fama-French four factor model using all available data from 1963 to the valuation date. Panel B reports the mean and median for the prices. Panel C reports the mean and median for the values.

Variable Definitions:

OVER = Bias 4 factors industry cost of capital: Deviation of the intrinsic value (VALUE) from the market price (PRICE), calculated as: (PRICE-VALUE)/PRICE

PRICE = Share price of the firm

VALUE = Estimation of the intrinsic value (see equation (5))

VI. ROBUSTNESS CHECKS AND ALTERNATIVE EXPLANATIONS

We conduct a battery of robustness tests, including time-shifts as a placebo test, investigation of post-Regulation G periods only, application of the difference-in-difference design, and replacing I/B/E/S data with pro-forma earnings by Bentley et al. (2018), amongst others. We also acknowledge contributions by Karpoff et al. (2017), who outline differences between financial restatements, Accounting and Auditing Enforcement Releases (AAERs) and Security Class Action Lawsuits (SCALs). Our findings, as expected, do not hold for AAERs and SCAL.[81] All other findings remain qualitatively similar throughout all tests (as expected findings do not hold for placebo tests). All these robustness tests are discussed in the following sections.

Robustness Test ERC: Using an Alternative Research Design

While we opted against the difference-in-difference design in our main analysis to simplify interpretation of the ERC-decline (see also Chen et al. (2014)), we apply this design choice as a robustness check (see Table 10). Accurately, we estimate the following equation:[82]

$$
\begin{aligned}
UR = {} & \alpha_1 + \alpha_2 POST + \alpha_2 AGGRESSIVE\_GROUP + \alpha_2 [UE \times POST] \\
& + \beta_1 UE + \beta_2 [UE \times POST] + \beta_3 [UE \times AGGRESSIVE\_GROUP] \\
& + \beta_4 [UE \times POST \times AGGRESSIVE\_GROUP] + \beta_5 [NONLINEAR] + \sum \beta_k CNTRLS \\
& + \sum \beta_k [UE \times CNTRLS] + \sum \beta_k [POST \times CNTRLS] + \sum \beta_k [POST \times AGGRESSIVE\_GROUP] \\
& + \sum \beta_k [UE \times CNTRLS \times POST] + \sum \beta_k [UE \times CNTRLS \times AGGRESSIVE\_GROUP] \\
& + \sum \beta_k [CNTRLS \times POST \times AGGRESSIVE\_GROUP] + \sum \beta_k [UE \times CNTRLS \times POST \times AGGRESSIVE\_GROUP]
\end{aligned}
$$

$$(7)$$

where: $\quad CNTRLS = \{MTB, BETA, SIZE, LOSS\_NONGAAP, Q4, PREDICT, PERSIST\}$

Consistent with the main findings, we see a higher pre-ERC for aggressive firms (*UE X AGGRESSIVE_GROUP*: 4.456, p-value: 0.08), a subsequent decline for firms with aggressive ex-ante non-GAAP reporting (*UE X AGGRESSIVE_GROUP X POST*: – 6.957, p-value: 0.01) and no ERC-decline for firms with non-aggressive ex-ante non-GAAP reporting (*UE X POST*: 0.889, p-value: 0.66). The base group is the non-aggressive group.

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[81] AAERs are usually announced after financial restatements (Karpoff et al. 2017), meaning that reactions to AAERs are likely moderated by the anticipation of low financial reporting quality. SCALs are often preceded by sharp share price declines, meaning that investor attention is likely heightened before the release of a SCAL. Finally, Ronen and Yaari (2008) suggest that restatements forego Class Action Lawsuits.

[82] The applied difference-in-differences regression closely follows Dehaan et al. (2013), who investigate the ERC after clawback adoptions (see: Dehaan et al. 2013, p. 1045).

Table 10 Robustness Tests: Alternative Model, Differences in Differences (ERC)

Variable	Coeff.	p-value
UE	3.556	0.05*
UE X POST	0.889	0.66
UE X AGGRESSIVE_GROUP	4.456	0.08*
UE X AGGRESSIVE_GROUP X POST	**-6.957**	**0.01****
NONLINEAR	-7.185	0.03**
CONSTANT	0.099	0.00***
CONTROLS	Yes	
Industry-fixed effects	Yes	
Year-fixed-effects	Yes	
Adj. R^2	0.13	
N	1,604	
Firms	124	

* *p<0.1; ** p<0.05; *** p<0.01*
This table reports the differences in differences design that captures the change in the ERC-decline for aggressive *(UE X AGGRESSIVE_GROUP X POST)* and non-aggressive firms *(UE X POST)*. The remaining control variables are described in Table 19. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value. The control group is the non-aggressive group (54 firms) and the treatment group is the aggressive group (70 firms).

Robustness Test ERC: Using Alternative Samples

In the following, we test the ERC-decline separately for GAO restatements (Table 11, Panel A), AA restatements (Table 11, Panel B), AAERs (Table 11, Panel C), and Security Class Action Lawsuits (Table 11, Panel D). We predict that the application of GAO only and AA only data should yield qualitatively similar ERC-related results compared to our main sample in which we combine these two databases. For AAERs and Security Class Action Lawsuits, however, we do not expect to see similar findings, as implications of these events are different from those of restatements, as discussed in later sections.[83]

Using GAO (Table 11, Panel A) and AA data (Table 11, Panel B) confirms our main findings. We observe an ERC-decline for aggressive firms and no ERC-decline for non-aggressive firms (see: *UE X POST*). Before we turn to AAERs and Class Action Lawsuits, we highlight that material restatements i) signal poor financial reporting quality, ii) are announced by the firm[84], and iii) are usually the initial public announcement informing on prior misreporting (Ronen and Yaari 2008). These three key features are crucial for our hypotheses development since they allow us to capture an increase in investor attention (low ex-ante investor anticipation of

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[83]   According to Dyck et al. (2010), the biggest potential problem with Security Class Action Lawsuits is that class action data includes frivolous cases. Further, it is biased toward firms that have had large stock price declines (Dechow et al. 2011). If we had applied severe and material restatements, one could argue that restatements are by no means a perfect proxy for poor reporting quality and attention grabbing events as they "are biased toward firms that have made a mistake that is not necessarily intentional" (Dechow et al. 2011, p. 18). However, by focusing on material restatements only and limit our investigation to firms with only one restatement mitigates potential drawbacks of restatement data.

[84]   While restatements can be initiated by different parties (e.g., the auditor), they are announced by the firm.

upcoming adverse news) and scrutiny towards financial reporting quality. Further, the pre-period reflects a scenario of high information asymmetry in which executives may apply aggressive non-GAAP reporting to extract rents before the release of unfavorable news.

Turning to AAERs (Table 11, Panel C), they help identify intentional misreporting (Karpoff et al. 2017) but are exposed to two limitations in light of our research question. First, AAERs are released by the SEC, meaning that executives do not have the informational advantage of the upcoming release of unfavorable news, and hence may not adjust non-GAAP reporting to extract rents ex-ante.[85] Second, perhaps more important, AAERs are on average, released many quarters after a restatement announcement (Karpoff et al. 2017), suggesting that investors have already learned about poor financial reporting quality. Therefore, investors' update of beliefs is likely to be more moderate as compared restatements. Consistent with our expectation, we do not find any ERC-declines throughout all three groups (aggressive, mixed, and non-aggressive) (Table 11, Panel C). Moreover, we do not observe economically significant short-term market reactions. In numbers, average CARs around the AAERs release dates range from 0 percent to – 2 percent, while average CARs around GAO restatement dates range from – 6 percent to – 14 percent.

Next, we apply Class Action Lawsuits (Table 11, Panel D) as a further alternative sample of attention grabbing events. Addressing the chronological order of restatements and Class Action Lawsuits, Ronen and Yaari (2008) suggest that restatements forego Class Action Lawsuits, while Karpoff et al. (2017) find that Class Action Lawsuits (slightly) outperform restatements in the category "Initial Revelation Dates" of misreporting (Karpoff et al. 2017). Given that Class Action Lawsuits are likely one of the earlier adverse signals to the market, we predict an ERC-decline. However, since Class Action Lawsuits, unlike restatements, do not necessarily signal poor financial reporting quality, we do not assume a difference in the ERC-decline across groups with different ex-ante non-GAAP reporting. While Table 11 Panel D shows a similar ERC-decline pattern that one would expect from a restatement sample (ERC-decline for aggressive firms and no ERC-decline for non-aggressive firms), these findings do not hold in the Dif-in-Dif design (appendix: Table D2). In the Dif-in-Dif design for Class Action Lawsuits, we see that non-aggressive and aggressive firms experience an ERC-decline alike. Further, CARs across all groups range from – 4 percent to – 5 percent. We further propose that since executives have less informational advantages before a Class Action Lawsuit (no information

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[85]   According to Armstrong et al. (2013), the primary disadvantage of using AAERs is that their release is conditional on detection by the SEC.

about the timing and content of the news event), as compared to a restatement announcement (information about the timing and restatement`s content), aggressive non-GAAP reporting before Class Action Lawsuits will be less likely targeted towards misleading investors in order to extract rents. Consistent with this view, we see that the pre-ERC for Class Action Lawsuits is similar across all groups (Panel D, *UE* ranges from 5.373 to 5.587). We note that for restatements, the pre-ERC for aggressive firms is at least twice as high relative to non-aggressive firms (e.g., Table 11, Panel B, aggressive firms *UE*: 2.844 vs. non-aggressive firms *UE*: 5.840).

Taken together, as expected, our findings do not apply to AAERs and Security Class Action Lawsuits. Given the different implications and features of AAERs, Security Class Action Lawsuits, and restatements our findings confirm prior views that these events are not interchangeable. For these alternative events, findings behave in a way one would expect. We evidence negative CARs and ERC-declines after Class Action Lawsuits across all groups, supporting the view that these events are not fully anticipated by the market. For AAERs, we find neither economically significant CARs nor statistically significant ERC-declines.[86] Our findings that relate to CARs align to those of Karpoff et al. (2017) (most negative CARs for restatements, least negative CARs for AAERs). Importantly, we extend findings by Karpoff et al. (2017) by documenting differences in the ERC-decline for restatements, AAERs and Class Action Lawsuits.[87]

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[86] To reflect design choices made for the restatement sample best, we included only those firms that had only one Security Class Action Lawsuits or one AAERs (one-timer to ensure a less noisy post-period).

[87] In the appendix, we show that our ERC-based findings do not hold for less severe restatements. We do not find an ERC-decline after less severe restatements (appendix: Table D3 and Table D4). Univariate descriptive statistics show CARs of –2.25 percent for aggressive firms and –0.65 percent for non-aggressive firms (appendix: Table D5).

Table 11 Robustness Tests: Alternative Sample (ERC)

Alternative Sample (AA only, GAO only, AAERs, Class Action Lawsuits)

	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value

Panel A: GAO Only, Partitioned on Ex-Ante Exclusion Frequency (1997-2006, 135 firms), Restatements

UE	3.444	0.00***	7.689	0.00***	12.876	0.00***
UE X POST	0.624	0.40	**-2.367**	**0.00***	**-9.093**	**0.00***
Controls	Yes		Yes		Yes	
Adj. R^2	0.04		0.16		0.16	
N	418		707		548	
Firms	30		60		45	
CAR (mean)	-0.06		-0.10		-0.14	

Panel B: AA Only, Partitioned on Ex-Ante Exclusion Frequency (1995-2015, 174 firms), Restatements

UE	2.844	0.00***	3.002	0.00***	5.840	0.00***
UE X POST	0.277	0.48	0.102	0.72	**-1.943**	**0.01***
Controls	Yes		Yes		Yes	
Adj. R^2	0.05		0.11		0.12	
N	456		1,164		585	
Firms	35		92		47	
CAR (mean)	-0.01		-0.04		-0.08	

Panel C: AAERs Only, Partitioned on Ex-Ante Exclusion Frequency (2000-2015, 187 firms)

UE	4.043	0.00***	6.538	0.00***	5.944	0.00***
UE X POST	-0.342	0.25	0.592	0.39	-0.320	0.60
Controls	Yes		Yes		Yes	
Adj. R^2	0.11		0.19		0.19	
N	976		863		741	
Firms	67		68		52	
CAR (mean)	0.00		-0.02		0.00	

Panel D: Class Action Lawsuits Only, Partitioned on Ex-Ante Exclusion Frequency (1996-2015, 439 firms)

UE	5.584	0.00***	5.456	0.00***	5.531	0.00***
UE X POST	-0.552	0.37	**-1.608**	**0.00***	**-1.204**	**0.10***
Controls	Yes		Yes		Yes	
Adj. R^2	0.07		0.10		0.10	
N	1,803		2,555		1,273	
Firms	135		201		103	
CAR (mean)	-0.05		-0.04		-0.05	

* *p<0.1; ** p<0.05; *** p<0.01*
This table reports the ERC change on *UE X POST* from the pre- to the post-period for aggressive (1), mixed (2), and non-aggressive firms (3). Panel A shows results for GAO restatements only, Panel B shows results for AA restatements only, and Panel C shows results for AAERs cases only. Control variables are described in table 4. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Robustness Test ERC: Alternative Thresholds for Exclusion Frequency

Next, we change the exclusion frequency thresholds for aggressive and non-aggressive firms. In our first modification, we set thresholds for non-aggressive firms from 0 to 0.4 and aggressive firms from 0.6 to 1.0 (Table 12, Panel A). We continue to see an ERC-decline for aggressive firms and no ERC-decline for non-aggressive firms. The results also hold if we apply the median as the cut-off value to separate aggressive from non-aggressive non-GAAP reporting firms (Table 12, Panel B).

Table 12 Robustness Tests: Alternative Thresholds (ERC)

Alternative Exclusion Frequency Threshold to Identify Non-GAAP Aggressiveness					
Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Panel A: Ex-Ante *EXCLUDE* MEAN (0-0.4;0.41-0.6., 0.61-1.0) (1995-2015, 264 firms)					
UE	3.225	0.00	5.305	0.00	5.522	0.00
UE X POST	0.001	1.00	**-1.015**	**0.02****	**-2.168**	**0.00*****
Controls	Yes		Yes		Yes	
Adj. R^2	0.06		0.18		0.10	
N	1,335		621		1,393	
Firms	101		51		112	
Panel B: Ex-Ante *EXCLUDE* MEAN (0-0.49; 0.5-1.0) (1995-2015, 264 firms)					
UE	3.606	0.00***	No observations		4.955	0.00***
UE X POST	0.120	0.77	due to median split		**-1.828**	**0.00*****
Controls	Yes				Yes	
Adj. R^2	0.07				0.11	
N	1,721				1,624	
Firms	129				135	

* p<0.1; ** p<0.05; *** p<0.01
This table reports the ERC change on *UE X POST* from the pre- to the post-period for aggressive (1), mixed (2), and non-aggressive firms (3). Panel A shows results for thresholds of 0-0.4 for non-aggressive, 0.41-0.6 for mixed and 0.61-1.0 for aggressive firms.
Panel B shows results for thresholds of AA restatements of 0-0.49 for non-aggressive and 0.5-1.0 for aggressive firms. Control variables are described in table 4. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Robustness Test ERC: Pre- and Post-Regulation G Period

Given that the prior literature finds improvements of non-GAAP reporting after the Regulation G release, which became effective as of March 28th, 2003, (Whipple 2015; Black et al. 2012; Marques 2006), we test our findings separately for restatement cases with pre-restatement periods before (Table 13, Panel A) and after the Regulation G has become effective (Table 13, Panel B). Since our findings also hold for post-Regulation G periods, in which firms have to reconcile non-GAAP earnings to GAAP earnings, we support the view that investors are misled, despite increased transparency. This finding underscores that inattention rather than opaqueness of non-GAAP earnings causes mispricing.

Table 13 Robustness Tests: Alternative Timeframes (ERC)

	Alternative Timeframe					
	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Panel A: Pre-Regulation G (1995-2003, 105 firms)						
UE	3.102	0.005***	9.983	0.00***	11.788	0.00***
UE X POST	-0.619	0.349	**-2.941**	**0.04****	**-3.846**	**0.03****
Controls	Yes[a]		Yes		Yes	
Adj. R^2	0.08		0.16		0.17	
N	289		517		440	
Firms	23		45		37	
Panel B: Post-Regulation G (2004-2015, 144 firms)						
UE	4.066	0.00***	3.893	0.00***	7.008	0.00***
UE X POST	-0.235	0.61	**-0.586**	**0.03****	**-3.741**	**0.00****
Controls	Yes		Yes		Yes	
Adj. R^2	0.07		0.12		0.14	
N	420		962		497	
Firms	31		74		39	

* p<0.1; ** p<0.05; *** p<0.01
This table reports the ERC change on *UE X POST* from the pre- to the post-period for aggressive (1), mixed (2), and non-aggressive firms (3). Panel A shows results for periods before Regulation G. Panel B shows results for periods after Regulation G. Control variables are described in table 4. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.
[a] We note that due to the small sample size and the number of interaction terms with *UE*, we observe multicollinearity for the non-aggressive firm-sample in the pre Regulation G period. To address this issue we run the ERC model without UE interaction terms (except *UEXPOST*). Findings using the standard ERC-model (including all *UE*-interactions) would yield an *UE* with 0.798 (p-value: 0.88) and *UEXPOST* with 1.150 (p-value: 0.23).

Robustness Test ERC: Alternative Identification of Non-GAAP Aggressiveness

While in our primary analyses, we identify aggressiveness by counting how many times a firm excludes recurring expenses from its quarterly earnings in the five quarters before the restatement announcement, we next identify aggressiveness using the exclusion amount (magnitude) across five pre-restatement quarters. Supporting our findings, we document a higher pre-ERC and a subsequent ERC-decline for aggressive firms (Table 14, Panel A). As expected, non-aggressive firms do not experience any change in the ERC (Table 14, Panel A). Moreover, we condition the ERC change on ex-ante exclusions of total (Table 14, Panel B) and non-recurring expense exclusions (Table 14, Panel C). Consistent with these exclusions not being a suitable proxy for aggressive non-GAAP reporting, we do not find an ERC-decline for firms with exclusions in the upper quartiles (column 3).[88]

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[88]   We calculate *RECURRING_EXP* as recurring expense exclusions multiplied by shares outstanding and scaled by total assets, as performed by Bentley et al. (2018).

Table 14 Robustness Tests: Using Exclusion Magnitude Instead of Frequency (ERC)

	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Panel A: Recurring Expense Exclusions (1995-2015, 264 Firms)						
UE	4.039	0.00***	3.042	0.00***	4.688	0.00***
UE X POST	-0.161	0.58	1.291	0.11	**-2.307**	**0.00***
Controls	Yes		Yes		Yes	
Adj. R^2	0.09		0.08		0.12	
N	837		1,759		775	
Firms	66		132		66	
Panel B: Total Exclusion (Recurring and Non-Recurring) (1995-2015, 264 Firms)						
UE	3.420	0.00***	5.149	0.00***	4.710	0.00***
UE X POST	-0.498	0.26	**-0.816**	**0.06***	-1.005	0.24
Controls	Yes		Yes		Yes	
Adj. R^2	0.05		0.10		0.12	
N	865		1,734		765	
Firms	66		132		66	
Panel C: Special Items (Recurring) (1995-2015, 264 Firms)						
UE	5.320	0.00***	4.612	0.00***	4.652	0.00***
UE X POST	**-1.681**	**0.01****	-1.678	0.06*	-0.179	0.76
Controls	Yes		Yes		Yes	
Adj. R^2	0.09		0.07		0.10	
N	821		1,712		819	
Firms	66		132		66	

Alternative Non-GAAP Reporting Identification

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the ERC change on *UE X POST* from the pre- to the post-period for aggressive (1), mixed (2), and non-aggressive firms (3). Panel A shows results for classification of aggressiveness based on recurring expense exclusions. Panel B shows results for classification of aggressiveness based on total expense exclusions while Panel C applies recurring expense exclusions. Control variables are described in table 4. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Robustness Test ERC: Alternative Time-Periods as a Placebo Test

Throughout our paper, we argue that the observed ERC-decline for aggressive firms is attributable to the increase of investor attention due to the release of material restatements. Hence, if we assume that the restatement had taken place 12 quarters before or after the true/actual restatement date, we should not be able to see an ERC-decline, because the attention grabbing restatement announcement will be non-existent between the artificially created new pre- and post-periods. By shifting periods 12 quarters back (Table 15, Panel A) or forth (Table 15, Panel B), we introduce artificial pre- and post-periods. Most importantly, there will be no restatement announcement between the artificial pre- and post-period.

In Table 15, Panel A, the artificial pre-period covers quarters –17 to –12 (relative to the original restatement date), and the artificial post-period covers quarters –11 to 0 (relative to the original restatement date). Consistent with our prediction, we do not find an ERC-decline for aggressive firms (Table 15, Panel A, *UE X POST*: – 1,053, p-value: 0.20). In Table 15, Panel B the artificial pre-period covers quarters 1 to 5 (relative to the original restatement date), and the artificial post-period covers quarters 6 to 17 (relative to the original restatement date). Consistent with our prediction, we do not find an ERC-decline for aggressive firms (Table 15, Panel B, *UE X POST*: 0.722 p-value: 0.25). These findings are important as they rule out the possibility that our findings are driven mechanically because responsiveness to aggressively reporting firms might always decline after a string of aggressive non-GAAP reporting choices, regardless of any attention grabbing events. Surprisingly, we see a relatively low pre-ERC for mixed firms and a subsequent increase (Table 15, Panel B, *UE X POST*: 1.301, p-value: 0.00). Since the artificial pre-period covers quarters 1 to 5 (relative to the original restatement date), we assume that this group is partially represented through firms that have changed their non-GAAP reporting immediately after the true restatement date from aggressive to moderate non-GAAP reporting and are rewarded for this adoption in the long run. Future research could investigate the movement in-between these groups after the restatement announcement, and address the question whether firms that change reporting to more moderate adjustments are able to recover sooner from the ERC-decline.

Table 15 Robustness Tests: Period Shift (Placebo test) (ERC)

	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value

Period Shift

Panel A: Period Shift by Plus 12 Quarters (1995-2015, 251 Firms)

All Firm Quarters Observations Take Place Before the Restatement[a]

	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
UE	6.149	0.00	8.565	0.00	6.588	0.00
UE X POST	-0.840	0.21	-1.398	0.16	-1.053	0.20
Controls	Yes		Yes		Yes	
Adj. R2	0.08		0.13		0.13	
N	1,944		728		810	
Firms	142		52		57	

Panel B: Period Shift by Minus 12 Quarters (1995-2015, 187 Firms)

All Firm Quarters Observations Take Place After the Restatement[b]

	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
UE	5.805	0.00***	2.908	0.00***	8.678	0.00***
UE X POST	-0.250	0.36	**1.301**	**0.00***	0.722	0.25
Controls	Yes		Yes		Yes	
Adj. R2	0.14		0.14		0.22	
N	959		1,131		451	
Firms	73		81		33	

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the ERC change on *UE X POST* from the newly defined pre- to the post-period for aggressive (1), mixed (2), and non-aggressive firms (3). Panel A has a pre-period that covers quarters -17 to -12, and the post-period covers quarters -11 to 0 (relative to the original restatement date) and Panel B has a pre-period covers quarters +1 to +5, and the post-period covers quarters +6 to +17 (relative to the original restatement date). Control variables are described in table 4. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

[a] Non aggressive firms are defined as firms that do not exclude recurring expenses and represent the median (instead of the quartile). The reason for this partitioning choice is grounded in the cutoff values, which in this case would assign the second quartile to the non-aggressive and the mixed sample, as the 25th and 50th percentile of exclusions frequency is 0.

[b] The number of firms varies, as the requirement of having two firm quarter observations and full data coverage varies with shifting time-frames.

Robustness Test ERC: Alternative Explanatory Variables

In our ERC regression, thus far, we included the variable *LOSS_NONGAAP* since we measure the responsiveness to non-GAAP earnings surprises. However, since aggressive firms turn approximately 50 percent of all ex-ante GAAP losses into non-GAAP profits, we intend to mitigate concerns that our findings are attributable to GAAP loss firms. Hence, we first replace *LOSS_NONGAAP* with *LOSS_GAAP* (Table 16, Panel A) and in a second variation include *LOSS_NONGAAP* and *LOSS_GAAP* simultaneously (Table 16, Panel B). Our findings hold in both versions.

Table 16 Robustness Tests: Alternative Controls (ERC)

	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Panel A: Gao and AA Using GAAP Loss Instead of Non-GAAP Loss (1995-2015, 264 firms)						
UE	3.787	0.00***	4.396	0.00***	7.603	0.00***
UE X POST	0.090	0.87	**-0.908**	**0.03***	**-2.754**	**0.00***
Controls	Yes		Yes		Yes	
Adj. R^2	0.06		0.10		0.13	
N	731		1,746		879	
Firms	54		140		70	
Panel B: Gao and AA Using GAAP Loss and Non-GAAP Loss (1995-2015, 264 Firms)						
UE	3.797	0.00***	4.873	0.00***	7.498	0.00***
UE X POST	0.070	0.89	**-0.773**	**0.05***	**-2.753**	**0.00***
Controls	Yes		Yes		Yes	
Adj. R^2	0.06		0.11		0.13	
N	715		1,689		831	
Firms	54		140		70	

* p<0.1; ** p<0.05; *** p<0.01

This table reports the ERC change on *UE X POST* from the pre- to the post-period for aggressive (1), mixed (2), and non-aggressive firms (3). In panel A the control variable *LOSS_NONGAAP* is replaced by *LOSS_GAAP*. In Panel B *LOSS_NONGAAP* and *LOSS_GAAP* are included both in the same regression. Further control variables are described in table 4. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Robustness Test CAR: Using Alternative Explanatory Variables

Turning to robustness tests for the CAR-related findings, we partition the restatement sample based on the exclusion amount (magnitude). Supporting our findings, we document more negative CARs for firms with aggressive ex-ante non-GAAP reporting (Table 17). In addition to our main CAR-analysis, we see that firms that are assigned to the mixed group also experience more negative CARs compared to the non-aggressive group (base group).

Table 17 Robustness Tests: Market Reaction Using Alternative Partition

(Dependent Variable: *CAR*)

Variable	Palmrose et al. (2004) (1) Coeff.	p-value	Extended Palmrose et al. (2004) I (2) Coeff.	p-value	Extended Palmrose et al. (2004) II (3) Coeff.	p-value	Extended Palmrose et al. (2004) III (4) Coeff.	p-value
PROMPTER_COMPANY	-0.046	0.03**	-0.048	0.03**	-0.040	0.07*	-0.043	0.05**
PROMPTER_AUDITOR	-0.026	0.43	-0.022	0.49	-0.010	0.76	-0.014	0.67
PROMPTER_OTHER	-0.072	0.09*	-0.082	0.05*	-0.074	0.08*	-0.074	0.07*
REVENUE	-0.065	0.01**	-0.065	0.01**	-0.057	0.03**	-0.051	0.05**
IMPACT	0.300	0.65	0.308	0.66	0.229	0.74	0.546	0.45
PERVASIVENESS	0.006	0.31	0.005	0.37	0.006	0.31	0.004	0.46
DURATION	0.004	0.29	0.003	0.49	0.004	0.33	0.001	0.77
IMPACT_SIZE	-0.118	0.34	-0.138	0.28	-0.127	0.32	-0.168	0.20
IMPACT_LEVERAGE	2.311	0.06*	2.352	0.05*	2.406	0.04**	2.161	0.06*
RET_120	-0.019	0.58	-0.025	0.48	-0.027	0.44	-0.032	0.36
MIXED_GROUP			-0.049	0.01**	-0.043	0.03**	-0.040	0.04**
AGGRESSIVE_GROUP			**-0.059**	**0.05***	**-0.053**	**0.07***	-0.043	0.12
PRESS_RELEASE					-0.045	0.07*	-0.037	0.14
POST_SOX							0.051	0.03**
CONSTANT	-0.023	0.53	0.025	0.54	0.015	0.71	-0.012	0.77
Industry-fixed effects	Yes		Yes		Yes		Yes	
Adj. R^2	0.08		0.09		0.10		0.12	
N	264		264		264		264	
Firms	264		264		264		264	

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the potential determinants for the cumulative abnormal returns around the restatement announcement day without (1) and with pre-restatement ex-ante non-GAAP reporting aggressiveness. *AGGRESSIVE_GROUP* indicates firms with aggressive ex-ante non-GAAP reporting.

Variable Definitions:

CAR = Cumulative abnormal returns in the three-day window [-3;3] around the restatement announcement date

Prompter:

PROMPTER_COMPANY = The restatement was prompted by the company;

PROMPTER_AUDITOR = The restatement was prompted by the auditor;

PROMPTER_OTHER = The restatement was prompted by another party than the SEC, company or auditor or was not known;

PROMPTER_SEC = The restatement was prompted by the SEC (base group);

Accounts:

REVENUE = The restatement affected revenue;

Further controls:

IMPACT = Total restated income (loss) less originally reported income (loss) accumulated over the restatement period scaled by the book value of total assets reported at quarter end before restatement announcement;

PERVASIVENESS = The number of accounts affected.

DURATION = Number of days between the beginning and end of misreporting scaled by 360.

IMPACT_SIZE = Natural log of book value of total assets reported at year end prior to the restatement announcement, times *Change in net income/assets*;

IMPACT_LEVERAGE = Book value of long-term debt divided by book value of total assets, reported at year end prior to the restatement announcement, times Change in net income/assets;

RET_120 = Buy and hold returns over 120 days prior to the restatement announcement;

Non-GAAP disclosure:

NON_AGGRESSIVE_GROUP= Firms with non-GAAP reporting that belong to the first quartile of ex-ante mean *EXCLUDE (54 firms, base group)*;

MIXED_GROUP = Firms with non-GAAP reporting that belong to the second and third quartile of ex-ante mean *EXCLUDE (75+65 firms)*;

AGGRESSIVE_GROUP = Firms with non-GAAP reporting that belong to the forth quartile of ex-ante mean *EXCLUDE (70 firms)*;

Additional controls (not applied by Palmrose et al. (2004)):

PRESS_RELEASE = The restatement was published through a press release;

POST_SOX = The restatement was published after the SOX-Act became effective.

All variables are described in Table 19 in detail.

Robustness Test OVER: Using Alternative Cost of Equity Capital in the Valuation

In another robustness check, we estimate the intrinsic value using the valuation model in equation (5) but replace the cost of equity by the industry cost of capital using the Fama-French five-factor model (instead of the four-factor model) (Fama and French 2015). Table 18 shows the market overvaluation using this five-factor model. The same pattern as in Table 9 can be observed (however, only if p-values are interpreted one-sided). The aggressive firms are punished with a significant decline of the mean and median valuation error in the post-period in comparison to the pre-period. The difference between the two groups in the post-period is also statistically significant (p-value: 0.0097).

Table 18 Robustness Test: Overvaluation (*OVER*)

Market Overvaluation Based on Intrinsic Values: Valuation Bias: Cost of Capital 5 Factor Industry

	Pre-Period	Post-Period		
Aggressive Group (70 firms, n = 904)	n = 326	n = 578	Dif.	p-value
Mean	0.4060	0.3481	0.0579	0.1251
Median	0.5364	0.5031	0.0333	0.1303
Std. Dev.	0.5081	0.5637		
Non-Aggressive Group (54 firms, n = 755)	n = 226	n = 529		
Mean	0.4524	0.4259	0.0265	0.4099
Median	0.5013	0.5060	-0.0476	0.6904
Std. Dev.	0.3699	0.4175		
Dif. mean	-0.0464	-0.0778		
p-value	0.2413	0.0097***		

***/**/* Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided). Panel A reports the mean and median overvaluation for aggressive and non-aggressive firms for the pre-and post-period. The valuation bias equals (P–V)/P, where V equals the estimated intrinsic value of equation (5) and P equals price. The cost of equity capital is estimated using the Fama-French five factor model using all available data from 1963 to the valuation date.
Variable Definitions:
OVER = Bias 5 factors industry cost of capital: Deviation of the intrinsic value (*VALUE*) from the market price (*PRICE*), calculated as: (*PRICE-VALUE*)/*PRICE*
PRICE = Share price of the firm
VALUE = Estimation of the intrinsic value (see equation (5))

Robustness Test ERC: Using Alternative Identification of Material One-Timers

As discussed earlier, focusing on material restatements and firms that have released only one restatement helps us to identify attention grabbing events and increases our confidence that findings are not attributable to a noisy pre- or post-period (e.g., through subsequent restatements). Therefore, in our investigated sample, we first identified material one-time restatements for each database (AA and GAO) separately and subsequently combined both subsamples (AA and GAO). An alternative approach is to combine both datasets first and identify the frequency of restatements (one-timers) only in the second step. While in theory, both procedures should yield the same final sample, in practice, this is not the case. In more detail, our first procedure yields 264 firms, while the second approach yields 194 firms. This divergence in sample size is attributable to different factors (e.g., timeframes, heterogeneous identification of materially, differences in restatement dates, fineness of data collection, etc.). To verify that our findings are not driven by the order of counting restatements (locally in each database vs. globally after the merge of AA and GAO), we perform all tests based on a reduced and more restrictive sample comprising 194 firms.[89] Our findings remain qualitatively similar. All analyses are replicated with the reduced sample and can be retrieved from our appendix (attached to this document).

To provide an example for a deviation in restatement dates we turn to Ikon Office Solutions Inc. The AA database provides April 25, 2005 as the first restatement date[90], while GAO provides July 8, 2005 as the first restatement date.[91] In both cases, each date refers to the same restatement case and represents the only date recorded for that firm in each database. The first date (April 25, 2005) refers to the announcement of accounting problems, and the second date (July 8, 2005) refers to the quantification of the restatement. Surprisingly, AA and GAO provide the one or the other date, but not both event dates.

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[89] We note that in cases in which we obtain one material restatement firm from each database with different restatement dates, we include the first one if the restatement dates do not deviate by more than 90 days.
[90] https://www.sec.gov/Archives/edgar/data/3370/0000003370-05-000072-index.htm
[91] https://www.sec.gov/Archives/edgar/data/3370/0001193125-05-139701-index.htm

Anecdotal Evidence

Using Eastman Kodak as anecdotal evidence, Bryan and Lilien (2005) showcase that managers are able to distract investors from unfavorable news by releasing positive non-GAAP earnings per share ($0.78) in the presence of negative GAAP earnings ($– 0.04).[92] In this case, the non-GAAP based analysts' forecast ($0.65) was exceeded by $0.13 ($0.78 vs. $0.65), leading to positive earnings surprises. Moreover, on the same day, Eastman Kodak announced a financial restatement. Robert H. Brust, the CFO of Eastman Kodak, commented about the restatement as follows: "[T]he errors are confined to income tax accounting, and as such, they do not affect the company's business operations".[93] Despite the low GAAP performance and the revelation of prior reporting failure, the market returns are positive, suggesting that the positive earnings surprise outweighs the unfavorable news (negative GAAP earnings and a restatement). The mitigating effect of positive earnings surprises on restatement dates has been empirically found by Myers et al. (2013). Based on our investigation, we find that Eastman Kodak excluded recurring expenses as high as $0.17 per share, meaning that without aggressive exclusions, the analyst forecasts would have been missed by $0.04 (negative earnings surprise: $0.61 vs. $0.65), perhaps leading to negative market reactions. Taken together, this anecdotal evidence is consistent with executives strategically excluding inappropriate earnings to meet and beat analyst forecasts. In Table 20 we provide a full list of firm names that are included in the aggressive and non-aggressive group (based on our sample and classification).

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[92] The earnings announcement refers to December 31, 2004, which was released on January 26, 2005.
[93] While this restatement is part of the GAO restatement database, we do not include this case in our restatement sample, as we focus on severe restatements.

Table 19 Variable Definitions

Variable	Definition	Data Sources
Variables Used for Categorization into Subgroups		
Ex-ante Mean of *EXCLUDE*	The mean of ex-ante non-GAAP reporting aggressiveness (ex-ante mean of *EXCLUDE*) is calculated by counting the frequency of pre-restatement quarters in which a firm excludes recurring expenses in the five quarter preceding the restatement announcement and dividing the number by the number of observations. For example, if a firm excludes recurring expenses in 5 out of 5 quarters, the ex-ante mean non-GAAP reporting aggressiveness is 1 (5/5). By contrast, if a firm excludes recurring expenses in 2 out of 4 quarters the ex-ante mean non-GAAP reporting aggressiveness is 0.5 (2/4). We note that not all companies have full data (at least 2 pre-restatements quarter observations per firm). Based on the ex-ante mean non-GAAP reporting aggressiveness we identify whether firms have aggressive, mixed, and non-aggressive ex-ante non-GAAP reporting. It is important to note that a firm is tagged with the same indicator variable throughout all quarters, as otherwise, a pre- and post-period comparison would not be possible. The disclosure after the restatement is of none relevance for firm classification, as only the pre-disclosure assigns each firm to the corresponding reporting group**.**	See below
Dependent Variables		
UR	Cumulative abnormal returns in the three-day window [-1;1] around the earnings announcement date, where the abnormal return is calculated as the firm's return less the CRSP value-weighted market return. Calculated as: **ret** – **vwretd** • **ret** (CRSP) = Returns • **vwretd** (CRSP) = Value-Weighted Return-incl. dividends	CRSP, Compustat
CAR	Cumulative abnormal returns in the three-day window [-3;3] around the restatement announcement date, where the abnormal return is calculated as the firm's return less the estimated return, using the market model and the value-weighted CRSP index, where the estimation window is [-200, -20]. Unexpected returns are calculated as: **ret** – predicted_return • **ret** (CRSP) = Returns • **vwretd** (CRSP) = Value-Weighted Return-incl. dividends	CRSP
Control Variables		
UE	Unexpected quarterly earnings at the earnings announcement date, scaled by price at the end of the fiscal quarter, with expected earnings proxied by the median of analysts' forecasts issued within 90 days prior to the earnings announcement date. Earnings surprise is based on non-GAAP earnings. Calculated as: (**actual** – **median value**) / (**prccq** /**ajexq**) • **actual** (I/B/ES) = Actual Value, from the Detail Actuals File (adjusted) • **median value** (I/B/ES) = median of analysts' forecasts issued within 90 days prior to the earnings announcement date (adjusted) • **prccq** (Compustat) = Price Close – Quarter • **ajexq** (Compustat) = Adjustment Factor (Company) - Cumulative by Ex-Date	I/B/E/S, Compustat
NONLINEAR	Calculated as: *UE**Absolute(*UE*)	I/B/E/S, Compustat
POST	*POST* is 1 if the firm quarter observation belongs to the post-restatement-period (12 quarter subsequent to the restatement), and 0 if the firm quarter observation belongs to the pre-restatement-period (5 quarters leading up to the restatement announcement).	Compustat, GAO, AA

QTR_i	QTR_i is a binary variable that takes the value 1 if the firm quarter observation belongs to a post-restatement quarter $i = 1$ to 12. QTR_i is zero if the firm quarter observation belongs to any of the five quarters leading up to the restatement announcement.	
EXCLUDE	1 if recurring expenses are excluded; non-GAAP exceed operating GAAP EPS. 1 if **actual** > (**opepsq** / **ajexq**) • **actual** (I/B/ES) = Actual Value, from the Detail Actuals File • **opepsq** (Compustat) = Earnings Per Share from Operations • **ajexq** (Compustat) = Adjustment Factor (Company) - Cumulative by Ex-Date	I/B/E/S, Compustat
AGGRESSIVE_GROUP MIXED_GROUP NON_AGGRESSIVE_GROUP	Each firm belongs to the 1st (non-aggressive), 2nd, and 3rd (mixed) or 4th (aggressive) quartile of **ex-ante non-GAAP reporting aggressiveness** (mean *AGGRESSIVE* in the pre-period).	I/B/E/S, Compustat
RECURRING_EXP	Recurring expense exclusions are calculated as: (**actual** – **opepsq**)***cshprq**) / **atq** Recurring expense exclusions are multiplied by shares outstanding and scaled by total assets as performed by Bentley et al. (2018). • **actual** (I/B/E/S) = Actual Value, from the Detail Actuals File • **opepsq** (Compustat) = Earnings Per Share from Operations • **cshprq** (Compustat) = Common Shares Used to Calculate Earnings Per Share - Basic • **atq** (Compustat) = Total assets	I/B/E/S, Compustat
MTB	Market-to-book ratio is calculated as: (**cshoq*****prccq**)/**ceqq** • **cshoq** (Compustat) = Common Shares Outstanding • **prccq** (Compustat) = Price Close - Quarter • **ceqq** (Compustat) = Common/Ordinary Equity - Total	Compustat
BETA	Market-model beta estimated over 250 days ending two days prior to the earnings announcement date (we require a minimum of 120 days).	CRSP
SIZE	Natural log of market value of equity is calculated as: log(**cshoq*****prccq**) **cshoq** (Compustat) = Common Shares Outstanding **prccq** (Compustat) = Price Close - Quarter	Compustat
LOSS_NONGAAP	1 if reported non-GAAP earnings per share are negative, otherwise 0. 1 if **actual** < 0 **actual** (I/B/ES) = Actual Value, from the Detail Actuals File	I/B/E/S
LOSS_GAAP	1 if reported GAAP earnings per share are negative 1 if **epsfxq** / **ajexq**< 0 & if **pdf** = "D" 1 if **epspxq** / **ajexq** < 0 & if **pdf** = "P" • **epsfxq** (Compustat) = Earnings Per Share (Diluted) - Excluding Extraordinary Items • **epspxq** (Compustat) = Earnings Per Share (Basic) - Excluding Extraordinary Items • **ajexq** (Compustat) = Adjustment Factor (Company) - Cumulative by Ex-Date • **pdf** (I/B/E/S) = Primary/Diluted Flag (Estimate Level)	I/B/E/S
Q4	Indicator variable, equal to 1 if the earnings announcement is for the fourth quarter of the fiscal year;	
PREDICT	The variance of the absolute values of unexpected earnings over the two-year period prior to the earnings announcement, where unexpected earnings are based on a seasonal random walk.	Compustat
PERSIST	Autoregressive coefficient from Foster's (1977) model estimated over the two-year period prior to the earnings announcement.	Compustat
$PRICE_t$	Share price of the firm • **prc** (CRSP) = Price per Share	CRSP
$VALUE_t$	Estimation of the intrinsic value (see equation (5))	Compustat, CRSP, I/B/E/S

B_t	Quarterly book value of equity per share. Calculated as ceqq/shrout: • **ceqq** (Compustat)= Common/Ordinary Equity – Total • **shrout** (CRSP) = Shares Outstanding	Compustat CRSP
$FROE_{t+j}$	Forecasted return on equity. Calculated as: median_forecast$_{t+j}$ / (B_t+B_{t-1})/2 • **median_forecast** (I/B/E/S) = median analyst forecast	Compustat, I/B/E/S
B_{t+j}	Forecasted book value of equity. Calculated as: $[1+(1-p)FROE_{t+j}]B_{t+j-1}$	Compustat, I/B/E/S
p	Payout ratio. Calculated as: dvc/ibcom: • **dvc** (Compustat) = Common Dividends • **ibcom** (Compustat) = income before extraordinary items, if negative 6% of Assets Total (at)	Compustat
r_e	The industry cost of equity capital. Calculated as $r_e=r_f+\beta_{MKT}RP^M+\beta_{SMB}RP^{SMB}+\beta_{HML}RP^{HML}+\beta_{UMD}RP^{UMD}$ Alternative: $r_e=r_f+\beta_{MKT}RP^M+\beta_{SMB}RP^{SMB}+\beta_{HML}RP^{HML}+\beta_{RMW}RP^{RMW}+\beta_{CMA}RP^{CMA}$ • Betas are estimated using a monthly rolling regression of industry return less the risk free rate on the corresponding factors starting in 1963. • RP^M, RP^{SMB}, RP^{HML}, RP^{UMD}, RP^{RMW}, and RP^{CMA} are the historical risk premiums of the corresponding portfolios starting in 1963. • r_f (FED) = Yields on ten-year U.S. government bonds.	Ken French Website, Federal Reserve Bulletins
OVER	Deviation of the intrinsic value $VALUE_t$ from the market price $PRICE_t$. Calculated as: $(PRICE_t-VALUE_t)/PRICE_t$ • prc (CRSP) = Price per Share	CRSP
RETURN120	Buy and hold returns over 120 days before the restatement announcement [–120;–1].	CRSP
PROMPTER AUDITOR	1 if the restatement was prompted by the auditor (GAO).	GAO, hand-collection, Dyck et al. (2010)
PROMPTER COMPANY	1 if the restatement was prompted by the company (GAO).	GAO, hand-collection, Dyck et al. (2010)
PROMPTER SEC	1 if the restatement was prompted by the SEC (GAO).	GAO, hand-collection, Dyck et al. (2010)
PROMPTER_OTHER	1 if the restatement was not prompted by the auditor, the SEC, the company, or when the prompter is unknown.	
REVENUE	The restatement affected revenue. For AA restatements 1 if **res_acc_res_fkey_list** = 6 (|Revenue recognition issues|) For GAO restatements 1 if **RevRecognition** = 1	GAO, AA
IMPACT	Total restated income (loss) less originally reported income (loss) accumulated over the restatement period scaled by the book value of total assets reported at quarter end before restatement announcement. Calculated as: **Cumulative Change in Net Income/atq** • **Cumulative Change in Net Income** (AA, hand-collection) • **atq** (Compustat) = Assets Total	AA, hand-collection, Compustat

IMPACT_SIZE	Natural log of book value of total assets reported at year end prior to the restatement announcement, times Change in net income/assets. Calculated as: ltq/atq*IMPACT • **ltq** (Compustat) = Liabilities Total • **atq** (Compustat) = Assets Total	AA,	hand-collection, Compustat
IMPACT_LEVERAGE	Book value of long-term debt divided by book value of total assets, reported at year end prior to the restatement announcement, times Change in net income/assets. Calculated as: log(atq)* *IMPACT* • **atq** (Compustat) = Assets Total	AA,	hand-collection, Compustat
DURATION	The number of days restated scaled by 360.	AA,	hand-collection
PERVASIVENESS	The number of accounts affected.	AA, GAO,	hand-collection
PRESS_RELEASE	1 if the restatement was published through a press release, otherwise 0.	AA,	hand-collection
POST_SOX	1 if the restatement was published after the SOX-Act became effective, otherwise 0.	Compustat,	AA, GAO

Table 20 Names of Firms Included in This Study

Firms with Non-Aggressive Ex-Ante Non-GAAP Reporting		Firms with Aggressive Ex-Ante Non-GAAP Reporting	
#	Company Name	#	Company Name
1	AON PLC	1	3COM CORPORATION
2	APPLE INC	2	ADAC LABS
3	AVIS BUDGET GROUP INC	3	AMERICA SVC GROUP INC
4	BIG 5 SPORTING GOODS CORP	4	AT HOME CORP
5	BLACKBERRY LTD	5	BELLSOUTH CORPORATION
6	BRADLEY PHARMACEUTICALS	6	BORLAND SOFTWARE
7	BRUKER CORP	7	CALAMP CORP
8	CAPITAL ONE FINANCIAL CORP	8	CHIQUITA BRANDS INTERNATIONL INC
9	CHARLOTTE RUSSE HOLDING INC	9	CHIRON CORPORATION
10	CHATTEM INCORPORATED	10	COHR INC
11	CITY HOLDING CO	11	CRITICAL PATH INC.
12	COMPUSA INC	12	CYLINK CORPORATION
13	CON-WAY INC	13	DIGIMARC CORP
14	CROP GROWERS CORP	14	DORAL FINANCIAL CORP
15	CUMMINS INC	15	DUKE ENERGY CORP
16	CVS HEALTH CORP	16	EBT INTERNATIONAL INC
17	DECKERS OUTDOOR CORP	17	ELECTRONIC DATA SYSTEMS CORP
18	DOCUCORP INTERNATIONAL INC.	18	EXTREME NETWORKS INC.
19	DOMINION HOMES INC	19	FREEMARKETS INC
20	DONALDSON COMPANY INC	20	HOUSEHOLD INTL INC
21	EDGEWATER TECH INC	21	IGO INC
22	FIFTH THIRD BANCORP	22	INPHONIC INC
23	HELMERICH AND PAYNE INC	23	JNI CORP.
24	HILB ROGAL AND HOBBS CO	24	KAMAN CORPORATION
25	INAMED CORPORATION	25	KELLWOOD CO
26	INFINITY PHARMACEUTICALS INC	26	KIMBERLY-CLARK CORP
27	JOHNSON & JOHNSON	27	LANTRONIX INC
28	KING PHARMACEUTICALS	28	LATTICE SEMICONDUCTOR CORP
29	L3 TECHNOLOGIES INC	29	LCA-VISION INCORPORATED
30	LENNOX INTERNATIONAL INC	30	LEGATO SYSTEMS INC
31	MAGNUM HUNTER RESOURCES INC	31	LYCOS INC
32	MARCUS CORP	32	MARTEK BIOSCIENCE CORPORATION
33	MITCHAM INDUSTRIES INC	33	MATTHEWS INTERNATIONAL CORP
34	MSC INDUSTRIAL DIRECT	34	MAXIM INTEGRATED PRODUCTS
35	NOVAVAX INC	35	MERGE HEALTHCARE INC
36	NVIDIA CORP	36	METLIFE INC
37	ODYSSEY RE HOLDINGS CORP	37	MICRO WAREHOUSE INC
38	OMNIVISION TECHNOLOGIES INC	38	MICROMUSE INC
39	PALM HARBOR HOMES INC	39	MICROS SYSTEM INC
40	PATTERSONUTI ENERGY INC	40	MICROSTRATEGY INC.
41	PROTALIX BIOTHERAPEUTICS INC	41	MICROTUNE
42	RED HAT INC	42	MOVE INC
43	SAREPTA THERAPEUTICS INC	43	NATIONAL COMM FINANCE

44	SKYWEST INC
45	SOUTHERN COPPER CORP
46	SPORTSMANS GUIDE INC
47	ST JOE COMPANY
48	STANDARD COMMERCIAL CP
49	SUNRISE MED INC
50	SYMANTEC CORP
51	UNISYS CORPORATION
52	US CONCRETE INC
53	VERMILLION INC
54	WATTS WATER TECHNOLOGIES INC

44	NAVIGANT INTERNATIONAL INC
45	NCI BUILDING SYSTEMS INC
46	NEOFORMA INC
47	NORTH FACE (THE)
48	NUANCE COMMUNICATIONS INC
49	OM GROUP INC
50	PACIFIC GATEWAY EXCHANGE INC.
51	PEMSTAR INC
52	PNC FINANCIAL SERVICES GROUP INC
53	PURCHASEPRO.COM INC
54	RAYTHEON CO
55	ROCKWELL AUTOMATION INC
56	SEGUE SOFTWARE INC
57	SKILLSOFT PLC
58	SUNBEAM CORP
59	SUNPOWER CORP
60	SUPERVALU INC
61	SYBASE INC
62	SYSTEM SOFTWARE ASSOC INC
63	TECHTEAM GLOBAL INC
64	THOMAS & BETTS CORP
65	UNUM GROUP
66	USA DETERGENTS
67	VEREIT INC
68	WEBMETHODS INC
69	WELLCARE HEALTH PLANS INC
70	ZALE CORP

Limitations and Alternative Explanations

While our findings provide strong empirical evidence that aggressive non-GAAP reporting misleads investors, we also consider alternative explanations that attribute to the ex-post revisions in the perceived financial reporting quality (ERC), share price (CAR), and overvaluation (OVER).

Market Reaction/Severity: First, we note that our results could alternatively be explained by the market reaction to the restatement announcement and not by the ex-ante non-GAAP reporting. In detail, executives might choose to report non-GAAP earnings more aggressively if they anticipated adverse market reactions, which is not unlikely given their informational advantages. Hence, firms with negative CARs will be pooled with firms with aggressive ex-ante reporting. In other words, due to potential reverse causality between (expected) market reactions and the choice to report non-GAAP earnings aggressively, assigning mispricing to aggressive firms is not without flaws. Trying to mitigate these concerns, we control for the restated amount and the revenue relation of restatements in the CAR-regression and find that firms with aggressive ex-ante non-GAAP reporting experience more negative CARs compared to non-aggressive firms (see: Table 8: CAR regression). Nevertheless, future research could investigate why some of the observed firms did not report non-GAAP earnings aggressively, despite knowing about the upcoming release of the restatement.

Analyst Forecasts: Second, since we use street earnings as a proxy for pro-forma earnings, our findings could also be explained through analysts' decision to exclude certain expenses. In particular, given that the prior literature finds that "analysts are more likely to make income-increasing adjustments" (Baik et al. 2009, p. 45) for glamour stocks, our findings could be explained through upwardly biased analyst forecasts, which inflate investors' expectations, until they are subsequently disconfirmed. In other words, perhaps analysts and not managers bias prices upwards. Given that "both managers and analysts appear to influence non-GAAP earnings calculations" (Black et al. 2018, p. 260), assigning the mispricing effect exclusively to the one or the other party is difficult.

Investor Sophistication: Third, our findings could be explained by ex-ante investors' sophistication rather than attention. Frankel et al. (2011) find that institutional ownership is associated with lower market reactions to non-GAAP earnings, suggesting that sophisticated investors are less likely to trade on non-GAAP earnings. However, in the appendix, Table D6, we see that the share of institutional ownership is higher for firms with aggressive ex-ante

reporting, suggesting that the ERC-decline is unlikely driven by less sophisticated investors. Moreover, we find that analysts revise forecasts downward only for aggressive firms, supporting the view that sophistication may require attention in order to be fully valuable.

VII. CONCLUSION

Non-GAAP reporting has been gaining popularity since the 1990s and refers to the exclusion of expenses and gains, which under US-GAAP must not be excluded. While managers claim that non-GAAP exclusions reduce noise from one-time effects, critics argue that managers may artificially inflate non-GAAP earnings to obscure the firm's true performance. Addressing current debates on whether non-GAAP reporting is informative or misleading, we investigate the exclusion of recurring expenses around material restatement announcements and offer three major takeaways.

First, we provide strong empirical evidence that attention determines investors' ability to disentangle aggressive from non-aggressive non-GAAP reporting choices. We document that investors reward the exclusion of recurring expenses in the pre-restatement period but punish these same aggressive non-GAAP reporting choices after the restatement announcement. Second, we find that revisions in perceived financial reporting quality, market value, and overvaluation are significantly more pronounced for firms with aggressive ex-ante non-GAAP reporting (ERC: – 43.93 percent; CAR: – 10.9 percent; OVER: – 17.49 percent) compared to firms with non-aggressive ex-ante non-GAAP reporting (ERC: no decline; CAR: – 3.8 percent; OVER: no decline). Given that market revisions to financial restatements are indicative of prior mispricing, our findings suggest that aggressive non-GAAP reporting has misled investors before the restatement announcement. Lastly, we find that ex-post analysts revise their forecasts downward for firms with aggressive ex-ante non-GAAP reporting, but not for non-aggressive firms. This finding supports the view that analysts, despite being perceived as more sophisticated than ordinary investors, may fail to detect inappropriate non-GAAP reporting strategies. One could even assume that analysts were exploited by managers to inflate market expectations. Further, our findings suggest that sophistication without attention cannot mitigate the misperception of non-GAAP metrics. Our results also align with the theory by Hirshleifer and Teoh (2003), who propose that limited attention causes mispricing in light of inappropriate non-GAAP adjustments. All three findings are novel to the non-GAAP-, restatement- and attention-related literature.

Despite investigating a rather specific setting, our findings might be generalizable. We conclude that non-GAAP reporting may lead to mispricing when executives are pressured (e.g., release of upcoming bad news or a low GAAP performance), market participants are inattentive, and information asymmetry is high. Consistent with our findings, we propose that investors

should be vigilant when processing non-GAAP earnings, especially in times of economic downturns and excessive exclusions of expenses in light of low GAAP performance. Future research could investigate why some firms opt against reporting non-GAAP earnings aggressively before the restatement announcement, while others do not. We like to close our paper with a citation from The Economist from the year 2002 that best reflects our findings relating to investors and analysts[94]:

> "*In theory, investors and other users of accounts know perfectly well that pro-forma numbers should be treated with deep scepticism. In practice, pro forma earnings releases do allow companies to mislead investors: they grab the headlines and since they are the first pieces of information that a share analyst has to talk to traders about, they drive valuations and share prices.*" (Economist 2002)

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[94] This citation is also given in Hirshleifer and Teoh (2003, p.352, fn. 14).

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Appendix

"Are Investors Misled by Exclusions of Recurring Expenses from Non-GAAP Earnings?"

Table of Contents

Introduction to the Appendix

This appendix provides main regression Tables for A) an alternative identification of pro-forma earnings (using I/B/E/S data compared to Bentley et al. 2018 data) and B) alternative identification of one-timers (firms that restate only once). Section C provides variable definitions. Lastly, in section D we provide supportive tables that are not interrelated as opposed to section A and B.

Section A provides regressions tables using Bentley et al. (2018) data instead of I/B/E/S data to identify non-GAAP reporting aggressiveness. We note that while the application of Bentley et al. (2018) data is more adequate, it is available only for a subset of our restatement firms. Since I/B/E/S data closely aligns with actual pro-forma earnings and underestimates -on average- manager's aggressiveness in non-GAAP reporting, we bias results rather against our predictions.

In section B, we identify one-time restatement firms only after the merge of two restatement databases, which yields a more restrictive sample of 194 instead of 264 firms. In all versions (section A and B), our main findings remain qualitatively similar to our original findings. We find that investors reward aggressive non-GAAP reporting choices before the restatement announcement and punish these choices after the restatement announcement. Further, revisions in the information content of earnings, market value and overvaluation are most pronounced for firms with aggressive pre-restatement disclosure. Research models are identical to original paper`s Table 5 (here Table A1 and B1), Table 6 (here Table A2 and B2), Table 7 (here Table A3 and B3), Table 8 (here Table A4 and B4) and Table 9 (here Table A5 and B5).

A. Alternative Identification of Pro-Forma Earnings, Bentley et al. (2018) data

Using Bentley et al. (2018) data instead of I/B/E/S data to identify non-GAAP reporting aggressiveness shows that investors reward aggressive non-GAAP reporting choices before the restatement, and punish the aggressive non-GAAP reporting choices after the restatement (Table A1). Further, we document that firms with aggressive ex-ante non-GAAP reporting experience more negative revisions in the information content of earning (see Table A2 and A3), market value corrections (Table A4), and overvaluation (Table A5).

Table A1 ERC-Regression: Discount for Aggressive Reporting Choices
(Dependent Variable: unexpected return (*UR*)), Bentley et al. (2018) Data

Variable	Pre-Period (1)		Post-Period (2)	
	Coeff.	p-value	Coeff.	p-value
UE	2.059	0.02**	3.694	0.00***
UE X AGGRESSIVE	**3.823**	**0.00***	**-0.368**	**0.04**
AGGRESSIVE	-0.007	0.10*	-0.011	0.00***
NONLINEAR	-37.904	0.00***	-8.058	0.00***
MTB	0.004	0.11	0.002	0.26
BETA	-0.001	0.59	-0.001	0.53
SIZE	-0.000	0.93	0.003	0.13
LOSS	0.007	0.23	-0.009	0.07*
Q4	-0.002	0.75	0.001	0.83
PREDICT	0.002	0.33	-0.003	0.25
PERSIST	-0.008	0.00***	-0.000	1.00
UE X MTB	-1.456	0.00***	-0.252	0.01***
UE X BETA	1.064	0.01***	0.007	0.92
UE X SIZE	-0.129	0.80	0.058	0.69
UE X LOSS	0.263	0.80	-2.570	0.00***
UE X Q4	1.323	0.06*	-0.375	0.19
UE X PREDICT	-0.543	0.03**	-0.019	0.67
UE X PERSIST	0.672	0.08*	-0.097	0.10*
CONSTANT	0.017	0.13	-0.013	0.27
Quarter-fixed effects	Yes		Yes	
Industry-fixed effects	Yes		Yes	
Adj. R^2	0.16		0.09	
N	1,117		2,229	
Firms	264		264	

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the change in the ERC when recurring expenses are excluded in the pre- (1) and the post-restatement period (2). The coefficient on *UE* is the ERC (investors' responsiveness) when the earnings are not exposed to recurring expense exclusions. The coefficient on *UE X AGGRESSIVE* captures the change in the ERC when recurring expenses are excluded from quarterly earnings. Remaining control variables are described in Table C. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Table A2 ERC-Regression: Magnitude (Dependent Variable: *UR*), Bentley et al. (2018) Data

Variable	Non-Aggressive Group (1) Coeff.	Non-Aggressive Group (1) p-value	Mixed Group (2) Coeff.	Mixed Group (2) p-value	Aggressive Group (3) Coeff.	Aggressive Group (3) p-value	(1) – (3) p-value
UE	4.039	0.00***	4.147	0.00***	5.970	0.00***	0.0639#
UE X POST	-0.197	0.72	-0.604	0.12	**-2.554**	**0.00***	0.0051###
NONLINEAR	4.607	0.49	-19.071	0.00***	-16.385	0.00***	
MTB	0.002	0.51	0.002	0.25	0.006	0.02**	
BETA	0.001	0.85	0.001	0.59	-0.008	0.00***	
SIZE	0.000	0.88	0.001	0.38	0.005	0.24	
LOSS	-0.002	0.84	0.001	0.86	-0.008	0.38	
Q4	0.005	0.36	-0.002	0.56	-0.007	0.33	
PREDICT	0.004	0.47	-0.002	0.60	-0.003	0.19	
PERSIST	-0.002	0.47	-0.001	0.67	-0.007	0.02**	
UE X MTB	0.034	0.62	-0.444	0.03**	-0.237	0.02**	
UE X BETA	0.137	0.65	-0.017	0.90	0.290	0.13	
UE X SIZE	0.489	0.11	-0.071	0.72	-0.434	0.15	
UE X LOSS	-3.524	0.00***	-1.545	0.01***	-2.084	0.00***	
UE X Q4	0.414	0.34	-1.097	0.03**	0.342	0.48	
UE X PREDICT	-0.084	0.70	0.065	0.41	-0.194	0.02**	
UE X PERSIST	0.152	0.37	-0.007	0.94	-0.164	0.21	
POST	0.004	0.48	0.002	0.62	-0.016	0.02**	
CONSTANT	-0.003	0.65	0.001	0.90	0.016	0.01**	
Industry-fixed effects	Yes		Yes		Yes		
Adj. R^2	0.06		0.08		0.13		
N	742		1,727		893		
Firms	55		138		71		

* $p<0.1$; ** $p<0.05$; *** $p<0.01$; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.
\# $p<0.1$; \#\# $p<0.05$; \#\#\# $p<0.01$; for *UE X POST*, we use seemingly unrelated estimation to test coefficients between non-aggressive (1) and aggressive firms (3).
This table reports the ERC change magnitude from the pre- to the post-restatement period through the coefficient on *UE X POST* for firms with non-aggressive (1), mixed (2), and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in in Table C. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Table A3 ERC-Regression: Duration (Dependent Variable: *UR*), Bentley et al. (2018) Data

Variable	Non-Aggressive Group (1) Coeff.	p-value	Mixed Group (2) Coeff.	p-value	Aggressive Group (3) Coeff.	p-value	(1) – (3) p-value
UE	3.678	0.00***	4.652	0.00***	6.969	0.00***	0.0106##
UE X QTR$_1$	-0.482	0.59	**-1.701**	**0.02****	**-3.463**	**0.00***	0.0101##
UE X QTR$_2$	-0.124	0.88	-0.358	0.53	**-1.598**	**0.01***	0.1272
UE X QTR$_3$	-0.827	0.23	-0.527	0.34	**-1.425**	**0.02****	0.4852
UE X QTR$_4$	-0.067	0.97	-0.502	0.39	-1.271	0.14	0.5287
UE X QTR$_5$	0.292	0.76	-0.614	0.28	**-2.112**	**0.00***	0.0376##
UE X QTR$_6$	-1.770	0.26	**-1.564**	**0.01***	**-3.495**	**0.02****	0.3941
UE X QTR$_7$	**1.878**	**0.04****	0.041	0.93	**-2.958**	**0.00***	0.0001##
UE X QTR$_8$	-0.377	0.65	**-1.248**	**0.02****	-1.343	0.11	0.3940
UE X QTR$_9$	0.963	0.53	-0.353	0.47	**-7.408**	**0.00***	0.0000##
UE X QTR$_{10}$	-0.060	0.97	**-1.214**	**0.03****	**-3.854**	**0.00***	0.0322
UE X QTR$_{11}$	1.244	0.21	0.490	0.56	**-3.387**	**0.00***	0.0004##
UE X QTR$_{12}$	0.110	0.95	**-1.711**	**0.00***	**-3.264**	**0.01***	0.1170
NONLINEAR	-0.969	0.86	-20.117	0.00***	-26.391	0.00***	
MTB	0.001	0.64	0.002	0.30	0.006	0.02**	
BETA	0.003	0.42	0.001	0.75	-0.009	0.00***	
SIZE	-0.000	0.95	0.001	0.71	0.004	0.30	
LOSS	-0.005	0.47	-0.001	0.80	-0.006	0.46	
Q4	0.006	0.35	-0.001	0.87	-0.003	0.59	
PREDICT	0.007	0.17	-0.002	0.54	-0.004	0.21	
PERSIST	-0.001	0.61	-0.001	0.58	-0.007	0.03**	
UE X MTB	0.005	0.97	-0.267	0.17	-0.308	0.00***	
UE X BETA	-0.070	0.85	0.049	0.72	0.533	0.01***	
UE X SIZE	0.143	0.74	-0.180	0.42	-0.043	0.90	
UE X LOSS	-3.005	0.00***	-1.852	0.00***	-1.958	0.01***	
UE X Q4	-0.255	0.57	-1.301	0.00***	0.093	0.85	
UE X PREDICT	-0.345	0.19	0.065	0.31	-0.241	0.01***	
UE X PERSIST	0.119	0.53	0.016	0.90	-0.072	0.62	
CONSTANT	-0.003	0.66	-0.001	0.82	0.015	0.02**	
Quarter-fixed	Yes		Yes		Yes		
Industry-fixed	Yes		Yes		Yes		
Adj. R^2	0.09		0.10		0.15		
N	728		1,748		875		
Firms	55		138		71		

* p<0.1; ** p<0.05; *** p<0.01; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.

\# *p*<0.1; ## *p*<0.05; ### *p*<0.01; for each quarter, we use seemingly unrelated estimation (SUEST) to test coefficients between non-aggressive (1) and aggressive firms (3).

This table reports the ERC change duration through the coefficient on *UE X QTR* for firms with non-aggressive (1), mixed (2), and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in Table C. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Table A4 CAR-Regression: Market Reaction (Dependent Variable: *CAR*), Bentley et al. (2018) Data

Variable	Palmrose et al. (2004) (1) Coeff.	p-value	Extended Palmrose et al. (2004) I (2) Coeff.	p-value	Extended Palmrose et al. (2004) II (3) Coeff.	p-value	Extended Palmrose et al. (2004) III (4) Coeff.	p-value
PROMPTER_COMPANY	-0.046	0.03**	-0.048	0.02**	-0.039	0.07*	-0.043	0.05**
PROMPTER_OTHER	-0.026	0.43	-0.029	0.38	-0.015	0.65	-0.019	0.57
PROMPTER_AUDITOR	-0.072	0.09*	-0.073	0.08*	-0.066	0.11	-0.067	0.10*
REVENUE	-0.065	0.01**	-0.063	0.02**	-0.055	0.03**	-0.048	0.06*
IMPACT	0.300	0.65	0.432	0.53	0.334	0.63	0.639	0.38
PERVASIVENESS	0.006	0.31	0.006	0.30	0.006	0.25	0.005	0.39
DURATION	0.004	0.29	0.003	0.36	0.004	0.25	0.002	0.66
IMPACT_SIZE	-0.118	0.34	-0.139	0.27	-0.127	0.32	-0.168	0.21
IMPACT_LEVERAGE	2.311	0.06*	2.137	0.08*	2.211	0.06*	1.979	0.09*
RET_120	-0.019	0.58	-0.019	0.58	-0.022	0.52	-0.028	0.41
MIXED_GROUP			-0.010	0.63	-0.012	0.56	-0.014	0.50
AGGRESSIVE_GROUP			**-0.055**	**0.06***	**-0.050**	**0.08***	-0.046	0.10
PRESS_RELEASE					-0.046	0.07*	-0.037	0.12
POST_SOX							0.051	0.03**
CONSTANT	-0.023	0.53	-0.001	0.99	-0.006	0.89	-0.028	0.50
Industry-fixed effects	Yes		Yes		Yes		Yes	
Adj. R^2	0.08		0.09		0.10		0.12	
N	264		264		264		264	
Firms	264		264		264		264	

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the potential determinants for the cumulative abnormal returns around the restatement announcement day without (1) and with pre-restatement ex-ante non-GAAP reporting aggressiveness. *AGGRESSIVE_FIRM* indicates firms with aggressive ex-ante non-GAAP reporting.

Variable Definitions:

CAR = Cumulative abnormal returns in the three-day window [-3;3] around the restatement announcement date

Prompter:

PROMPTER_COMPANY = The restatement was prompted by the company;

PROMPTER_AUDITOR = The restatement was prompted by the auditor;

PROMPTER_OTHER = The restatement was prompted by another party than the SEC, company or auditor or was not known;

PROMPTER_SEC = The restatement was prompted by the SEC (base group);

Accounts:

REVENUE = The restatement affected revenue;

Further controls:

IMPACT = Total restated income (loss) less originally reported income (loss) accumulated over the restatement period scaled by the book value of total assets reported at quarter end prior to restatement announcement;

PERVASIVENESS = The number of accounts affected.

DURATION = Number of days between the beginning and end of misreporting scaled by 360.

IMPACT_SIZE = Natural log of book value of total assets reported at year end prior to the restatement announcement, times *Change in net income/assets*;

IMPACT_LEVERAGE = Book value of long-term debt divided by the book value of total assets, reported at year end before the restatement announcement, times Change in net income/assets;

RET_120 = Buy and hold returns over 120 days prior to the restatement announcement;

Non-GAAP disclosure:

NON_AGGRESSIVE_GROUP = Firms with non-GAAP reporting that belong to the first quartile of ex-ante mean *AGGRESSIVE (55 firms, base group)*;

MIXED_GROUP =Firms with non-GAAP reporting that belong to the second and third quartile of ex-ante mean *AGGRESSIVE (138 firms)*;

AGGRESSIVE_GROUP = Firms with non-GAAP reporting that belong to the forth quartile of ex-ante mean *AGGRESSIVE (71 firms)*;

Additional controls (not applied by Palmrose et al. (2004)):

PRESS_RELEASE = The restatement was published through a press release;

POST_SOX = The restatement was published after the SOX-Act became effective.

All variables are described in Table C in detail.

Table A5 Overvaluation, Bentley et al. (2018) Data

Overvaluation: Statistics on Firms with Non-Aggressive Ex-Ante Non-GAAP

Market Overvaluation Based on Intrinsic Values (Variables *OVER = (PRICE-VALUE)/PRICE, PRICE, VALUE*)

OVER	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (71 firms, n = 919)	n = 331	n = 588		
Mean	**0.4101**	**0.3413**	0.0688	**0.0517***
Median	0.4898	0.4680	0.0217	0.2334
Std. Dev.	0.4466	0.5481		
Non-Aggressive Group (55 firms, n = 765)	n = 230	n = 535		
Mean	0.4261	0.3989	0.0272	0.3675
Median	0.4812	0.4497	0.0315	0.2668
Std. Dev.	0.3578	0.3928		
Dif. Mean	-0.0159	-0.0575		
p-value	0.6530	0.0453**		

PRICE	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (71 firms, n = 919)	n = 331	n = 588		
Mean	**27.4012**	**21.4094**	5.9918	**0.0005***
Median	21.6600	13.7054	7.9546	0.0000***
Std. Dev.	22.4644	26.0016		
Non-Aggressive Group (55 firms, n = 765)	n = 230	n = 535		
Mean	29.1719	32.5722	-3.4003	0.1587
Median	24.9325	21.3625	3.5700	0.4310
Std. Dev.	22.0470	33.5597		
Dif. Mean	-1.7707	-11.1628		
p-value	0.3553	0.0000***		

VALUE	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (71 firms, n = 919)	n = 331	n = 588		
Mean	**13.2001**	**10.7273**	2.4728	**0.0010***
Median	10.9143	7.6704	3.2440	0.0000***
Std. Dev.	10.7923	10.9033		
Non-Aggressive Group (55 firms, n = 765)	n = 230	n = 535		
Mean	**15.8765**	**19.0610**	-3.1845	**0.0321***
Median	14.5428	12.6877	1.8551	0.6636
Std. Dev.	13.4969	20.6748		
Dif. Mean	-2.6764	-8.3337		
p-value	0.0095***	0.0000***		

***/**/* Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided). Panel A reports the mean and median overvaluation for aggressive and non-aggressive firms for the pre-and post-period. The valuation bias equals (*PRICE–VALUE*)/*PRICE*, where *VALUE* equals the estimated intrinsic value of equation (5) and P equals price. The cost of equity capital is estimated using the Fama-French four factor model using all available data from 1963 to the valuation date. Panel B reports the mean and median for the market to book value.
Variable Definitions:
OVER = Bias using Fama-French 4 factors industry cost of capital: Deviation of the intrinsic value (*VALUE*) from the market price (*PRICE*), calculated as: (*PRICE-VALUE*)/*PRICE*
PRICE = Share price of the firm
VALUE = Estimation of the intrinsic value (see equation (5)) in the main text.

B. Alternative Identification of One-Time Restating Firms

Identifying one-timers after the merge of the two restatement databases (GAO and Audit Analytics (AA)), instead of before yields a more restrictive and smaller sample of 194 firms, instead of 264 firms. Findings show that investors reward aggressive non-GAAP reporting choices before the restatement, and punish the aggressive non-GAAP reporting choices after the restatement (Table B1). Further, we document that firms with aggressive ex-ante non-GAAP reporting experience more negative revisions in the information content of earning (see Table B2 and B3), market value corrections (Table B4) and overvaluation (Table B5).

Table B1 ERC-Regression: Discount by Period for Aggressive Reporting Choices (Dependent Variable: *UR*), One-Timer

Variable	Pre-Period (1)		Post-Period (2)	
	Coeff.	p-value	Coeff.	p-value
UE	1.790	0.05*	3.474	0.00***
UE X AGGRESSIVE	**3.638**	**0.00***	**-0.332**	**0.08***
AGGRESSIVE	-0.005	0.37	-0.008	0.05*
NONLINEAR	-24.133	0.02**	-4.519	0.05*
MTB	0.006	0.12	0.002	0.43
BETA	-0.002	0.41	-0.002	0.35
SIZE	0.000	0.93	0.004	0.05*
LOSS	0.013	0.09*	-0.006	0.25
Q4	-0.006	0.34	0.002	0.70
PREDICT	-0.004	0.02**	-0.001	0.82
PERSIST	-0.007	0.01***	0.000	0.81
UE X MTB	-0.984	0.18	-0.094	0.10
UE X BETA	0.944	0.01***	-0.034	0.66
UE X SIZE	-0.573	0.28	0.047	0.78
UE X LOSS	-0.901	0.39	-2.782	0.00***
UE X Q4	1.804	0.01***	-0.151	0.58
UE X PREDICT	-0.670	0.00***	-0.021	0.69
UE X PERSIST	1.078	0.01***	-0.147	0.00***
CONSTANT	0.016	0.22	-0.004	0.61
Quarter-fixed effects	Yes		Yes	
Industry-fixed effects	Yes		Yes	
Adj. R^2	0.16		0.09	
N	826		1,658	
Firms	194		194	

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

This table reports the change in the ERC when recurring expenses are excluded in the pre- (1) and in the post-restatement period (2). The coefficient on *UE* is the ERC (investors' responsiveness) when the earnings are not exposed to recurring expense exclusions. The coefficient on *UE X AGGRESSIVE* captures the change in the ERC when recurring expenses are excluded from quarterly earnings. Remaining control variables are described in Table C. The original samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Table B2 ERC-Regression: Magnitude (Dependent Variable: *UR*), One-Timer

Variable	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)		(1) – (3)
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	p-value
UE	3.226	0.00***	3.978	0.00***	5.702	0.00***	0.0394##
UE X POST	-0.414	0.39	-0.427	0.16	**-2.846**	**0.01*** **	0.0242##
NONLINEAR	1.736	0.75	-12.846	0.00***	-14.643	0.00***	
MTB	-0.000	0.90	0.001	0.54	0.004	0.29	
BETA	-0.002	0.67	0.000	0.95	-0.013	0.00***	
SIZE	0.001	0.65	0.002	0.27	0.004	0.43	
LOSS	0.002	0.84	0.002	0.74	0.002	0.85	
Q4	0.013	0.03**	-0.003	0.61	-0.014	0.09*	
PREDICT	0.003	0.46	-0.005	0.03**	-0.004	0.17	
PERSIST	-0.001	0.68	-0.001	0.59	-0.006	0.10*	
UE X MTB	0.028	0.58	-0.573	0.00***	-0.156	0.13	
UE X BETA	0.120	0.65	0.118	0.37	0.289	0.14	
UE X SIZE	0.441	0.06*	-0.109	0.70	-0.380	0.21	
UE X LOSS	-2.448	0.01**	-2.116	0.00***	-1.577	0.02**	
UE X Q4	0.620	0.03**	-1.166	0.02**	0.800	0.04**	
UE X PREDICT	0.026	0.84	-0.021	0.86	-0.048	0.62	
UE X PERSIST	-0.001	0.99	0.022	0.83	-0.303	0.03**	
POST	0.003	0.56	0.001	0.84	-0.013	0.10	
CONSTANT	-0.010	0.16	0.007	0.21	0.016	0.04**	
Industry-fixed effects	Yes		Yes		Yes		
Adj. R^2	0.05		0.09		0.14		
N	541		1,273		679		
Firms	41		100		53		

* $p<0.1$; ** $p<0.05$; *** $p<0.01$; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.
\# $p<0.1$; \#\# $p<0.05$; \#\#\# $p<0.01$; for *UE X POST*, we use seemingly unrelated estimation to test coefficients between non-aggressive (1) and aggressive firms (3).
This table reports the ERC change magnitude from the pre- to the post-restatement period through the coefficient on *UE X POST* for firms with non-aggressive (1), mixed (2), and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in Table C. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Table B3 ERC-Regression: Duration (Dependent Variable: *UR*), One-Timer

Variable	Non-Aggressive Group (1) Coeff.	p-value	Mixed Group (2) Coeff.	p-value	Aggressive Group (3) Coeff.	p-value	(1) – (3) p-value
UE	2.698	0.00***	4.270	0.00***	8.626	0.00***	0.0000###
UE X QTR₁	0.181	0.83	**-1.124**	**0.06***	**-4.935**	**0.00***	0.0000 ###
UE X QTR₂	-0.504	0.54	-0.281	0.51	**-2.498**	**0.00***	0.0673 #
UE X QTR₃	-1.006	0.13	-0.316	0.46	**-2.338**	**0.01***	0.2001
UE X QTR₄	1.136	0.43	-0.774	0.28	**-1.720**	**0.09***	0.0868 #
UE X QTR₅	0.048	0.95	-0.739	0.13	**-3.955**	**0.00***	0.0002 ###
UE X QTR₆	**-2.640**	**0.02****	**-1.394**	**0.03****	**-3.423**	**0.00***	0.5935
UE X QTR₇	1.464	0.17	0.193	0.59	**-4.658**	**0.00***	0.0000 ###
UE X QTR₈	-0.496	0.54	**-1.742**	**0.00***	-1.035	0.29	0.6534
UE X QTR₉	1.899	0.24	0.014	0.97	**-8.137**	**0.00***	0.0000 ###
UE X QTR₁₀	-0.303	0.93	**-1.206**	**0.03****	**-4.716**	**0.00***	0.2109
UE X QTR₁₁	1.475	0.18	1.053	0.30	**-5.006**	**0.00***	0.0000 ###
UE X QTR₁₂	-0.798	0.63	**-1.474**	**0.00***	**-4.146**	**0.01***	0.1150
NONLINEAR	-1.353	0.79	-15.315	0.00***	-19.324	0.00***	
MTB	0.001	0.75	0.001	0.63	0.004	0.27	
BETA	-0.001	0.82	-0.000	0.89	-0.013	0.00***	
SIZE	0.002	0.38	0.002	0.29	0.004	0.45	
LOSS	-0.002	0.79	0.002	0.72	0.009	0.32	
Q4	0.013	0.06*	-0.002	0.69	-0.008	0.33	
PREDICT	0.006	0.12	-0.005	0.06*	-0.007	0.00***	
PERSIST	0.001	0.85	-0.001	0.49	-0.006	0.10	
UE X MTB	0.020	0.88	-0.425	0.02**	0.201	0.60	
UE X BETA	-0.063	0.86	0.028	0.83	0.383	0.01***	
UE X SIZE	-0.026	0.94	-0.085	0.75	0.139	0.69	
UE X LOSS	-2.154	0.02**	-2.017	0.00***	-2.544	0.00***	
UE X Q4	0.128	0.71	-1.203	0.00***	-0.695	0.13	
UE X PREDICT	-0.043	0.78	0.055	0.50	-0.214	0.01**	
UE X PERSIST	0.093	0.64	0.256	0.18	0.051	0.72	
CONSTANT	-0.008	0.23	0.005	0.33	0.013	0.10*	
Quarter-fixed	Yes		Yes		Yes		
Industry-fixed	Yes		Yes		Yes		
Adj. R^2	0.10		0.10		0.18		
N	545		1,271		679		
Firms	41		100		53		

* $p<0.1$; ** $p<0.05$; *** $p<0.01$; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.
# $p<0.1$; ## $p<0.05$; ### $p<0.01$; for each quarter, we use seemingly unrelated estimation (SUEST) to test coefficients between non-aggressive (1) and aggressive firms (3).
This table reports the ERC change duration through the coefficient on *UE X QTR* for firms with non-aggressive (1), mixed (2), and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in Table C. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value.

Table B4 CAR-Regression: Market Reaction (Dependent Variable: *CAR*), One-Timer

Variable	Palmrose et al. (2004) (1) Coeff.	p-value	Extended Palmrose et al. (2004) I (2) Coeff.	p-value	Extended Palmrose et al. (2004) II (3) Coeff.	p-value	Extended Palmrose et al. (2004) III (4) Coeff.	p-value
PROMPTER_COMPANY	-0.069	0.01***	-0.069	0.01***	-0.055	0.03**	-0.059	0.03**
PROMPTER_OTHER	-0.035	0.35	-0.036	0.34	-0.019	0.60	-0.025	0.51
PROMPTER_AUDITOR	-0.111	0.08*	-0.114	0.07*	-0.106	0.09*	-0.100	0.10*
REVENUE	-0.110	0.00***	-0.105	0.00***	-0.094	0.00***	-0.081	0.01***
IMPACT	0.178	0.85	0.495	0.64	0.490	0.65	0.656	0.58
PERVASIVENESS	0.005	0.50	0.004	0.55	0.005	0.44	0.003	0.61
DURATION	0.006	0.16	0.004	0.33	0.006	0.21	0.002	0.60
IMPACT_SIZE	0.016	0.92	-0.048	0.77	-0.046	0.79	-0.068	0.71
IMPACT_LEVERAGE	0.201	0.82	0.017	0.98	0.030	0.97	-0.064	0.94
RET_120	-0.026	0.55	-0.026	0.54	-0.029	0.48	-0.040	0.33
MIXED_GROUP			-0.005	0.81	-0.008	0.73	-0.014	0.55
AGGRESSIVE_GROUP			**-0.075**	**0.04****	**-0.068**	**0.05***	**-0.070**	**0.05****
PRESS_RELEASE					-0.054	0.06*	-0.044	0.11
POST_SOX							0.065	0.03**
CONSTANT	-0.029	0.52	-0.004	0.94	-0.011	0.81	-0.037	0.45
Industry-fixed effects	Yes		Yes		Yes		Yes	
Adj. R²	0.13		0.15		0.16		0.19	
N	194		194		194		194	
Firms	194		194		194		194	

* *p*<0.1; ** *p*<0.05; *** *p*<0.01

This table reports the potential determinants for the cumulative abnormal returns around the restatement announcement day without (1) and with pre-restatement ex-ante non-GAAP reporting aggressiveness. *AGGRESSIVE_FIRM* indicates firms with aggressive ex-ante non-GAAP reporting.
Variable Definitions:
CAR = Cumulative abnormal returns in the three-day window [-3;3] around the restatement announcement date
Prompter:
PROMPTER_COMPANY = The restatement was prompted by the company;
PROMPTER_AUDITOR = The restatement was prompted by the auditor;
PROMPTER_OTHER = The restatement was prompted by another party than the SEC, company or auditor or was not known;
PROMPTER_SEC = The restatement was prompted by the SEC (base group);
Accounts:
REVENUE = The restatement affected revenue;
Further controls:
IMPACT = Total restated income (loss) less originally reported income (loss) accumulated over the restatement period scaled by the book value of total assets reported at quarter end prior to restatement announcement;
PERVASIVENESS = The number of accounts affected.
DURATION = Number of days between the beginning and end of misreporting scaled by 360.
IMPACT_SIZE = Natural log of book value of total assets reported at year end prior to the restatement announcement, times *Change in net income/assets*;
IMPACT_LEVERAGE = Book value of long-term debt divided by the book value of total assets reported at year end before the restatement announcement, times Change in net income/assets;
RET_120 = Buy and hold returns over 120 days before the restatement announcement;
Non-GAAP disclosure:
NON_AGGRESSIVE_GROUP = Firms with non-GAAP reporting that belong to the first quartile of ex-ante mean *AGGRESSIVE (41 firms, base group)*;
MIXED_GROUP = Firms with non-GAAP reporting that belong to the second and third quartile of ex-ante mean *AGGRESSIVE (100 firms)*;
AGGRESSIVE_GROUP = Firms with non-GAAP reporting that belong to the forth quartile of ex-ante mean *AGGRESSIVE (53 firms)*;
Additional controls (not applied by Palmrose et al. (2004)):
PRESS_RELEASE = The restatement was published through a press release;
POST_SOX = The restatement was published after the SOX-Act became effective.
All variables are described in Table C in detail.

Table B5 Overvaluation, One-Timer

Overvaluation: Statistics on Firms with Non-Aggressive Ex-Ante Non-GAAP

Market Overvaluation Based on Intrinsic Values (Variables *OVER = (PRICE-VALUE)/PRICE, PRICE, VALUE*)

OVER	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (53 firms, n = 698)	n = 245	n = 453		
Mean	**0.4277**	**0.3485**	0.0792	**0.0706***
Median	0.5323	0.4910	0.0414	0.0802*
Std. Dev.	0.5035	0.5761		
Non-Aggressive Group (41 firms, n = 562)	n = 170	n = 392		
Mean	0.4207	0.3953	0.0254	0.5433
Median	0.4812	0.4594	0.0217	0.7416
Std. Dev.	0.3920	0.4802		
Dif. mean	0.0070	-0.0468		
p-value	0.8790	0.2041		

PRICE	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (53 firms, n = 698)	n = 245	n = 453		
Mean	**29.3625**	**22.1767**	7.1859	**0.0008*****
Median	23.7188	13.4475	10.2712	0.0000***
Std. Dev.	23.9215	28.5205		
Non-Aggressive Group (41 firms, n = 562)	n = 170	n = 392		
Mean	**29.0447**	**35.7777**	-6.7330	**0.0306****
Median	23.8383	22.9383	0.9000	0.6558
Std. Dev.	23.4716	37.4148		
Dif. mean	0.3179	-13.6010		
p-value	0.8933	0.0000***		

VALUE	Pre-Period	Post-Period	Dif.	p-value
Aggressive Group (53 firms, n = 698)	n = 245	n = 453		
Mean	**13.2579**	**10.5402**	2.7177	**0.0022*****
Median	10.9223	7.3994	3.5229	0.0000***
Std. Dev.	11.0337	11.2496		
Non-Aggressive Group (41 firms, n = 562)	n = 170	n = 392		
Mean	**16.5187**	**20.5394**	-4.0207	**0.0310****
Median	14.0570	13.5533	0.5037	0.6167
Std. Dev.	15.1961	22.0690		
Dif. mean	-3.2608	-9.9992		
p-value	0.0117**	0.0000***		

***/**/* Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided). Panel A reports the mean and median overvaluation for aggressive and non-aggressive firms for the pre-and post-period. The valuation bias equals (*PRICE–VALUE*)/*PRICE*, where *VALUE* equals the estimated intrinsic value of equation (5) and P equals price. The cost of equity capital is estimated using the Fama-French four factor model using all available data from 1963 to the valuation date. Panel B reports the mean and median for the market to book value.
Variable Definitions:
OVER = Bias calculated using Fama-French 4 factors industry cost of capital: Deviation of the intrinsic value (*VALUE*) from the market price (*PRICE*), calculated as: (*PRICE-VALUE*)/*PRICE*
PRICE = Share price of the firm
VALUE = Estimation of the intrinsic value (see equation (5))

C. Variable Definitions

Table C Variable Definitions[95]

Variable	Definition	Data Sources
Variables Used for Categorization into Subgroups		
Ex-ante Mean of *AGGRESSIVE*	The mean of ex-ante non-GAAP reporting aggressiveness (ex-ante mean of *AGGRESSIVE*) is calculated by counting the frequency of pre-restatement quarters in which a firm excludes recurring expenses in the five quarter preceding the restatement announcement and dividing the number by the number of observations. For example, if a firm excludes recurring expenses in 5 out of 5 quarters, the ex-ante mean non-GAAP reporting aggressiveness is 1 (5/5). By contrast, if a firm excludes recurring expenses in 2 out of 4 quarters the ex-ante mean non-GAAP reporting aggressiveness is 0.5 (2/4). We note that not all companies have full data (at least 2 pre-restatements quarter observations per firm). Based on the ex-ante mean non-GAAP reporting aggressiveness we identify whether firms have aggressive, mixed, and non-aggressive ex-ante non-GAAP reporting. It is important to note that a firm is tagged with the same indicator variable throughout all quarters, as otherwise, a pre- and post-period comparison would not be possible. The disclosure after the restatement is of none relevance for firm classification, as only the pre-disclosure assigns each firm to the corresponding reporting group**.**	
Dependent Variables		
UR	Cumulative abnormal returns in the three-day window [-1;1] around the earnings announcement date, where the abnormal return is calculated as the firm's return less the CRSP value-weighted market return. Calculated as: **ret** – **vwretd** • **ret** (CRSP) = Returns • **vwretd** (CRSP) = Value-Weighted Return-incl. dividends	CRSP, Compustat
CAR	Cumulative abnormal returns in the three-day window [-3;3] around the restatement announcement date, where the abnormal return is calculated as the firm's return less the estimated return, using the market model and the value-weighted CRSP index, where the estimation window is [-200, -20]. Unexpected returns are calculated as: **ret** – predicted_return • **ret** (CRSP) = Returns • **vwretd** (CRSP) = Value-Weighted Return-incl. dividends	CRSP
Control Variables		
UE	Unexpected quarterly earnings at the earnings announcement date, scaled by price at the end of the fiscal quarter, with expected earnings proxied by the median of analysts' forecasts issued within 90 days prior to the earnings announcement date. Earnings surprise is based on non-GAAP earnings. Calculated as: (**actual** – **median value**) / (**prccq** /**ajexq**) • **actual** (I/B/ES) = Actual Value, from the Detail Actuals File (adjusted) • **median value** (I/B/ES) = median of analysts' forecasts issued within 90 days prior to the earnings announcement date (adjusted) • **prccq** (Compustat) = Price Close – Quarter • **ajexq** (Compustat) = Adjustment Factor (Company) - Cumulative by Ex-Date	I/B/E/S, Compustat

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[95]   This table is identical to Table 10 in our main text.

NONLINEAR	Calculated as: UE*Absolute(UE)	I/B/E/S, Compustat
POST	*POST* is 1 if the firm quarter observation belongs to the post-restatement-period (12 quarter after the restatement), and 0 if the firm quarter observation belongs to the pre-restatement-period (5 quarters leading up to the restatement announcement).	Compustat, GAO, AA
QTR_i	QTR_i is a binary variable that takes the value 1 if the firm quarter observation belongs to a post-restatement quarter i = 1 to 12. QTR_i is zero if the firm quarter observation belongs to any of the five quarters leading up to the restatement announcement.	
AGGRESSIVE	1 if recurring expenses are excluded; non-GAAP exceed operating GAAP EPS. 1 if **actual** > (**opepsq** / **ajexq**) • **actual** (I/B/ES) = Actual Value, from the Detail Actuals File • **opepsq** (Compustat) = Earnings Per Share from Operations • **ajexq** (Compustat) = Adjustment Factor (Company) - Cumulative by Ex-Date	I/B/E/S, Compustat
AGGRESSIVE_FIRM	The firm belongs to the 4th quartile of **ex-ante mean non-GAAP reporting aggressiveness** (mean *AGGRESSIVE* in the pre-period), otherwise, it belongs to the 1st quartile.	I/B/E/S, Compustat
AGGRESSIVE_GROUP *MIXED_GROUP* *NON_AGGRESSIVE_GROUP*	Each firm belongs to the 1st (non-aggressive), 2nd, and 3rd (mixed) or 4th (aggressive) quartile of **ex-ante non-GAAP reporting aggressiveness** (mean *AGGRESSIVE* in the pre-period).	I/B/E/S, Compustat
RECURRING_EXP	Recurring expense exclusions are calculated as: (**actual** – **opepsq**)***cshprq**) / **atq** Recurring expense exclusions are multiplied by shares outstanding and scaled by total assets, as performed by Bentley et al. (2018). • **actual** (I/B/E/S) = Actual Value, from the Detail Actuals File • **opepsq** (Compustat) = Earnings Per Share from Operations • **cshprq** (Compustat) = Common Shares Used to Calculate Earnings Per Share - Basic • **atq** (Compustat) = Total assets	I/B/E/S, Compustat
MTB	Market-to-book ratio is calculated as: **(cshoq*prccq)/ceqq** • **cshoq** (Compustat) = Common Shares Outstanding • **prccq** (Compustat) = Price Close - Quarter • **ceqq** (Compustat) = Common/Ordinary Equity - Total	Compustat
BETA	Market-model beta estimated over 250 days ending two days prior to the earnings announcement date (we require a minimum of 120 days).	CRSP
SIZE	Natural log of market value of equity is calculated as: log(**cshoq*prccq**) **cshoq** (**Compustat**) = Common Shares Outstanding **prccq** (**Compustat**) = Price Close - Quarter	Compustat
LOSS_NONGAAP	1 if reported non-GAAP earnings per share are negative, otherwise 0. 1 if **actual < 0** **actual** (I/B/ES) = Actual Value, from the Detail Actuals File	I/B/E/S
LOSS_GAAP	1 if reported GAAP earnings per share are negative 1 if **epsfxq** / **ajexq** < 0 & if **pdf** = "D" 1 if **epspxq** / **ajexq** < 0 & if **pdf** = "P" • **epsfxq** (Compustat) = Earnings Per Share (Diluted) - Excluding Extraordinary Items • **epspxq** (Compustat) = Earnings Per Share (Basic) - Excluding Extraordinary Items • **ajexq** (Compustat) = Adjustment Factor (Company) - Cumulative by Ex-Date • **pdf** (I/B/E/S) = Primary/Diluted Flag (Estimate Level)	I/B/E/S
Q4	Indicator variable, equal to 1 if the earnings announcement is for the fourth quarter of the fiscal year;	

PREDICT	The variance of the absolute values of unexpected earnings over the two-year period prior to the earnings announcement, where unexpected earnings are based on a seasonal random walk.	Compustat
PERSIST	Autoregressive coefficient from Foster (1977) model estimated over the two-year period prior to the earnings announcement.	Compustat
$PRICE_t$	Share price of the firm • **prc** (CRSP) = Price per Share	CRSP
$VALUE_t$	Estimation of the intrinsic value (see equation (5))	Compustat, CRSP, I/B/E/S
B_t	Quarterly book value of equity per share. Calculated as ceqq/shrout: • **ceqq** (Compustat) = Common/Ordinary Equity – Total • **shrout** (CRSP) = Shares Outstanding	Compustat CRSP
$FROE_{t+j}$	Forecasted return on equity. Calculated as: median_forecast$_{t+j}$ / $(B_t+B_{t-1})/2$ • **median_forecast** (I/B/E/S) = median analyst forecast	Compustat, I/B/E/S
B_{t+j}	Forecasted book value of equity. Calculated as: $[1+(1-p)FROE_{t+j}]B_{t+j-1}$	Compustat, I/B/E/S
p	Payout ratio. Calculated as: dvc/ibcom: • **dvc** (Compustat) = Common Dividends • **ibcom** (Compustat) = income before extraordinary items, if negative 6% of Assets Total (at)	Compustat
r_e	Industry cost of equity capital. Calculated as $r_e = r_f+\beta_{MKT}RP^M+\beta_{SMB}RP^{SMB}+\beta_{HML}RP^{HML}+\beta_{UMD}RP^{UMD}$ Alternative: $r_e = r_f+\beta_{MKT}RP^M+\beta_{SMB}RP^{SMB}+\beta_{HML}RP^{HML}+\beta_{RMW}RP^{RMW}+\beta_{CMA}RP^{CMA}$ • Betas are estimated using a monthly rolling regression of industry return less the risk free rate on the corresponding factors starting in 1963. • RP^M, RP^{SMB}, RP^{HML}, RP^{UMD}, RP^{RMW}, and RP^{CMA} are the historical risk premiums of the corresponding portfolios starting in 1963. • r_f (FED) = Yields on ten-year U.S. government bonds.	Ken French Website, Federal Reserve Bulletins
OVER	Deviation of the intrinsic value $VALUE_t$ from the market price $PRICE_t$. Calculated as: $(PRICE_t-VALUE_t)/PRICE_t$ • prc (CRSP) = Price per Share	CRSP
RETURN120	Buy and hold returns over 120 days prior to the restatement announcement [–120;–1].	CRSP
PROMPTER AUDITOR	1 if the restatement was prompted by the auditor (GAO).	GAO, hand-collection, Dyck et al. (2010)
PROMPTER COMPANY	1 if the restatement was prompted by the company (GAO).	GAO, hand-collection, Dyck et al. (2010)
PROMPTER SEC	1 if the restatement was prompted by the SEC (GAO).	GAO, hand-collection, Dyck et al. (2010)
PROMPTER_OTHER	1 if the restatement was not prompted by the auditor, the SEC, the company, or when the prompter is unknown.	
REVENUE	The restatement affected revenue. For AA restatements 1 if **res_acc_res_fkey_list** = 6 (|Revenue recognition issues|) For GAO restatements 1 if **RevRecognition** = 1	GAO, AA

IMPACT	Total restated income (loss) less originally reported income (loss) accumulated over the restatement period scaled by the book value of total assets reported at quarter end prior to restatement announcement. Calculated as: **Cumulative Change in Net Income/atq** • **Cumulative Change in Net Income** (AA, hand-collection) • **atq** (Compustat) = Assets Total	AA, hand-collection, Compustat
IMPACT_SIZE	Natural log of the book value of total assets reported at year end prior to the restatement announcement, times Change in net income/assets. Calculated as: ltq/atq*ial*IMPACT* • **ltq** (Compustat) = Liabilities Total • **atq** (Compustat) = Assets Total	AA, hand-collection, Compustat
IMPACT_LEVERAGE	Book value of long-term debt divided by book value of total assets reported at year end prior to the restatement announcement, times Change in net income/assets. Calculated as: log(atq)* *IMPACT* • **atq** (Compustat) = Assets Total	AA, hand-collection, Compustat
DURATION	The number of days restated scaled by 360.	AA, hand-collection
PERVASIVENESS	The number of accounts affected.	AA, GAO, hand-collection
PRESS_RELEASE	1 if the restatement was published through a press release, otherwise 0.	AA, hand-collection
POST_SOX	1 if the restatement was published after the SOX-Act became effective, otherwise 0.	Compustat, AA, GAO

D. Supportive Tables

Table D1 GAAP vs. non-GAAP loss

Non-GAAP Loss vs. GAAP Loss in the Pre-Restatement Period				
	LOSS_NONGAAP	*LOSS_GAAP*	Dif.	p-value
Aggressive Group (70 firms, n = 326)				
Mean	0.212	0.423	0.211	0.000***
Non-Aggressive Group (54 firms, n = 226)				
Mean	0.177	0.181	0.0286	0.7397

***/**/* Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided). This Table compares GAAP and non-GAAP based loss in the pre-period.
LOSS_NONGAAP = The non-GAAP based earnings are negative.
LOSS_GAAP = The GAAP based earnings are negative.

Table D2 Robustness Tests: Differences in Differences (ERC), Class Action Lawsuits

Variable	Coeff.	p-value
UE	**9.787**	**0.00***
UE X POST	**-5.346**	**0.00***
UE X AGGRESSIVE_GROUP	-1.515	0.39
UE X AGGRESSIVE_GROUP X POST	0.868	0.63
NONLINEAR	-36.492	0.00***
CONSTANT	-0.037	0.01
CONTROLS	Yes	
Industry-fixed effects	Yes	
Year-fixed-effects	Yes	
Adj. R^2	0.09	
N	3,079	
Firms	238	

* *p<0.1*; ** *p<0.05*; *** *p<0.01*

This table reports the differences in differences design that captures the change in the ERC-decline for aggressive *(UE X AGGRESSIVE_GROUP X POST)* and non-aggressive firms *(UE X POST)*. The remaining control variables are described in Table C. This sample refers to Class Action Lawsuits.

Table D3 ERC-Regression: Magnitude (Dependent Variable: *UR*) for Less Severe Restatements

Variable	Non-Aggressive Group (1)		Mixed Group (2)		Aggressive Group (3)		(1) – (3)
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	p-value
UE	3.828	0.00***	2.912	0.00***	2.877	0.00***	0.0502#
UE X POST	-0.026	0.88	0.164	0.40	-0.075	0.70	0.8501
NONLINEAR	-17.887	0.00***	-16.020	0.00***	-20.056	0.00***	
MTB	-0.002	0.04**	-0.001	0.37	0.000	0.83	
BETA	0.000	0.86	-0.004	0.00***	-0.001	0.27	
SIZE	0.000	0.70	-0.001	0.31	-0.002	0.16	
LOSS	-0.014	0.00***	-0.014	0.00***	-0.016	0.00***	
Q4	0.001	0.72	0.004	0.13	0.001	0.82	
PREDICT	-0.001	0.47	-0.001	0.60	-0.001	0.21	
PERSIST	0.000	0.54	0.000	0.78	-0.001	0.63	
UE X MTB	-0.063	0.44	-0.235	0.01***	0.066	0.62	
UE X BETA	0.128	0.06*	0.243	0.00***	0.085	0.43	
UE X SIZE	0.045	0.71	0.176	0.23	-0.157	0.03	
UE X LOSS	-1.648	0.00***	-0.745	0.01**	-0.728	0.01**	
UE X Q4	-0.260	0.12	-0.510	0.04	-0.208	0.36	
UE X PREDICT	-0.083	0.11	0.049	0.30	-0.116	0.15	
UE X PERSIST	0.067	0.33	-0.081	0.31	0.269	0.00***	
POST	-0.002	0.21	0.003	0.21	0.000	0.91	
CONSTANT	0.002	0.59	0.003	0.41	0.004	0.15	
Industry-fixed effects	Yes		Yes		Yes		
Adj. R^2	0.10		0.13		0.07		
N	6,880		3,710		4,405		
Firms	528		301		347		

* p<0.1; ** p<0.05; *** p<0.01; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.
# p<0.1; ## p<0.05; ### p<0.01; for *UE X POST*, we use seemingly unrelated estimation to test coefficients between non-aggressive (1) and aggressive firms (3). Findings are based on less severe restatements.
This table reports the ERC change magnitude from the pre- to the post-restatement period through the coefficient on *UE X POST* for firms with non-aggressive (1), mixed (2), and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in Table C. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value. Due to missing observations in quartile 1 of non-GAAP aggressiveness, we use the second quartile of ex-ante aggressiveness to identify aggressive firms.

Table D4 ERC-Regression: Duration (Dependent Variable: *UR*) for Less Severe Restatements

Variable	Non-Aggressive Group (1) Coeff.	p-value	Mixed Group (2) Coeff.	p-value	Aggressive Group (3) Coeff.	p-value	(1) – (3) p-value
UE	3.881	0.00***	2.841	0.00***	2.843	0.00***	0.03##
UE X QTR$_1$	-0.316	0.22	-0.068	0.87	-0.474	0.17	0.71
UE X QTR$_2$	0.045	0.91	0.420	0.18	-1.029	0.00***	0.05#
UE X QTR$_3$	-0.585	0.10*	0.795	0.01***	0.161	0.67	0.14
UE X QTR$_4$	0.320	0.16	-0.010	0.97	-0.151	0.70	0.30
UE X QTR$_5$	-0.243	0.34	-1.240	0.00***	-0.104	0.81	0.78
UE X QTR$_6$	-0.146	0.63	0.648	0.08	-0.217	0.61	0.89
UE X QTR$_7$	0.556	0.06*	0.069	0.87	-0.020	0.96	0.25
UE X QTR$_8$	0.016	0.96	-0.499	0.12	1.111	0.01***	0.04##
UE X QTR$_9$	-0.291	0.44	-0.048	0.91	-0.198	0.64	0.87
UE X QTR$_{10}$	0.280	0.42	0.004	0.99	-0.384	0.24	0.16
UE X QTR$_{11}$	-0.419	0.31	0.701	0.05*	0.104	0.82	0.39
UE X QTR$_{12}$	0.715	0.07*	-0.160	0.62	0.662	0.18	0.93
NONLINEAR	-17.866	0.00***	-17.097	0.00***	-19.703	0.00***	
MTB	-0.002	0.06*	-0.001	0.27	0.001	0.72	
BETA	0.000	0.96	-0.004	0.00***	-0.001	0.22	
SIZE	-0.001	0.53	-0.001	0.54	-0.001	0.27	
LOSS	-0.014	0.00***	-0.015	0.00***	-0.017	0.00***	
Q4	0.001	0.56	0.003	0.24	0.001	0.65	
PREDICT	0.000	0.58	0.000	0.86	-0.001	0.20	
PERSIST	0.000	0.57	0.000	0.84	0.000	0.78	
UE X MTB	-0.106	0.22	-0.261	0.00***	0.095	0.48	
UE X BETA	0.178	0.01**	0.238	0.00***	0.127	0.19	
UE X SIZE	0.074	0.55	0.082	0.57	-0.201	0.01***	
UE X LOSS	-1.632	0.00***	-0.836	0.00***	-0.753	0.01**	
UE X Q4	-0.457	0.01**	-0.056	0.79	-0.207	0.34	
UE X PREDICT	-0.054	0.27	0.045	0.24	-0.095	0.25	
UE X PERSIST	0.098	0.17	-0.082	0.29	0.229	0.01**	
CONSTANT	0.002	0.59	0.004	0.35	0.004	0.15	
Quarter-fixed	Yes		Yes		Yes		
Industry-fixed	Yes		Yes		Yes		
Adj. R^2	0.10		0.13		0.08		
N	6,875		3,706		4,398		
Firms	528		301		347		

* p<0.1; ** p<0.05; *** p<0.01; ERC-decline within the group (1) to (3), difference the pre- and post-restatement period.

# *p*<0.1; ## *p*<0.05; ### *p*<0.01; for each quarter, we use seemingly unrelated estimation (SUEST) to test coefficients between non-aggressive (1) and aggressive firms (3). Findings are based on less severe restatements.

This table reports the ERC change duration through the coefficient on *UE X QTR* for firms with non-aggressive (1), mixed (2) and aggressive (3) ex-ante non-GAAP reporting. The coefficient on *UE* constitutes the pre-period ERC. We regress unexpected returns (*UR*) on unexpected earnings (*UE*). Remaining control variables are described in Table C. The original sub-samples are reduced through the exclusion of observations with studentized residuals greater than 2.5 in absolute value. Due to missing observations in quartile 1 of non-GAAP aggressiveness, we use the second quartile of ex-ante aggressiveness to identify aggressive firms.

Table D5 CAR for Less Severe Restatements

CAR for Less Severe Restatements around the Restatement Announcement Date				
	Aggressive *n=347*	*Non-Aggressive* *n=528*	Dif.	p-value
CAR Mean	-0.0225	-0.0065	-0.0160	0.005***

***/**/* Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided). This table compares CARs between aggressive and non-aggressive firms that announcement less severe restatements.
Due to missing observations in quartile 1 of non-GAAP aggressiveness, we use the second quartile of ex-ante aggressiveness to identify aggressive firms.

Table D6 Institutional Ownership in the Pre-Period

Institutional Ownership in the Pre-Period				
	Aggressive *n=221*	*Non-Aggressive* *n=320*	Dif.	p-value
Institutional Ownership % Mean	0.5451	0.4750	0.0701	0.011**

***/**/* Significantly different between the pre- and post-restatement period at the 0.01/0.05/0.10 level (two-sided). This table compares the institutional ownership for aggressive and non-aggressive firms in the pre-period. Due to data availability of institutional ownership data, our sample size reduces to 221 (from 347) firm quarter observations for aggressive firms and to 320 (from 528) for non-aggressive firms in the pre-period.

Appendix References

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