Do we really know what we think we know about investors' reliance on GAAP and Non-GAAP earnings?

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ABSTRACT

Prior research concludes that investors perceive non-GAAP earnings to be more informative than GAAP earnings. We reassess the statistical models underlying this conclusion and refine these inferences by highlighting the perfect linear relation among GAAP earnings, non-GAAP earnings, and non-GAAP exclusions—a relation that materially affects how coefficients should be interpreted. Although researchers have preferred model specifications, regressions that include any two of these three components yield equivalent conclusions, but they differ in how easily the results can be interpreted. We demonstrate that these models capture three nuanced investor responses. We compare the relative magnitudes of these effects and find that the long-standing claim that investors react more to non-GAAP than to GAAP earnings is essentially a misnomer based on overly broad interpretations of estimated coefficients. Because we focus broadly on how to interpret coefficients in commonly used models, our evidence is relevant regardless of how researchers conceptualize non-GAAP disclosure strategies and could apply in other accounting settings. It also speaks to ongoing discussions among regulators and standard setters considering expanded oversight of non-GAAP reporting.

Keywords: Non-GAAP disclosure, Earnings response coefficients, Earnings informativeness, SEC regulation

1. Introduction

The disclosure of non-GAAP performance metrics has become commonplace in capital markets. Recent estimates indicate that nearly all S&P 500 firms disclose one or more non-GAAP measures in most quarters (e.g., Center for Audit Quality 2020). However, in the late 1990s and early 2000s, when the practice of reporting non-GAAP earnings was relatively new and it occurred rarely, investors, regulators, and academics were skeptical of these adjusted performance metrics. As a result, as part of the Sarbanes-Oxley Act of 2001, the U.S. Congress directed the SEC to issue regulations to reign in non-GAAP reporting, resulting in the implementation of Regulation G and other modifications to Regulation S-K. Because of this heightened focus on these metrics, much of the early research on non-GAAP reporting performs "horse races" between GAAP and non-GAAP performance metrics in an attempt to ascertain whether investors differentiate between them and which metric is more informative (Black et al. 2018). The overwhelming conclusion of these studies is that investors pay more attention to non-GAAP than to GAAP earnings (Bradshaw and Sloan 2002; Bhattacharya et al. 2003; Brown and Sivakumar 2003; Lougee and Marquardt 2004).[1] As a literature matures and researchers adopt a common foundation or paradigm, it is sometimes useful to evaluate the extent to which we really know what we "think" we know (Bamber et al. 2000). By reassessing influential research designs, we provide evidence indicating that the conclusion that investors react more to non-GAAP earnings relative to GAAP earnings is more nuanced than prior studies imply.

We assert that the question of whether investors react more to GAAP *or* non-GAAP earnings is fundamentally ill formed. Since Reg G requires a reconciliation from non-GAAP to GAAP earnings, when firms disclose non-GAAP earnings, investors' reaction surrounding the earnings announcement captures investors' response to *both* the non-GAAP *and* the GAAP information signals that are disclosed simultaneously. While there is substantial overlap between the two metrics, neither provides a complete information set on its own. Moreover, the large

[1] Appendix A summarizes prior research citing the seminal conclusion that non-GAAP earnings are more informative than GAAP earnings. This conclusion has been referenced in more than 250 subsequent papers.

overlap between the two metrics means that they are highly correlated with one another, so that any research design measuring investors' response to an earnings announcement that includes one and omits the other will generate biased estimates of their relations to market outcomes (a correlated omitted variable bias). Our first contribution is to quantify the degree of bias inherent in the application of simple linear regression (SLR) research designs and to interpret the evidence provided by prior research.

Because non-GAAP earnings differ from GAAP earnings only by the amount that managers exclude (i.e., exclusions), empirical models cannot simultaneously include GAAP earnings, non-GAAP earnings, and exclusions, since any one of these variables is an exact linear combination of the other two. Models that include any two of the three will generate equivalent conclusions, but the interpretation of the coefficients of interest is easier in some models than in others. Due to this definitionally mechanical relation between GAAP earnings, non-GAAP earnings, and exclusions, multiple linear regression (MLR) research designs that include any two of the three are not capable of identifying general market responses to just GAAP earnings or just non-GAAP earnings independently but rather reveal relatively narrow effects corresponding to specific scenarios implied by the researcher's choice of which two variables to include.[2]

First, suppose that we are interested in measuring investors' reaction to unexpectedly higher reported GAAP earnings (e.g., because of a one-time gain). If we also include unexpected non-GAAP earnings in the regression, effectively holding them constant, then the implication is that managers exclude the additional GAAP income component when calculating their reported non-GAAP earnings number, a scenario we call the "excluded income effect" (meaning the one-time gain is "excluded" in calculating non-GAAP earnings so that non-GAAP earnings remain

[2] To identify fully independent effects of non-GAAP and GAAP earnings surprises, a researcher would have to observe investors' behavior when they receive *only* GAAP earnings information or *only* non-GAAP earnings information and then compare the measured responses. While some companies disclose only GAAP earnings, any company that discloses non-GAAP earnings must also disclose GAAP earnings (and provide a reconciliation between the two). Since the SEC prohibits non-GAAP-only disclosures, this type of comparison is not possible. Therefore, it is impossible to fully disentangle the response induced by one earnings surprise relative to that induced by the other surprise.

unaffected).[3,4] Second, assuming that we are still interested in measuring investors' reaction to unexpectedly higher GAAP earnings, if we include net exclusions in the regression, effectively holding them constant, then the implication is that managers include the additional GAAP income component in calculating the non-GAAP earnings number, a scenario we refer to as the "included income effect" (meaning the one-time gain is "included" in non-GAAP earnings, resulting in a *higher* non-GAAP earnings figure).[5,6] In both cases, GAAP earnings exceed expectations, but the model choice determines whether the observed coefficient reflects investors' response when the unexpected GAAP income component (e.g., a one-time gain) is included in calculating non-GAAP earnings or when it is excluded—scenarios where we could reasonably expect investors' reactions to differ. Importantly, neither reaction can accurately be called the "overall" investor response to GAAP earnings, since they represent distinct and mutually exclusive situations. Third, we also define a "composition effect" that reflects investors' reaction when GAAP earnings remain constant but more of the GAAP earnings components are excluded in calculating non-GAAP earnings (meaning that while GAAP earnings remain unchanged, the relative composition of exclusions and non-GAAP earnings shifts so that the non-GAAP earnings number changes).[7]

We provide a detailed framework to guide and inform the interpretation of MLR model coefficients. Thus, our second contribution is to demonstrate how models that include any two of the three variables—GAAP, non-GAAP, and non-GAAP exclusions—will generate equivalent conclusions and to highlight that the interpretation of the directly estimated coefficients differs

[3] When considering GAAP expenses, the excluded income effect reflects situations where GAAP earnings *decrease* (e.g., because of a one-time asset write-down), but managers exclude the additional expense item in calculating non-GAAP earnings so that non-GAAP earnings do not change. In other words, managers' increased exclusions offset the asset write-down so that non-GAAP earnings do not decrease along with GAAP earnings.
[4] Early non-GAAP reporting research often "horse races" GAAP versus non-GAAP earnings by including both unexpected GAAP earnings and unexpected non-GAAP earnings in the same model (e.g., Bradshaw and Sloan 2002, Bhattacharya et al. 2003, Lougee and Marquardt 2004, Marques 2006) and interprets the coefficients on these variables as investors' response to one earnings surprise variable while controlling for the other earnings surprise. The coefficient on the GAAP earnings surprise in these models actually captures the "excluded income effect."
[5] When considering GAAP expenses, the included income effect reflects situations where GAAP earnings *decrease* (e.g., because of a one-time asset write-down), but managers do not exclude the additional expense item (i.e., exclusions remain constant) so that non-GAAP earnings also decrease by the same amount as the decrease in GAAP earnings. In other words, since managers don't change exclusions, the asset write-down decreases both GAAP and non-GAAP earnings by the same amount.
[6] More recent studies that perform "horse race" regressions include unexpected non-GAAP earnings and unexpected exclusions in the same model (e.g., Bradshaw et al. 2018, McVay et al. 2024) and interpret the coefficient on unexpected non-GAAP earnings as investors' response to the non-GAAP earnings surprise variable while controlling for the exclusions surprise. The coefficient on the non-GAAP earnings surprise in these models actually captures the "included income effect."
[7] In the early "horse race" studies (e.g., Bradshaw and Sloan 2002, Bhattacharya et al. 2003, etc.) that include both unexpected GAAP earnings and unexpected non-GAAP earnings in the same model, the coefficient on the non-GAAP surprise actually captures this "composition effect."

depending on the specification being considered. The results from these analyses highlight the tendency of researchers to overgeneralize their results, extending them beyond the more limited and nuanced inferences that the coefficients actually imply.

We use the expanded sample of non-GAAP earnings disclosures collected by Bentley et al. (2018) in a series of pooled regression analyses to estimate the three investor responses identifiable using a MLR regression model: (1) the excluded income effect, (2) the included income effect, and (3) the composition effect. Our results suggest that market participants exhibit much stronger reactions to GAAP earnings components that are *included* in computing non-GAAP earnings (the included income effect) than to GAAP earnings components that are *excluded* to arrive at non-GAAP earnings (the excluded income effect). Our results also indicate that investors respond more to GAAP earnings components *included* in non-GAAP earnings than to exclusion surprises, which influence non-GAAP earnings through the *composition* of exclusions rather than higher GAAP earnings. We consider this evidence to be striking considering the commonly held belief that investors focus primarily on non-GAAP earnings. Our results suggest that investors believe non-GAAP disclosures provide incrementally useful information, and that it is the combination of *both* the GAAP *and* the non-GAAP numbers disclosed in tandem that motivates investors' actions.[8]

Considering the fact that investors' preferences and beliefs regarding managers' motives may vary over time, we also estimate annual regressions for the years 2003 to 2020 and find that the estimated effects are largely consistent over time. Interestingly, in most years, we do not find a significant difference between the included income and the composition effects. However, in 2009, 2010, 2016, and 2018, the included income effect is significantly higher than the composition effect. That is, investors seem to place less weight on managers' non-GAAP disclosures (i.e., the composition effect) when economic times are tough and perhaps the

[8] Prior research and consistent statements from managers suggest that non-GAAP earnings isolate a firm's "core performance" by excluding non-recurring and non-cash items, aiding in forecasting future cash flows. However, one-time items can still theoretically have sizeable effects on firm value (e.g. by enabling the financing of otherwise unaffordable positive-NPV investment projects), and many firms regularly exclude recurring items, indicating that non-GAAP disclosures serve purposes beyond simply presenting recurring earnings. Moreover, Griffin and McInnis (2025) find that investors ignore firms' exclusions of non-cash recurring items (i.e., stock-based compensation and amortization of intangibles from acquisitions), suggesting that these adjustments do not meaningfully influence investors' assessments of core performance. However, the very low magnitude of the estimated "excluded income" effect suggests that investors believe that managers of the average firm accurately identify less value relevant items.

incentives to make aggressive exclusions are stronger. Thus, our third contribution is to provide evidence that investor reactions reflect the combined information in both GAAP and non-GAAP disclosures, challenging the view that investors primarily rely on non-GAAP earnings.

We also investigate the degree to which financial analysts respond to GAAP and non-GAAP disclosures by observing their forecast revisions in the short window surrounding earnings announcements. These analyses yield similar inferences relative to those based on stock returns. Pooled regression analyses indicate that analysts generally make larger revisions in response to included income signals compared to excluded income or composition signals. Since analysts are generally considered to be more sophisticated than the population of retail investors, this pattern of results suggests that analysts likewise rely significantly on the informational signals provided by managers via their choices to include or exclude unexpected GAAP earnings components and changes to the composition of non-GAAP exclusions. We also assess whether analysts' preferences vary over time by estimating annual regressions of analysts' forecast revisions over our sample period. The results indicate that analysts have consistently responded significantly to both the included income and composition portions of performance surprises although we do not find clearly identifiable intertemporal patterns.

Finally, we estimate firm-specific versions of our main regression comparing the included income and composition effects using each firm's individual time series. Time-series estimations are subject to different costs and benefits relative to cross-sectional analyses. This approach allows for the possibility that investors may find non-GAAP disclosures of some firms to be more reliable and informative than others, an effect that may not be observable in cross-sectional tests. Based on these firm-specific analyses, we classify firms into three categories: those for which investors respond (1) significantly more to the included income effect, (2) significantly more to the composition effect, or (3) insignificantly different between the included income and composition effects. We find that, for the vast majority of firms (81 percent), the magnitude of the included income and composition effects is not significantly different. However, we find that, consistent with our pooled results, the included income effect is significantly higher than the composition effect for 12.3 percent of firms. Yet, we also find that for 6.7 percent of the firms in our sample, the composition effect is significantly higher than the included income effect. In these situations, the excluded income effect is actually negative. This result suggests that, for a small subset of firms, investors may perceive certain exclusions to be inappropriate or overly aggressive. Consequently, we find a muted reaction to unexpected GAAP expenses that increase exclusions proportionally, thereby leaving non-GAAP earnings unaffected. We conduct a similar firm-specific analysis of analysts' forecast revisions. This analysis generates similar conclusions that for the vast majority of firms (70 percent), the magnitudes of the included income and composition effects are not significantly different, but for a small subset of firms these effects differ.

Our evidence contributes to the non-GAAP reporting literature in several important ways. First, by quantifying the degree of bias in SLR models that separately include either GAAP or non-GAAP earnings and interpreting the models after accounting for this bias, the evidence is not consistent with the notion that investors strongly favor non-GAAP earnings. This insight adds significant nuance to the formative non-GAAP reporting literature that has interpreted the larger coefficient on non-GAAP earnings as strong evidence that investors prefer non-GAAP earnings relative to GAAP earnings.

Second, our MLR framework and empirical tests reveal that while models including any two of the three metrics—GAAP earnings, non-GAAP earnings, or non-GAAP exclusions—yield equivalent inferences, interpreting the coefficients is challenging due to the deterministic relation among these measures. This relation indicates that each coefficient reflects an investor response to a specific, narrow scenario, and our full reconciliation of the various models reveals that an accurate interpretation depends on which variable is held constant in each model. Finally, our results challenge the widely held belief that investors consistently prefer non-GAAP relative to GAAP earnings, revealing a far more nuanced dynamic than prior studies suggest. The substantial regulatory attention and enforcement costs associated with non-GAAP disclosure suggest a concern among regulators about potential overreliance on these metrics. Our results suggest that market participants are heavily influenced by non-GAAP earnings disclosures, but when used *in conjunction with* and not as *a replacement for* GAAP earnings, consistent with a more sophisticated understanding than prior research suggests. If regulatory concern arises from the possibility that investors place undue reliance on non-GAAP earnings without considering GAAP earnings, our results suggest that these concerns may be less warranted than previously assumed.

Our evidence could apply in other settings in accounting where researchers compare metrics that are deterministically related, such as earnings, cash flows, and accruals. Careful interpretation of coefficients comparing earnings and cash flows would be analogous to comparisons of GAAP and non-GAAP earnings.

2. Comparing investor reactions to GAAP and non-GAAP earnings disclosures

For many years, managers, analysts, and investors have calculated and promoted the use of financial performance metrics other than regulation-compliant, bottom-line net income to better inform investment decisions. For example, the famous idiom that "cash is king" (i.e., of greater general importance than reported bottom-line earnings) appears in business textbooks dating back to at least the late 19th century.[9] More recently, in the 1970s, billionaire American investor John Malone championed the use of EBITDA (earnings before interest, taxes, depreciation, and amortization) over traditional metrics such as EPS (earnings per share). For many years after the SEC's inception (i.e., 1930s – 1980s), external investors and analysts would commonly use non-regulated metrics while managers would focus on GAAP-sanctioned measures and exercise caution in disclosing non-GAAP metrics. During this period, managers likely feared that placing too much emphasis on non-GAAP measures would increase the risk of sanctions from the SEC and legal challenges from potentially misled investors.

[9] McLean, G.N. 1890. "How to Do Business: Or The Secret of Success in Retail Merchandising" J. Jackson Pub.

However, with the advent of the "information age," characterized by access to low-cost and rapid mass communication and data analysis, managers have increasingly sought to control the narratives surrounding their own performance in myriad ways, including an ever-increasing willingness to disclose and accentuate non-GAAP performance metrics. This practice that once seemed uncommon and risky has effectively become standard procedure, with 94% of S&P-500-listed firms disclosing at least one non-GAAP metric in 2020 (Center for Audit Quality 2020). While regulators have expressed concern about firms using non-standardized measures to opportunistically mislead investors and obfuscate poor performance (SEC 2001), managers value the opportunity to present an alternative view of their firm's core performance.

Naturally, a key question of interest to researchers, regulators, investors, and managers alike is whether financial markets actually trust and rely on these un-audited, non-standard financial disclosures and, if so, to what extent do they appear to influence market outcomes. As non-GAAP earnings disclosures became more frequent and gained prominence in the late 1990s and early 2000s, researchers began to address these questions. Early academic research on non-GAAP disclosures primarily employs an earnings response coefficient (ERC) approach to assess and compare equity market reactions to firms' GAAP earnings announcements and their non-GAAP earnings releases (Bradshaw and Sloan 2002; Bhattacharya et al. 2003; Brown and Sivakumar 2003; Lougee and Marquardt 2004). While these studies differ in terms of sampled firms and time periods, the measures of non-GAAP earnings, and the calculation of abnormal returns, they all arrive at the same general conclusion—estimated non-GAAP ERCs appear to be greater in magnitude than the estimated GAAP ERCs. The harmonious results from these early analyses have engendered a long-lasting conclusion among academic researchers that "investors pay more attention to non-GAAP performance metrics than to standard GAAP earnings when looking for a summary assessment of performance" (Black et al. 2018).[10]

[10] An unanswered concern that lingered in this literature was whether conclusions from this early literature could be attributable to measurement error because researchers generally used the same expectation for calculating both GAAP and non-GAAP earning surprises. Once GAAP forecasts became widely available, Bradshaw et al. (2018) conclude "…Correcting for this measurement error, we settle a long-standing debate regarding investor preference for GAAP versus non-GAAP earnings and provide strong evidence of a preference for non-GAAP earnings."

However, disentangling market participants' distinct reactions to GAAP and non-GAAP earnings is difficult in this context for two fundamental reasons. First, ERC-based research designs focus on a single market-based outcome (i.e., the change in equity prices in short windows surrounding earnings announcements), which holistically reflects investors' response to *numerous* informational signals, including GAAP earnings, non-GAAP earnings, and many other contemporaneous factors. Accurately identifying the marginal effect of any one factor on equity returns requires careful consideration of the confounding effects stemming from all other potentially correlated factors. Second, the average percentage of overlap between GAAP and non-GAAP earnings is 58.41%.[11] In a sense, the two earnings measures generally convey much of the *same* information. Therefore, in contrast to standard empirical regression settings, it is not straightforwardly possible to isolate the influence of one metric while holding the other "fixed," since they are so essentially intertwined with each other. Therefore, we cannot identify real-world investors' responses *solely* to non-GAAP earnings disclosures.

Fundamentally, the question of whether non-GAAP earnings are relatively more informative than GAAP earnings is somewhat ill formed. Truly answering this question would require a research design in which the researcher can fully identify the distinct effects of non-GAAP and GAAP earnings surprises independently of one another. It would require the researcher to observe investors' behavior when they receive *only* GAAP earnings information or *only* non-GAAP earnings information and then compare the measured responses. While some companies disclose only GAAP earnings, any company that discloses non-GAAP earnings since the advent of Regulation G in 2003 must also disclose GAAP earnings with at least equal prominence and provide a reconciliation between the two metrics. Since the SEC prohibits non-GAAP-only disclosures, this type of direct comparison is not feasible using archival data.

[11] Calculated as the average ratio of GAAP ÷ non-GAAP earnings (when GAAP < non-GAAP earnings) or non-GAAP / GAAP earnings (when non-GAAP < GAAP earnings) across all firm-quarter observations for which both GAAP and non-GAAP earnings are positive, using the sample data described in table 1.

Given these challenges to empirical identification, we next discuss several important considerations regarding the inferences promulgated by prior research in this area. Moreover, we delineate and provide empirical estimates of the precise investor reactions to GAAP and non-GAAP earnings disclosures that can be identified using archival financial data to help reinterpret prior research and update our understanding of the role that non-GAAP information plays in modern financial markets.

2.1. SLR models and omitted variable bias

Early research on investor reactions to non-GAAP disclosures estimates various forms of the following simple linear regression model, [12]

$$AbRet_{it} = \alpha + \beta Forecast\_Error_{it} + e_{it}, \quad (1)$$

where *i* denotes a specific firm, *t* denotes the period of the earnings announcement, *AbRet* denotes some form of market-adjusted abnormal returns (typically calculated over a short window of time surrounding firms' earnings announcements), and $Forecast\_Error$ would either be the GAAP (FE_GAAP) or non-GAAP (FE_NG) forecast error as defined by earnings expectations based on analysts' consensus forecasts or prior period earnings (Bradshaw and Sloan 2002; Bhattacharya et al. 2003; Brown and Sivakumar 2003; Lougee and Marquardt 2004) [13] Mathematically, $FE\_GAAP = GAAP - \widehat{GAAP}$, where $GAAP$ represents the GAAP earnings number, $\widehat{GAAP}$ represents its forecasted value, and likewise for non-GAAP earnings. In terms of inferences, Bhattacharya et al. (2003) state, "the earnings response coefficient and the adjusted-R^2 value from each regression provide measures of the informativeness of the respective earnings metrics."

To illustrate the potential shortfalls associated with comparing SLR regression estimates in this manner, Figure 1 provides an anecdotal example using simulated data. First, we define 100

[12] From an econometric research design perspective, these early studies implicitly invoke some fairly strong assumptions about the fundamental relations between earnings surprises and markets. Since their regression models utilize pooled cross-sectional data sets without including any fixed effects, they do not allow for variance in market reactions between different firms, industries, or time periods, nor do they adjust the standard errors for potential heteroskedasticity or clustering in the error structures. Moreover, prior research also explores how estimates of ERCs such as the β coefficients in these models are sensitive to the addition/omission of several firm-specific covariates that would not be accounted for by the broad market adjustments implemented in defining the abnormal returns used as dependent variables (Collins and Kothari 1989).

[13] See Appendix B for a summary table of research designs implemented in prior non-GAAP research.

values for a generic dependent variable, y, based on the values of two randomly generated explanatory variables, x_1 and x_2, using the following specification: $y_i = 5 + 1.1\, x_{1i} + 0.8\, x_{2i} + e_i$, where x_1 and x_2 are positively correlated and e is a normally distributed, mean-zero error term. Next, we use OLS to regress y on x_1 by itself ($y_i = \alpha_1 + \beta_1 x_{1i} + e_{1i}$) and then on x_2 by itself ($y_i = \alpha_2 + \beta_2 x_{2i} + e_{2i}$) in two separate SLR models, which yield coefficient estimates of 1.22 for x_1 and 2.38 for x_2, relative to their true values of 1.1 and 0.8, respectively. While the estimated coefficient on x_1 from its SLR model is fairly accurate, the SLR model using x_2 yields an estimate suggesting that its marginal association with y is roughly twice as high as that of x_1 even though its true marginal effect is actually relatively smaller. As this example illustrates, the well-known bias that results from failing to account for the correlation between explanatory variables can result in very skewed inferences. Moreover, despite the estimated coefficient value being much larger, the R^2 value of 0.47 from the SLR model featuring x_2 alone is roughly half that of the R^2 of 0.95 from the x_1 model. Due in part to the potential for such conflicting inferences,[14] we focus our analyses on comparing estimated coefficient values since they better reflect the construct of "informativeness" as a measure of the magnitude of investors' reactions to earnings news, whereas an R^2 statistic only quantifies the degree of linearity between two variables.[15]

As illustrated in this example, the SLR regression models represented by equation 1 are problematic since they do not acknowledge the potential for GAAP and non-GAAP forecast errors to be correlated with one another. That is, in attempting to estimate the effects of GAAP and non-GAAP earnings on returns in isolation from one another, a researcher implicitly imposes the assumption that investors only care about one surprise or the other, even though investors would

[14] In the context of SLR models, the estimated coefficients and the associated R^2 values are closely related. Specifically, the estimated coefficient on x_2 will be greater than that on x_1 so long as $Cov[y, x_2]/StDev[x_2]^2 > Cov[y, x_1]/StDev[x_1]^2$, and the R^2 associated with x_2 will be greater than the R^2 associated with x_1 so long as $Cov[y, x_2]/StDev[x_2] > Cov[y, x_1]/StDev[x_1]$. In most cases, the estimated coefficient and the R^2 will both be higher for one variable relative to the other, but it is possible for the inequalities to disagree, as demonstrated by our example.

[15] In other words, the inability of any single piece of accounting information to explain a large degree of the variance in equity returns does not automatically imply that the market is not very *responsive* to that information. Rather, it may simply suggest the market is additionally responsive to several other factors and/or that the relation between returns and the accounting information is fairly nonlinear. Conversely, it's also possible for an explanatory variable in a SLR model to simultaneously yield both an R^2 that is very close to 1.00 and an estimated coefficient that is very close to zero in value. In such a case, even though the R^2 may be very high, we assert that it would be an abuse of language to describe the explanatory variable as being highly "informative" given its apparent low economic significance.

in practice receive *both* signals at the same time. For example, an investor choosing to buy, hold, or sell a particular equity stake would likely base their decision not only on an unanticipated increase in the bottom-line GAAP earnings number announced by the firm but also on a relatively low non-GAAP earnings number concurrently provided by managers perhaps eager to emphasize that the higher GAAP number was attained via a one-time windfall of additional revenue.

Estimating the distinct GAAP and non-GAAP reactions in separate SLR regressions would not pose an econometric challenge to the identification of these individual responses if they did not covary with one another. However, the correlation between FE_GAAP and FE_NG is mechanically present by definition due to the intrinsically close relation between the constructs of GAAP and non-GAAP earnings. More precisely, we can express the relation between GAAP earnings ($GAAP$) and non-GAAP earnings (NG) in the following three ways:

$$GAAP \equiv NG - EXCL \qquad (2a)$$
$$NG \equiv GAAP + EXCL \qquad (2b)$$
$$EXCL \equiv NG - GAAP, \qquad (2c)$$

where *EXCL* denotes the net expenses managers choose to be exclude from the FASB-mandated GAAP earnings calculation.[16] It is important to emphasize that all three of these expressions are equivalent and represent the same accounting identity (i.e., no matter which way your arrange the elements, this relation between *GAAP*, *NG*, and *EXCL* must always hold true for any and all potential values and in all contexts).[17] Moreover, the same relations hold when expressed in terms of forecast errors, so that we can also state the following identities:[18]

$$FE\_GAAP \equiv FE\_NG - FE\_EXCL \qquad (3a)$$
$$FE\_NG \equiv FE\_GAAP + FE\_EXCL \qquad (3b)$$
$$FE\_EXCL \equiv FE\_NG - FE\_GAAP. \qquad (3c)$$

[16] In contrast to *GAAP* and *NG*, which we express in units of net *income*, we express *EXCL* in units of net *expenses* because (1) managers have historically chosen to exclude more expenses and losses than revenues or gains, on average, and (2) we believe this approach facilitates a more intuitive comparison of estimated regression coefficients in our subsequent analyses. Alternatively expressing *EXCL* in units of net income would not have a material effect on any our inferences.

[17] We use tribar notation (≡) where appropriate to denote a mathematical identity and emphasize the absence of an independent/dependent relation among the variables therein.

[18] For example, starting with the identity in equation 2a and using "^" to denote an estimated value, we can write:

$$GAAP \equiv NG - EXCL$$
$$GAAP - \widehat{GAAP} \equiv NG - EXCL - \widehat{GAAP}$$
$$GAAP - \widehat{GAAP} \equiv NG - EXCL - (\widehat{NG} + \widehat{EXCL})$$
$$GAAP - \widehat{GAAP} \equiv \left(NG - \widehat{NG}\right) - (EXCL - \widehat{EXCL}\ )$$
$$FE\_GAAP \equiv FE\_NG - FE\_EXCL$$

For example, equation 3a indicates that an unexpectedly higher level of reported GAAP earnings must necessarily coincide with either an unexpectedly higher level of non-GAAP earnings or an unexpectedly higher level of excluded expenses. Therefore, in the context of comparing responses to GAAP and non-GAAP disclosures, the β coefficient estimates from equation 1 will suffer from a correlated omitted variable bias that distorts the inferences from these simple regression models.

As an illustrative analogue, suppose a researcher were interested in comparing the relative market responses to bottom-line earnings versus cash flows. Regressing returns on earnings may yield an estimated coefficient that reflects the market's general reaction to earnings, but the estimated coefficient from a simple linear regression of returns on cash flows alone would clearly be biased since cash flows are correlated with accruals and market returns are jointly informed by accruals (Dechow 1994).[19] Therefore, comparing the coefficients from these two regressions would not provide a clear picture of the relative importance of each to investors.

In Section 4.1, we use real-world data from the past two decades of U.S. non-GAAP reporting to quantify the size of the bias in the SLR regressions presented in equation 1 and discuss how our inferences are affected by addressing the inherent econometric issues outlined here.

2.2. Interpreting MLR model coefficients

Whenever context and theory suggest that an outcome variable may depend on two or more independent variables, the standard approach to research design involves the implementation of a multiple linear regression model, whereby each independent variable's influence on the dependent variable can be estimated while "controlling for" any covariation with the other independent variables. By so doing, the correlated omitted variable bias discussed previously can be mitigated, thereby allowing for more accurate inferences. Many prior studies in the non-GAAP reporting literature utilize various forms of MLR designs including both GAAP and non-GAAP earnings as independent variables in addition to the SLR models discussed in the previous section (Bradshaw

[19] We do not intend to suggest that SLR models are never of any utility. For example, Dechow (1994) uses SLR models to assess the explanatory powers of net income and cash flows in relation to market returns, where the focus in that study is more on like-for-like comparisons between different time horizons rather than a horse race between net income and cash flows, per se.

and Sloan 2002; Bhattacharya et al. 2003; Lougee and Marquardt 2004; Bradshaw et al. 2018). However, the correct interpretation of the coefficients in these models is unusually challenging, due to the deterministic relations between the variables expressed in equations 3a, 3b, and 3c. When the independent variables in a regression model exhibit rigidly defined relations with one another, focusing solely on any one independent variable's coefficient estimate may misattribute the size of the effect that variable has on the dependent variable.

In most cases, the application of OLS regression methods yields coefficient estimates that permit a straightforward interpretation of the marginal effects of changes in the corresponding independent variables on the dependent variable. As a starting point, consider the following generic regression model,

$$y = \alpha + \beta_x\, x + \beta_z\, z + e,$$

where e represents a mean-zero error term. Applying an expected value operator and partially differentiating with respect to the presumed variable of interest, x, yields the following expression:

$$\frac{\partial E[y]}{\partial x} = \beta_x + \beta_z\, \frac{\partial z}{\partial x}.$$

Most of the time, researchers are interested in estimating *ceteris paribus* effects, meaning that we want to know how y responds to a change in x alone, while everything else is being "held constant." In the context of the previous expression, *ceteris paribus* simply means that we set the value of $\partial z/\partial x$ to zero, leaving β_x to express the entire marginal effect. In practice, particularly when we have evidence to believe that x and z are correlated, we may not expect $\partial z/\partial x$ to actually ever perfectly equal zero. Rather, when interpreting regression results, we are conducting a hypothetical "thought experiment" to highlight the individual effects of each independent variable.

However, in some regression contexts, it may be unreasonable to even consider imposing the assumption that $\partial z/\partial x = 0$. In the extreme, degenerate case where $z = x$, asking the question of how a change in x affects y while holding z constant obviously does not make any sense, since it would be impossible for this situation to occur. Because of the identities expressed in equations

3a, 3b, and 3c, we face similar challenges in attempting to cleanly estimate the marginal effects of GAAP and non-GAAP earnings disclosures when using a MLR model.

To better illustrate the issues involved with making correct inferences in a MLR non-GAAP ERC context, we next introduce a menu of regression model options. SLR models are unattractive because they do not account for the confounding correlation between GAAP earnings, non-GAAP earnings, and net excluded expenses. At the other extreme, we can't regress abnormal returns on GAAP, non-GAAP, and excluded expenses all at once to identify their individual effects because the linear relation between these variables expressed in equations 2a, 2b, and 2c imply that they exhibit *perfect* collinearity, thereby rendering OLS impossible to implement.[20] Therefore, we can only consider models that include at most any two elements (from GAAP, non-GAAP, and exclusions) as independent variables, yielding the following three possible models:

$$AbRet_{i,t} = \alpha^{X} + \beta_{NG}^{X}\, FE\_NG_{i,t} + \beta_{G}^{X}\, FE\_GAAP_{i,t} + e_{i,t}^{X} \qquad (4a)$$
$$AbRet_{i,t} = \alpha^{G} + \beta_{NG}^{G}\, FE\_NG_{i,t} + \beta_{X}^{G}\, FE\_EXCL_{i,t} + e_{i,t}^{G} \qquad (4b)$$
$$AbRet_{i,t} = \alpha^{NG} + \beta_{G}^{NG}\, FE\_GAAP_{i,t} + \beta_{X}^{NG}\, FE\_EXCL_{i,t} + e_{i,t}^{NG}, \qquad (4c)$$

where subscripts identify the variable of interest and superscripts denote the variable that is *omitted* from that regression specification.

The key insight when considering these three models is that they all convey the *exact same* information about the effects of changes in GAAP earnings, non-GAAP earnings, and exclusion surprises on equity returns. Since the three variables are linear combinations of one another, estimating the coefficients from any one of these models provides no more, no less, nor any different knowledge about the association between the three variables and market returns than the others, as long as the meanings of the coefficients are interpreted carefully. Ultimately, the choice of model is a matter of heuristics since some models offer clearer interpretations of certain effects than others. Often, the choice of model seems to be a function of researchers' preferred framework for conceptualizing the relation between GAAP earnings, non-GAAP earnings, and exclusions.

[20] This would be the equivalent of the case where $x = z$ in the generic example. In other words, it's paradoxical to consider a change in non-GAAP earnings while both GAAP earnings and exclusions remain constant.

Researchers with a focus on "earnings persistence" tend to favor the relation defined in equation 2a, which expresses GAAP earnings as the combination of "core" earnings (proxied by non-GAAP earnings) and "transitory" earnings (proxied by exclusions),[21] which then naturally aligns with the regression model in equation 4b. On the other hand, papers with a focus on "voluntary disclosure" tend to favor equation 4c, which expresses non-GAAP earnings as the outcome of managers choice to exclude components of the GAAP earnings number (that is exogenously determined by FASB rules, verified by an external audit, and monitored by the SEC).

Although several prior studies use variants of equation 4 and comparable research designs, they phrase their inferences differently when interpreting their estimated results. For example, many prior non-GAAP reporting studies estimate regression models with GAAP and non-GAAP forecast errors as the independent variables, as in equation 4a, and then compare the magnitudes of the coefficients. Bhattacharya et al. (2003) state, "we find that [$\hat{\beta}_{NG}^{X}$] is significantly greater than [$\hat{\beta}_{G}^{X}$] ($p < 0.01$) suggesting that [non-GAAP] earnings are more informative than GAAP" earnings. Similarly, Bradshaw and Sloan (2002) find that "the difference between the [non-GAAP and GAAP] forecast error coefficients is significant (p-value 0.0001). Thus, overall it appears that investors are displaying an increasing preference for [non-GAAP EPS] over [GAAP EPS]." Lougee and Marquardt (2004) conclude that "[non-GAAP] earnings have incremental information content over GAAP earnings." In contrast, using the specification in equation 4b, Bradshaw et al. (2018) "find a significant incremental market response to [FE_EXCL]…indicating investors find the information in GAAP earnings incrementally informative relative to [non-GAAP] earnings."

The issue with these broad inferences is that estimation of equations 4a, 4b or 4c intrinsically do *not* identify investors' overall preferences for GAAP versus non-GAAP earnings disclosures *independently* since any two measures are fundamentally embedded within one another

[21] While managers often justify their disclosure of non-GAAP earnings as a means of identifying "core" earnings via the exclusion of "transitory" earnings, we consider it worth emphasizing that "core" earnings and non-GAAP earnings are *not* definitionally equivalent. The former is exogenous to managers' reporting choices, while the latter is not. In other words, a firm that does not disclose a non-GAAP earnings number will still have a latent amount of "core" earnings, and a firm that does disclose non-GAAP earnings may have arrived at that number by excluding some amount of "core" expenses (whether deliberately or otherwise).

and define the third measure.[22] Each coefficient captures the investor reaction to a specific and relatively narrow scenario, and the key to interpreting the coefficients accurately is to focus on what variable is being held constant in each model. Using any of the MLR regression models in equations 4a, 4b, and 4c, we can directly estimate two of three investor reactions and infer the third. We next define and provide numerical examples to illustrate the three nuanced effects.

2.3. Defining the three nuanced effects

2.3.1. The excluded income effect

First, suppose that we are interested in investors' reaction to an increase in the GAAP forecast error while holding the level of the non-GAAP forecast error fixed. The only way that FE_GAAP can take on higher values while holding FE_NG constant is if FE_EXCL were to take on lower values ($FE\_GAAP \equiv FE\_NG - FE\_EXCL$). Likewise, we can only observe smaller values of FE_EXCL while FE_NG remains constant if FE_GAAP exhibits higher values ($FE\_EXCL \equiv FE\_NG - FE\_GAAP$). We capture these mathematically equivalent effects using β_G^X in equation 4a, $-\beta_X^G$ in equation 4b, and the difference between β_G^{NG} and β_X^{NG} in equation 4c. These coefficients represent the marginal effect on abnormal returns in the specific hypothetical scenario where managers report higher GAAP earnings but simultaneously exclude the additional GAAP earnings in calculating their reported non-GAAP earnings—the excluded income effect. Table 1 illustrates this effect, beginning with a baseline model that assumes zero forecast errors. In the baseline, GAAP Revenue is $800 and Excluded Revenue (the portion removed in calculating non-GAAP earnings) is $3. In the example demonstrating the excluded income effect, GAAP Revenue increases unexpectedly to $801. The $1 increase is excluded in calculating non-GAAP earnings because Excluded Revenue increases from $3 to $4. As a result, the unexpected increase in GAAP Revenue does not affect on non-GAAP earnings—hence the term *excluded income effect*.

[22] As an analogy, suppose we attempt to assess fruit preferences by serving a random sample of individuals a bundle of apples and oranges and then survey their post-consumption levels of rated satisfaction. If we regress the consumers' ratings on the quantity of apples consumed and the total quantity of fruit consumed (i.e., apples plus oranges), the coefficient on the quantity of apples by itself does not convey the ceteris paribus effect on rated satisfaction associated with eating one more apple, since it's clearly impossible to increase apple consumption without *also* increasing the total quantity of fruit consumed.

2.3.2. The included income effect

Second, suppose that we are interested in investors' reaction to an increase in the GAAP forecast error while holding the level of the exclusions forecast error fixed. The only way that FE_GAAP could increase while FE_EXCL remains constant is if FE_NG were to increase by the same amount ($FE\_GAAP \equiv FE\_NG - FE\_EXCL$). Note also that the only way FE_NG could take on a higher value while FE_EXCL remains constant is for FE_GAAP to increase ($FE\_NG \equiv FE\_GAAP + FE\_EXCL$). Mathematically, these two concepts are equivalent. That is, while holding FE_EXCL fixed, the reaction to a change in FE_GAAP is the same as the reaction to a change in FE_NG. This effect is equivalently captured by β_G^{NG} in equation 4c, which measures investors' reaction to an increase in the GAAP forecast error while holding the exclusions forecast error fixed (and consequently allowing the non-GAAP forecast error to increase proportionate to the GAAP forecast error). Similarly, β_{NG}^{G} in equation 4b measures investors' reaction to an increase in the non-GAAP forecast error while holding the exclusion forecast error fixed (and consequently allowing the GAAP forecast error to increase in proportion to the non-GAAP forecast error). Importantly, the coefficient on the GAAP forecast error in equation 4c (β_G^{NG}) and the coefficient for the non-GAAP forecast error in equation 4b (β_{NG}^{G}) will be identical. Moreover, the same effect can also be expressed as the sum of β_{NG}^{X} and β_G^{X} from equation 4a. These coefficients reflect the included income effect, the marginal effect on abnormal returns when GAAP earnings are higher than expected and managers choose not to exclude the additional income thereby allowing it to "pass through" to the non-GAAP earnings number.[23] Table 1 also illustrates this effect. In the baseline, GAAP Expenses are \$700 and Excluded Expenses are \$8. In the example illustrating the included income effect, GAAP Expenses fall unexpectedly to \$699, increasing GAAP Net Income by \$1. Because Excluded Expenses remain unchanged at \$8, the \$1

[23] By interpreting the marginal effects solely in terms of the reported figures, rather than in terms of forecast errors, we implicitly assume that the corresponding forecasts remain constant in our hypothetical scenarios.

increase in net income is fully reflected in non-GAAP earnings. Thus, the unexpected decrease in GAAP Expenses increases non-GAAP earnings by $1 relative to the baseline.

These first two effects alone highlight the difficulty in drawing inferences from these regression models. Borrowing the parlance of previously referenced research, suppose that we are interested in investors' "preference for" or the "incremental informativeness of" GAAP earnings disclosures. The coefficients β_G^X from equation 4a and β_G^{NG} from equation 4b both reflect investor responses to unexpected increases in GAAP earnings and have been used in prior studies. However, they actually capture the investor reactions in two very different contexts: one in which the increase in GAAP earnings is excluded in calculating non-GAAP earnings and one in which it is not. Because managers send two very different signals about the additional GAAP earnings in these two scenarios, we would naturally expect investors to respond differently between the two scenarios. Simply describing either of these effects as the broad investor reaction to a "GAAP surprise" is inaccurate due to the lack of specificity. In our view, the common use of this kind of language in prior non-GAAP reporting research has facilitated excessively general inferences.

2.3.3. The composition effect

The third and final effect we can estimate is investors' reaction to an increase in the non-GAAP forecast error while holding the level of the GAAP forecast error fixed. Again, FE_NG can only take on higher values when FE_GAAP is fixed if FE_EXCL were to take on higher values ($FE\_NG \equiv FE\_GAAP + FE\_EXCL$). Likewise higher values of FE_EXCL must coincide with higher values of FE_NG when FE_GAAP remains unchanged ($FE\_EXCL \equiv FE\_NG - FE\_GAAP$). These equivalent effects are captured by β_{NG}^X in equation 4a, by β_X^{NG} in equation 4c, or equivalently by the sum of β_{NG}^G and β_X^G in equation 4b. These coefficients represent the marginal effect on abnormal returns in the case that a firm's unexpected GAAP earnings remain constant, but managers exclude *more* of that income than expected, resulting in an unexpectedly *higher* non-GAAP earnings number—the composition effect. Alternatively, this effect can also simply be viewed as the difference between the included and excluded income effects, as analogously demonstrated in other accounting contexts by prior research (e.g., Richardson et al. 2005). Again, Table 1 provides a numeric example. In the baseline, Excluded Expenses are $8. In the example illustrating the composition effect, GAAP Net Income remains unchanged at $100, but Excluded Expenses rise from $8 to $9. This $1 increase in exclusions raises Non-GAAP Income by $1. Thus, Non-GAAP Income increases even though GAAP Net Income did not deviate from expectations.

Importantly, early studies focus on two specific effects: the excluded income effect and the composition effect. Specifically, Bradshaw and Sloan (2002) and Bhattacharya et al. (2003) estimate and compare using the specification in equation 4a. Crucially, investor responses to (1) a *generic* change in unexpected GAAP earnings and (2) a change in unexpected GAAP earnings *specifically* when managers exclude that change in calculating their reported non-GAAP earnings are distinct constructs. Likewise, investor responses to (1) a *generic* change in unexpected non-GAAP earnings and (2) a change in unexpected non-GAAP earnings stemming *specifically* from a change in exclusions while GAAP earnings remain constant are distinct constructs. Therefore, in a MLR regression context, researchers should be careful not to mistake the latter constructs for the former constructs when drawing inferences from the estimated coefficient values. In other words, the model in equation 4a does not yield a comparison of investor reactions to GAAP versus non-GAAP earnings surprises, generally speaking, but rather a comparison of the relatively narrow excluded income and composition effects.

Likewise, more recent studies (Bradshaw et al. 2018 and McVay et al. 2024) have utilized regression specifications that include non-GAAP earnings surprises and exclusion surprises as independent variables (i.e., equation 4b) and thereby yield coefficient estimates that correspond to the included income and excluded income effects. With this model, the coefficients describe a case in which non-GAAP earnings are held constant (when considering the coefficient estimate for exclusions) and another in which non-GAAP earnings are increasing (when considering the coefficient estimate for non-GAAP earnings). But reported GAAP earnings are presumed to be increasing in *both* cases, meaning that the coefficients do not provide a comparison of investor reactions to GAAP versus non-GAAP earnings, generally speaking. Our analyses present estimation results based on the regression specification defined in equation 4c. We choose this specification, in part, because it offers direct estimates of the included income and composition effects, and a comparison of these two effects has not been previously presented in the non-GAAP reporting literature. We can observe all three effects from any form of the model and all three model specifications are ultimately equivalent, as illustrated in panel C of Table 4.

3. Data and research design

3.1. Sample selection

Our initial sample includes all firm-quarter observations with 8-K earnings announcements in the updated Bentley et al. (2018) dataset on managers' non-GAAP disclosures (196,135 observations). Panel A of Table 2 indicates that we restrict the sample to firm-quarters that report non-GAAP EPS[24] and have a non-missing earnings announcement date in Compustat, with matching dates in Compustat and I/B/E/S.[25] We also require non-missing values for all variables used in our main tests. These filters yield a final sample of 55,917 firm-quarter observations from calendar years 2003 to 2020, representing 4,046 unique firms. We winsorize all continuous regression variables at the 1st and 99th percentiles. Panel B of Table 2 indicates that the sample observations are fairly evenly distributed across years beginning around 2009. Consistent with prior research, we find that the frequency of non-GAAP reporting is lower in the earlier part of the sample period prior to the SEC staff's release of the first set of C&DIs in 2010.

3.2. Descriptive statistics

Panel A of Table 3 presents descriptive statistics for all variables used in our analyses. The mean value of unexpected non-GAAP earnings (scaled by stock price), *FE_NG*, is 0.002, while the mean of unexpected GAAP earnings, *FE_GAAP*, is -0.013. These statistics suggest that, on

[24] Specifically, observations for which $MGR\_NG\_EPS = 1$ in the Bentley et al. (2018) dataset.
[25] Due to discrepancies between the earnings announcement dates recorded in Compustat and I/B/E/S, we restrict our sample to those observations with consistent dates across databases, and also perform a manual accuracy check on a random selection of sample observations.

average, firms meet analysts' forecasts based on non-GAAP earnings but fall short when using GAAP earnings. The mean value of unexpected exclusions (*FE_EXCL*) is 0.015, indicating that firms, on average, exclude more expenses than anticipated to report higher non-GAAP earnings. Panel B of Table 3 presents pairwise correlations.

3.3. Research design

We utilize ERCs to measure the informativeness of GAAP and non-GAAP earnings announcements. For our main analyses, we use the following expanded version of equation 4c for firm i in fiscal quarter t:

$$AbRet_{it} = \alpha_i + \beta_G\ FE\_GAAP_{it} + \beta_X\ FE\_EXCL_{it} + \gamma\ Controls_{it} + \tau_t + \varepsilon_{it}, \quad (5)$$

where *AbRet* represents the market-adjusted buy-and-hold returns from one day before a quarterly earnings announcement through the day after the quarterly earnings announcement, α_i represents industry-level fixed effects, and τ_t represents time fixed effects. *FE_GAAP* is unexpected GAAP EPS, defined as the actual GAAP EPS minus the median of the most recent analysts' GAAP EPS forecasts. FE_EXCL is unexpected exclusions per share, defined as unexpected non-GAAP EPS minus unexpected GAAP EPS. We calculate unexpected non-GAAP EPS as manager-disclosed non-GAAP EPS minus the median of the most recent analysts' non-GAAP EPS forecast for the quarter. We scale FE_GAAP and FE_EXCL by the share price one day prior to the return window.

We follow prior research (Collins and Kothari, 1989; Chen et al., 2014; Chen et al. 2021) in adding several control variables (i.e., *LogSize*, *SalesGrowth*, *BM, Beta, EarnVol, Loss, Q4*). We first control for firm size using *LogSize*, defined by the natural logarithm of the firm's market value of equity at the end of quarter *t*. We also control for sales growth, *SalesGrowth*, defined as the increase in sales from quarter *t-4* to *t*, scaled by shares outstanding. *Loss* is an indicator variable equal to 1 if GAAP earnings in quarter *t* are negative, and 0 otherwise. *BM* is the book value of equity divided by the market value of equity. Both *SalesGrowth* and *BM* control for growth opportunities. *Beta* controls for firm-specific risk as proxied by a firm's estimated coefficient on the market excess return from a Fama-French three-factor model with an additional momentum factor for the 250-trading-day period ending two trading days before the earnings announcement date. *EarnVol* is the standard deviation of a firm's return on assets over at least five of the eight preceding quarters. *Q4* is an indicator variable equal to 1 if it is the 4th quarter of a firm's fiscal year, and 0 otherwise, which we include to control for differential investor reactions when annual earnings are also disclosed. We provide formal variable definitions in Appendix C.

Equation 5 provides direct estimates of the composition effect via β_X (the coefficient on FE_EXCL) and the included income effect via β_G (the coefficient on FE_GAAP). The composition effect conveys the reaction to unanticipated changes in reported non-GAAP earnings by way of managers' adjustments to their chosen exclusions while holding GAAP earnings fixed. The included income effect provides a sense of how investors respond to an increase in reported GAAP earnings that also flows to non-GAAP earnings.

In additional analyses, we also use the following similar regression specification:

$$Revision_{it} = \alpha_i + \beta_G\ FE\_GAAP_{it} + \beta_X\ FE\_EXCL_{it} + \gamma\ Controls_{it} + \tau_t + \varepsilon_{it}, \qquad (6)$$

where *Revision* represents changes in analysts' one-quarter-ahead forecasts of "street" non-GAAP EPS, based on the mean value of forecasts newly issued within a five-day window after the earnings announcement date relative to the last consensus forecast before the earnings announcement. All right-hand-side independent variables are the same as those defined in equation 5, which permits a similar estimation of included income, excluded income, and composition effects but in regard to analyst behavior, specifically. This context allows us to explore whether analysts, as representatives of relatively sophisticated market participants, process and respond to GAAP and non-GAAP earnings disclosures differently from general market participants, including relatively unsophisticated retail traders who may not have the same level of awareness and understanding of non-GAAP earnings and managers' exclusions.

4. Results

4.1. Reconciling prior research estimation methods

We begin our analyses by presenting a set of basic results to practically illustrate the research design issues outlined in section 2 and heuristically connect our inferences to those of prior research. Panel A in Table 4 presents coefficient estimates for the SLR model in equation 1 using each of the three variables of interest (*FE_NG*, *FE_GAAP*, and *FE_EXCL*) as well as the three possible MLR model specifications presented in equations 4a, 4b, and 4c. Since our focus in Table 4 is on the interpretation of and commonalities between the various regression models rather than the magnitudes and statistical significances of the coefficients, we estimate each regression without additional covariates, fixed effects, or clustered standard errors for ease of exposition.

The coefficient estimates in Panel A generally follow the same patterns of results seen in prior research, as summarized in Appendix B. The SLR models exhibit a higher coefficient on *FE_NG* in column 1 than the coefficient on *FE_GAAP* in column 2, consistent with the past interpretations that investors "prefer" non-GAAP earnings over GAAP earnings as espoused by Bradshaw and Sloan (2002), Bhattacharya et al. (2003), Brown and Sivakumar (2003), Lougee and Marquardt (2004), and Bradshaw et al. (2018).[26] Moreover, the estimates from the MLR model in column 4 similarly exhibit a greater coefficient on *FE_NG* than *FE_GAAP*, consistent with results from these studies, as well as Marques (2006).[27] Appendix B provides a summary of these studies and their methodologies. Panel B of Table 4 illustrates how the results of the SLR models in columns 1 – 3 of Panel A can be reconciled with those of the MLR models in columns 4 – 6 from an omitted-correlated-variable-bias perspective. According to statistical theory, the magnitude of this bias is expressed as follows:

$$E\left[\beta_k^j\right] - \beta_k = \rho_{k,j} \times \frac{\sigma_j}{\sigma_k} \times \beta_j \tag{7}$$

[26] Johnson and Schwartz (2006) utilized a slightly different research design by comparing the coefficient on *FE_NG* between two subsamples: firms that reported a manager-supplied non-GAAP earnings number and those that did not. While the magnitude of the two coefficients exhibited a similar relation and potential inference, the difference was statistically insignificant.

[27] Marques (2006) uses a similar but different regression model that does not yield coefficients estimates for *FE*_NG directly, but which can be inferred from other reported coefficient values. The results are somewhat of an outlier, likely due to the relatively small sample sizes and the inclusion of a menu of covariates not present in other studies.

where β_k^j represents the coefficient on variable k in a SLR model that omits variable j, β_k and β_j are the respective coefficients on variables k and j in the fully specified MLR model, σ_k and σ_j are the respective standard deviations of variables k and j, and $\rho_{k,j}$ denotes the Pearson correlation coefficient between variables k and j. Intuitively, this expression states that the estimated effect of k in the SLR model is equal to its true marginal effect as defined in the MLR model plus an over/under-allocated effect equal to the marginal effect of variable j times the degree to which j covaries with k.

For example, if the MLR regression specification in column 4 of Panel A were the "correct" model (in the sense that FE_GAAP is correlated with both $AbRet$ and FE_NG), then the coefficient estimate on FE_NG in the SLR model of column 1 will exhibit an omitted-variable bias as defined in equation 7. In this case, as indicated in bold type in Panel B of Table 4, the correlation between *FE_NG* and *FE_GAAP* of 0.200 (from Panel B of Table 3) times the ratio of their respective standard deviations of 0.074/0.011 (from Panel A of Table 3), times the marginal effect of FE_GAAP on $AbRet$ of 0.048 (from column 4 of Panel A of Table 4) yields a positive bias of 0.066, suggesting that the SLR model's estimate of 1.858 in column 1 *overstates* investors' reaction to non-GAAP earnings surprises relative to the MLR coefficient estimate of 1.792. In this way, every SLR model in columns 1 to 3 can be interpreted as a biased version of a better specified MLR model in columns 4 to 6.

In addition to the SLR-model coefficient on *FE_NG* being biased upward, Panel B of Table 4 also reveals how the omission of *FE_EXCL* from the SLR regression of abnormal returns on *FE_GAAP* causes the estimate of its coefficient to exhibit a relatively *severe* negative bias, resulting in an estimate of 0.101 instead of 1.840. A similar bias likely existed in every prior SLR study of investor reactions to GAAP and non-GAAP earnings disclosures. While both the upward bias on *FE_NG* and the negative bias on *FE_GAAP* work in tandem to give the impression that non-GAAP earnings is far more informative than GAAP earnings when comparing SLR coefficients estimates, it's primarily the latter bias that contributes to the ostensibly large difference between investor responses, due to the high degree of correlation between *FE_GAAP* and *FE_EXCL*.

In presenting Table 4, we reiterate and emphasize two important concepts from the discussion of model specifications in section 2. First, each SLR model can be viewed as providing biased coefficients, but the sign and magnitude of those biases depend on what is considered to be the omitted variable. For example, according to Panel B, the estimated bias embedded in the SLR coefficient of 1.858 on *FE_NG* could either be 0.066 or 0.018, depending on whether *FE_GAAP* or *FE_EXCL* is viewed as the omitted variable, respectively. Including both omitted variables is not viable, since doing so would induce perfect collinearity and render the model inestimable. In a purely mathematical sense, neither view is more "correct," as they simply yield coefficients representing different and distinct constructs. Fundamentally, Panel C demonstrates how all three MLR models provide equal estimates of the same three underlying constructs: the included income effect, the excluded income effect, and the composition effect, as defined in section 2.2.

Second, in our view, the overarching question of whether investors respond "more" to GAAP or non-GAAP disclosures is fundamentally ill formed and cannot truly be answered using estimates from the SLR nor the MLR models. Perhaps the closest we can get to such a comparison would be to focus on the "GAAP response" of 0.101 from column 1 of Panel A and the "non-GAAP response" of 1.840 from column 5. However, asserting that the market is "less responsive" to GAAP earnings than to non-GAAP earnings based on these results is somewhat convoluted, because an increase in non-GAAP income will also increase GAAP income, so this phrasing is merely obfuscating the deeper truth that the market appears to respond less to GAAP income because it's essentially responding less to excluded income.[28] From another perspective, if regression coefficients express the response to a unit change in the explanatory variables, then comparing a $1 increase in non-GAAP earnings to a $1 increase in GAAP earnings is somewhat

[28] Mathematically, the estimated coefficient on FE_GAAP from the SLR model in column 1 is just a function of the underlying terms (i.e., $Cov[AbRet, FE\_NG]$, $Cov[AbRet, FE\_EXCL]$, $Cov[FE\_NG, FE\_EXCL]$, $Var[FE\_NG]$, and $Var[FE\_EXCL]$) that define the OLS coefficients on FE_NG and FE_EXCL in column 5.

unfair, because the GAAP increase on average comprises a mix of non-GAAP earnings and exclusions, so it is akin to comparing a $1 increase in non-GAAP earnings to a $0.50 increase in non-GAAP earnings along with a $0.50 decrease in net excluded expenses. Rather than trying to broadly compare GAAP and non-GAAP reactions, we instead use the MLR models to articulate relatively narrow inferences by providing accurate estimates of the specific included income, excluded income, and composition effects. Therefore, in presenting our results, we focus on these three effects and the relative magnitude of each implied by our sample data.

4.2. Estimates of investors' reactions

Table 5 reports the results from estimating our chosen specification, as expressed in equation 5, using our full, cross-sectionally pooled sample. Column 1 reproduces the basic analysis from column 6 of Panel A of Table 4, while columns 2 – 4 assess the robustness of these results to alternative specifications that include additional covariates as well as industry and time-period fixed effects. Across all four model specifications, we find that the coefficients on both FE_GAAP and FE_EXCL, which represent the included income and composition effects, respectively, are significantly positive, and that the coefficient on FE_GAAP is significantly larger than that on FE_EXCL, implying that the excluded income effect is also significantly positive.

In terms of economic magnitudes, the estimated included income effect implies that a one percent increase in the GAAP earnings surprise, as a share of the firm's market value, corresponds to a three-day abnormal return surrounding the earnings announcement that is 1.757 percentage points higher, on average, specifically when managers also report the additional income as part of non-GAAP earnings. The estimated composition effect suggests that when investors forecast GAAP earnings accurately, but non-GAAP earnings are one percent higher than expected (as a share of market value), implying that net excluded expenses are also higher than expected, abnormal returns increase by 1.741 percentage points, on average. Thus, these two effects are very similar in magnitude, but the additional GAAP income intrinsic to the included income effect elicits a slightly larger response. In contrast, the estimated excluded income effect implies that excluding an unexpected one-percent increase in GAAP income (scaled by market value) is associated with the three-day abnormal return by only 0.016 percentage points. The sizeable difference between the included and excluded income effects suggests that investors find non-GAAP disclosures to be useful in determining the value-relevance of GAAP earnings surprises.

We also estimate equation 5 separately by calendar year to identify trends in these investor reactions over time. Table 6 presents the annual coefficient estimates from 2003 to 2020. Generally, we find that the pattern of results from the pooled sample is intertemporally consistent. A notable discrepancy is that the excluded income effect, represented by the difference between the estimated coefficients on FE_GAAP and FE_EXCL, is almost always statistically insignificant and even negative in some years. We posit that it is likely negative because the much smaller sample sizes available in any single year are insufficient to confidently distinguish the estimated effects from zero. More specifically, the estimated excluded income effect based on the full pooled sample of 55,917 observations is 0.0157 (rounded to 0.016 in column 4 of Table 5) and has a standard error of 0.008, implying that the smallest possible point estimate that would be statistically different from zero at a 5% significance level is 0.0162. By contrast, the year with the single biggest number of observations in our sample is 2018 with 4,690 observations. In Table 6, the estimated excluded income effect for 2018 is 0.0633 with a relatively much larger standard error of 0.040, implying that the smallest possible estimated effect our analysis could find statistically significant with such a small sample size is 0.0788. Therefore, we conjecture that this issue is a symptom of reduced statistical power, and the excluded income effect may likely nearly always be positive albeit so small in magnitude that it's difficult to accurately identify.

4.3. Estimates of analysts' reactions

In addition to investors, we also investigate the responses of a sophisticated group of market participants—financial analysts—to unexpected GAAP and non-GAAP earnings. Prior research has found that analysts tend to be more skeptical than investors when evaluating non-GAAP earnings (Bhattacharya et al., 2003). To examine whether we find similar results for analysts, we replicate the tests in Tables 4 and 5 using analysts forecast revisions as the dependent variable to measure their reactions to earnings news. Specifically, we replace abnormal returns (*AbRet*) in equation 5 with *Revision*, which measures the short-window (i.e., five days after the earnings announcement) change in the mean one-quarter-ahead analysts' consensus forecast. Accordingly, the coefficients on *FE_GAAP* and *FE_EXCL* can be interpreted as the extent to which GAAP earnings and exclusions inform analysts' forecasts of future non-GAAP earnings.

These analyses yield similar inferences to those based on equity returns. In column 4 of Table 7, the coefficients on *FE_GAAP* and *FE_EXCL* are 0.151 and 0.135, which reflect the included income and composition effects, respectively, and the difference between the two is 0.016, which represents the excluded income effect. In terms of economic significance, the estimated included income effect, suggests that a 1 percentage point increase in unexpected GAAP income (as a share of market value)—with exclusions held constant—generates a 0.152 percentage point increase in next-quarter forecasted non-GAAP earnings (as a share of market value).

All three effects are significantly positive and exhibit a pattern of relative magnitudes that is similar to that of the estimated effects on market returns. That is, the pooled regression analysis in Table 7 suggests that analysts generally react more to unexpected GAAP earnings that are included in non-GAAP earnings than to unexpected non-GAAP earnings that stem from changes in the composition of exclusions, and analysts respond the least to unexpected changes to GAAP earnings that are excluded from non-GAAP earnings. Because analysts are generally deemed to be more sophisticated, on average, than the general population of financial market participants, these results suggest that the equity return results in section 4.3 are not merely attributable to the reactions of relatively less-sophisticated retail investors that are being "mislead" by managers' non-GAAP disclosures. Instead, both equity investors (generally) and financial analysts (specifically) appear to find both GAAP and non-GAAP earnings disclosures to be informative when disclosed in conjunction with one another.

We also consider the possibility that analysts' preferences could vary over time by cross-sectionally estimating the model in equation 6 separately for each calendar year. We present the results in Table 8. While the estimates do exhibit some amount of intertemporal variation, the general pattern of results is largely consistent across time, suggesting that analysts have always valued the informational content of non-GAAP earnings disclosures in addition to traditional GAAP earnings news. One notable difference between the forecast revisions results in Table 8 and the equity return results in Table 6 is that the estimated excluded income effects on revisions are almost all significantly greater than zero in spite of the reduced statistical power resulting from smaller annual sample sizes. The exceptions include 2003, when the sample size is only 151 observations due to the relative rarity of managers providing non-GAAP disclosures at that time, and 2007, the only year for which the estimated effect is negative (albeit insignificantly so). This evidence suggests that the effect of unexpected GAAP earnings components that managers exclude are more clearly identifiable in the context of forecasting next-period income alone relative to the context of updating beliefs about the full financial valuation of a firm.

4.4 Firm-level analysis

Our analyses so far focus on large cross-sectionally pooled samples and annual sub-samples that feature many different types of firms. We attempt to control for the confounding effects of this cross-firm heterogeneity by including our chosen covariates and industry fixed effects, but it may be structurally true that the reactions to similar earnings news differs meaningfully between firms. For example, it is possible that market participants may find non-GAAP disclosures from some firms to be more reliable and informative than those of others. Therefore, our final analysis focuses on estimating market reactions to information at the individual firm level. Specifically, we estimate a simplified versions of equations 5 and 6 for each firm individually across time periods by regressing abnormal returns ($AbRet$) or forecast revisions ($Revision$) solely on FE_GAAP and FE_EXCL. For each firm, we estimate the coefficients on

FE_GAAP and FE_EXCL using all available firm-specific quarterly observations in our sample (Teets and Wesley, 1996).[29]

To assess the degree of cross-firm heterogeneity, we place each firm into one of three categories based on the relative sizes of the estimated coefficients on FE_GAAP and FE_EXCL in Table 9. A firm is included in the "Included income Effect > Composition Effect" group if $\hat{\beta}_G$ is statistically greater than $\hat{\beta}_X$, the "Included Income Effect = Composition Effect" group if the difference between $\hat{\beta}_G$ and $\hat{\beta}_X$ is statistically insignificant, or "Included income Effect < Composition Effect" group if $\hat{\beta}_G$ is statistically less than $\hat{\beta}_X$. For 12.26% (21.97%) of firms, the coefficient on FE_GAAP is significantly greater than the coefficient on FE_EXCL in the tests of abnormal returns (forecast revisions), while for 6.69% (8.27%) of firms FE_EXCL has a significantly greater coefficient than *FE_GAAP* in the tests of abnormal returns (forecast revisions), and we do not find a significant difference between the coefficients for the remaining 81.05% (69.77%) of firms.

Notably, for the "Included Income Effect < Composition Effect" category, these results suggest that the excluded income is actually significantly negative for a small subset of firms. While this scenario is theoretically possible, it's also somewhat counter-intuitive, since it implies that the market is "punishing" a firm by way of negative equity returns and/or downgraded earnings forecasts in response to the firm's reporting unexpectedly *higher* GAAP earnings. Importantly, this punishing effect occurs when managers simultaneously send a signal to investors and analysts by deliberately excluding those additional GAAP earnings from their reported non-GAAP earnings. We conjecture that these results may be indicative that the managers of the firms in this sub-sample may calculate non-GAAP earnings for which investors and analysts deem the exclusions to be inappropriate or overly aggressive.

[29] We require each firm to have at least eight quarterly observations when estimating firm-specific ERCs. We exclude our usual covariates from these regressions as they reduce the already-limited number of available degrees of freedom.

Overall, our time-series results are consistent with our cross-sectional results and indicate that investors generally respond similarly to unexpected GAAP earnings that flow through to non-GAAP earnings (included income effect) and non-GAAP earnings surprises stemming from unexpected exclusions (composition effect), but when a difference does manifest, GAAP earnings that pass through to non-GAAP earnings are more likely to garner the larger response.

5. Conclusion

Non-GAAP reporting, once met with skepticism, has become an important and accepted element of today's disclosure environment. Early research generally concludes that investors place greater weight on non-GAAP earnings relative to GAAP earnings. By reassessing the statistical models underlying this conclusion, we focus on the fact that GAAP, non-GAAP, and non-GAAP exclusions are perfectly linearly related, which makes standard empirical designs vulnerable to correlated omitted variable bias. Our analyses demonstrate that simple linear regression models that include only one of these measures generate biased coefficients and that models including any two of these measures yield equivalent results, with coefficients that reflect narrower investor responses than previously recognized.

The implication is that investor reactions are more nuanced than a simple "preference" for non-GAAP earnings. Instead, they reflect three distinct effects—the excluded income effect, the included income effect, and the composition effect. By identifying and quantifying these effects, we refine the interpretation of prior conclusions and offer a clearer framework for future research. Our results suggest that investors benefit from the complementary disclosure of *both* GAAP and non-GAAP information, underscoring the value of non-GAAP earnings disclosure when viewed alongside GAAP earnings. These insights contribute to a more balanced understanding of investor and analyst behavior, and they can inform ongoing discussions among regulators, standard setters, and researchers about how best to ensure transparency and decision-usefulness in financial reporting. These results could be applied in other settings comparing variables with deterministic relations among three measures (e.g., earnings, cash flows, and accruals).

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Appendix A: Citation summary of prior research

	Conclusions about Relative Informativeness	Total Top Journal Citations	Cited Conclusion	Challenged Conclusion	Cited Other Information
Bradshaw and Sloan (2002 JAR)	"...the market response to the Street earnings number has displaced GAAP earnings as a primary determinant of stock prices…"	140	77	3	63
Bhattacharya et al. (2003 JAE)	"...pro forma earnings are more informative and more permanent than GAAP operating earnings…"	84	48	2	36
Bradshaw et al. (2018 JAE)	"...provide strong evidence of a preference for non-GAAP earnings…"	34	16	0	18

This table presents the citation summary of three highly cited papers using model specification 4a and 4b. We capture citations from peer-reviewed publications in the top five accounting journals: *Journal of Accounting and Economics, Journal of Accounting Research, The Accounting Review, Contemporary Accounting Research,* and *Review of Accounting Studies*. Total citations equal the sum of the "cited conclusion" and "cited other information" categories. The "challenged conclusion" category is part of the "cited conclusion" category.

Appendix B: Review of research designs in prior research

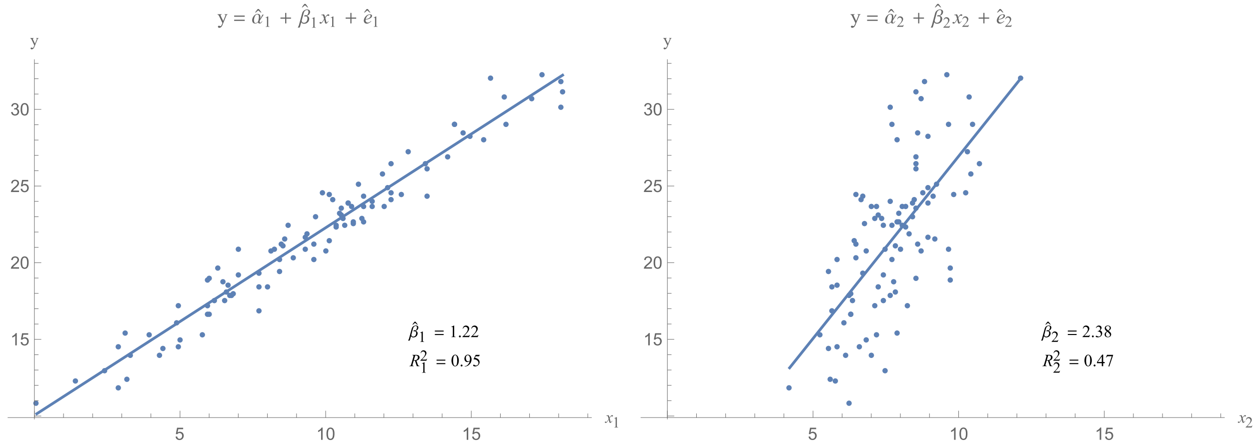
Paper	Coeff on *FE_NG*	Coeff on *FE_GAAP*	Coeff on *FE_EXCL*	Sample Date Range	*FE* Definition	*AbRet* Definition
Bradshaw & Sloan (2002 JAR)	1.815	-	-	1992-1997	NG = *IBES* actual EPS; $GAAP$ = *Compustat* income before extraordinary items; $\widehat{NG} = \widehat{GAAP}$ = *IBES* median consensus EPS; Scaled by fiscal-quarter-end stock price	Buy-and-hold returns from 2 days after previous EA to 1 day after current EA
	-	0.957	-			
	1.346	0.439	-			
Bhattacharya et al. (2003 JAE)	2.068	-	-	1998-2000	NG = Managers' press releases; $GAAP$ = *Compustat* income before extraordinary items; $\widehat{NG} = \widehat{GAAP}$ = *IBES* mean consensus EPS; Scaled by closing stock price 5 days prior to EA	Cumulative decile-size-adjusted returns over [-1,+1] window around EA
	-	0.111	-			
	0.162	0.027	-			
Brown & Sivakumar (2003 RAST)	1.345	-	-	1989-1997	NG = *IBES* actual EPS; $GAAP$ = *Compustat* operating income; $\widehat{NG} = \widehat{GAAP}$ = *IBES* mean consensus EPS; Scaled by fiscal-quarter-start stock price	Cumulative market-adjusted returns over [-1,+1] window around EA
	-	0.871	-			
Lougee & Marquardt (2004 TAR)	0.598	-	-	1997-1999	NG = Managers' press releases; $GAAP$ = *Compustat* income before extraordinary items; $\widehat{NG} = \widehat{GAAP}$ = Comparable earnings from *q-4*; Scaled by fiscal-quarter-end market cap	Cumulative equal-weighted-market-portfolio-adjusted returns over [0,+1] window around EA
	-	0.207	-			
	0.447	0.134	-			
Johnson & Schwartz (2005 CAR)	2.224	Non-GAAP-reporting firms		June-Aug 2000	NG = *Zacks Investor Research* actual; $\widehat{NG}$ = Most recent *Zacks* consensus; Scaled by stock price 23 days prior to EA	Cumulative size-adjusted returns over [-1,+1] window around EA
	1.418	Only-GAAP-reporting firms				
Marques (2006 RAST)	0.365	-0.136	-	2001	NG = Managers' press releases; $GAAP$ = *Compustat* income before extraordinary items; $\widehat{NG} = \widehat{GAAP}$ = *IBES* mean consensus EPS; Scaled by prior-calendar-quarter-end market cap	Cumulative value-weighted-market-portfolio-adjusted returns over [-1,+1] window around EA
	0.832	-0.285	-	2002		
	-0.124	-0.004	-	2003		
Bradshaw et al. (2018 JAE)	1.68	-	-	2003-2015	NG = *IBES* actual EPS; $GAAP$ = *IBES* actual GPS; $\widehat{NG}$ = *IBES* quarter-ahead consensus EPS; $\widehat{GAAP}$ = *IBES* quarter-ahead consensus GPS; Scaled by prior-fiscal-quarter-end stock price	Cumulative value-weighted-market-portfolio-adjusted returns over [-1,+1] window around EA
	-	0.36	-			
	1.897†	-	-0.129†			
McVay et al. (2024 TAR)	0.089	-	-0.021	2005-2019	NG = *IBES* actual EPS; $GAAP$ = *IBES* actual GPS; $\widehat{NG}$ = *IBES* quarter-ahead consensus EPS; $\widehat{GAAP}$ = *IBES* quarter-ahead consensus GPS; Scaled by total assets per share at fiscal quarter end	Cumulative value-weighted-market-portfolio-adjusted returns over [-1,+1] window around EA

† Estimates specifically from subsample where non-GAAP income meets/beats analysts' consensus forecast and GAAP income misses. Sign on *FE_EXCL* flipped for cross-study comparability.

Appendix C: Variable definitions

Variables	Definition
AbRet	Value-weighted market-adjusted (vwretd) buy-and-hold returns (ret) from one day before the quarterly earnings announcement to one day after the quarterly earnings announcement, [-1,+1].
Beta	Firm's coefficient loading on the market excess return from Fama-French three-factor model with momentum factor for the 250-trading day period ending two trading days before the earnings announcement date.
BM	Book value of equity (seqq) divided by the market value of equity (prccq× cshoq).
EarnVol	Standard deviation of return on assets (income before extraordinary items (ibq) divided by total assets (atq)) over at least 5 of the past 8 quarters.
EXCL	Exclusions per share, calculated as *NG_EPS – GAAP_EPS*
FE_EXCL	Unexpected exclusions, calculated as *FE_NG – FE_GAAP*.
FE_GAAP	Unexpected GAAP earnings, calculated as GAAP EPS (epsfiq) minus the most recent analyst consensus GAAP EPS forecast, scaled by the opening share price one day prior to the return window.
FE_NG	Unexpected non-GAAP earnings, calculated as non-GAAP EPS from Bentley et al. (2018) minus the most recent analyst consensus non-GAAP EPS forecast, scaled by the opening share price one day prior to the return window.
GAAP_EPS	GAAP-based earnings per share (epsfiq).
LogSize	Logarithm of the market value of equity (prccq× cshoq) as of the end of the fiscal quarter.
Loss	Indicator variable equal to one if *GAAP_EPS* is negative, and zero otherwise.
NG_EPS	Non-GAAP earnings per share reported by managers from updated Bentley et al. (2018) dataset.
Q4	Indicator variable equal to one for observations in a firm's 4th fiscal quarter, and zero otherwise.
Revision	Short-term analysts' forecast revisions of one-quarter-ahead non-GAAP EPS, calculated as the difference between mean analysts' forecasts issued within five days after the current earnings announcement date and the last consensus analyst forecast issued before the current earnings announcement date, and scaled by the opening share price one day prior to the return window.
SalesGrowth	Quarter-over-quarter increase in sales divided by total assets.

Figure 1: An Example



This figure depicts two hypothetical OLS regressions based on simulated data, estimated separately where the values of the dependent variable, y, are jointly determined by two correlated independent variables, x_1 and x_2.

Table 1: Surprise definitions illustrative example

Name	Description	Metric	Example Scenarios Actual	Example Scenarios Forecast	Error	Change
Baseline	Reference for defining marginal surprises below	GAAP Revenues	$800			
		− GAAP Expenses	$700		*FE_GAAP*	
		GAAP Net Income	$100	$96	$4	
		Excluded Expenses	$8			
		− Excluded Revenues	$3		*FE_EXCL*	
		Net Exclusions	$5	$3	$2	
		GAAP Net Income	$100			
		+ Net Exclusions	$5		*FE_NG*	
		Non-GAAP Income	$105	$99	$6	
Included Income Surprise	Unexpectedly higher GAAP income is also *included* in reported non-GAAP income	GAAP Revenues	$800			
		− GAAP Expenses	$**699**		*FE_GAAP*	*ΔFE_GAAP*
		GAAP Net Income	$**101**	$96	$**5**	**$1**
		Excluded Expenses	$8			
		− Excluded Revenues	$3		*FE_EXCL*	*ΔFE_EXCL*
		Net Exclusions	$5	$3	$2	**$0**
		GAAP Net Income	$**101**			
		+ Net Exclusions	$5		*FE_NG*	*ΔFE_NG*
		Non-GAAP Income	$**106**	$99	$**1**	**$1**
Composition Surprise	Relatively more of a given amount of GAAP income is classified as non-GAAP income than expected	GAAP Revenues	$800			
		− GAAP Expenses	$700		*FE_GAAP*	*ΔFE_GAAP*
		GAAP Net Income	$100	$96	$4	**$0**
		Excluded Expenses	$**9**			
		− Excluded Revenues	$3		*FE_EXCL*	*ΔFE_EXCL*
		Net Exclusions	$**6**	$3	$**3**	**$1**
		GAAP Net Income	$100			
		+ Net Exclusions	$**6**		*FE_NG*	*ΔFE_NG*
		Non-GAAP Income	$**106**	$99	$**7**	**$1**
Excluded Income Surprise	Unexpectedly higher GAAP income is *excluded* from reported non-GAAP income	GAAP Revenues	$**801**			
		− GAAP Expenses	$700		*FE_GAAP*	*ΔFE_GAAP*
		GAAP Net Income	$**101**	$96	$**5**	**$1**
		Excluded Expenses	$8			
		− Excluded Revenues	$**4**		*FE_EXCL*	*ΔFE_EXCL*
		Net Exclusions	$**4**	$3	$**1**	**−$1**
		GAAP Net Income	$**101**			
		+ Net Exclusions	$**4**		*FE_NG*	*ΔFE_NG*
		Non-GAAP Income	$105	$99	$6	**$0**

This table provides illustrations of the patterns of forecast errors that would prevail under each surprise scenario. The *Change* column is the change in the forecast error relative to the baseline. For ease of exposition, we present the forecast errors here in units of dollars, rather than the scaled units used in our regression analyses.

Table 2: Sample construction

Panel A: Sample selection steps

Observations in updated Bentley et al. (2018) dataset	196,135
Less: firm-quarters without non-GAAP EPS	(125,215)
Less: different earnings announcement date in Compustat and I/B/E/S	(9,548)
Less: firm quarters with missing variable information for the main tests	(5,380)
Firm-quarter observations	**55,917**
Unique firms	**4,046**

Panel B: Number of firm-quarter observations by calendar year

Calendar Year	N	Percentage
2003	160	0.29%
2004	1,021	1.83%
2005	1,344	2.40%
2006	1,951	3.49%
2007	2,171	3.88%
2008	2,605	4.66%
2009	3,338	5.97%
2010	3,353	6.00%
2011	3,432	6.14%
2012	3,596	6.43%
2013	3,835	6.86%
2014	3,802	6.80%
2015	4,114	7.36%
2016	4,192	7.50%
2017	3,578	6.40%
2018	4,690	8.39%
2019	4,378	7.83%
2020	4,357	7.79%
Total	55,917	100%

This table reports the sample selection process and distributions of our testing sample. Panel A presents the sample selection steps. Panel B presents the yearly distribution of our sample of 55,917 firm-quarters from calendar year 2003 to 2020.

Table 3: Sample summary

Panel A: Descriptive statistics

	N	Mean	Std Dev	Min	p25	Median	p75	Max
AbRet	55,917	0.002	0.088	-0.263	-0.043	0.002	0.048	0.263
FE_NG	55,917	0.002	0.011	-0.052	0.000	0.001	0.003	0.054
FE_GAAP	55,917	-0.013	0.074	-0.581	-0.005	-0.000	0.002	0.089
FE_EXCL	55,917	0.015	0.072	-0.141	-0.000	0.001	0.006	0.635
NG_EPS	55,917	0.541	0.690	-0.860	0.120	0.380	0.780	3.610
GAAP_EPS	55,917	0.316	0.967	-4.050	-0.020	0.250	0.660	3.850
EXCL	55,917	0.225	0.700	-4.710	0.020	0.090	0.250	7.660
LogSize	55,917	7.624	1.716	3.797	6.409	7.542	8.764	11.889
SalesGrowth	55,917	0.011	0.045	-0.151	-0.003	0.008	0.029	0.171
EarnVol	55,917	0.020	0.030	0.000	0.005	0.009	0.021	0.185
Loss	55,917	0.263	0.440	0.000	0.000	0.000	1.000	1.000
BM	55,917	0.536	0.462	-0.316	0.236	0.430	0.721	2.655
Beta	55,917	1.037	0.360	0.134	0.810	1.017	1.249	2.077
Q4	55,917	0.262	0.440	0.000	0.000	0.000	1.000	1.000
Revision	52,718	-0.002	0.007	-0.045	-0.002	-0.000	0.000	0.016

Panel B: Pairwise correlations

	AbRet	*FE_NG*	*FE_GAAP*	*FE_EXCL*	*LogSize*	*Sales Growth*	*EarnVol*	*Loss*	*BM*	*Beta*	*Q4*	*Revision*
AbRet	**1.000**	**0.325**	**0.220**	**-0.061**	-0.001	**0.097**	-0.004	**-0.097**	-0.007	**0.009**	0.004	**0.317**
FE_NG	**0.230**	**1.000**	**0.400**	**0.072**	**-0.099**	**0.064**	**0.129**	**-0.034**	**0.042**	**0.032**	**-0.030**	**0.249**
FE_GAAP	**0.082**	**0.195**	**1.000**	**-0.772**	**0.070**	**0.154**	**-0.016**	**-0.400**	**-0.080**	**-0.010**	**-0.060**	**0.232**
FE_EXCL	**-0.050**	**-0.051**	**-0.989**	**1.000**	**-0.169**	**-0.135**	**0.111**	**0.421**	**0.123**	**0.032**	**0.048**	**-0.123**
LogSize	-0.000	**-0.051**	**0.164**	**-0.175**	**1.000**	**0.035**	**-0.284**	**-0.322**	**-0.298**	**0.012**	-0.006	**0.144**
SalesGrowth	**0.074**	**0.044**	**0.157**	**-0.154**	**0.052**	**1.000**	**0.033**	**-0.158**	**-0.293**	**0.022**	**0.024**	**0.142**
EarnVol	-0.000	**0.061**	**-0.085**	**0.096**	**-0.262**	**-0.046**	**1.000**	**0.324**	**-0.145**	**0.127**	-0.006	**-0.067**
Loss	**-0.094**	**-0.063**	**-0.345**	**0.342**	**-0.325**	**-0.176**	**0.260**	**1.000**	**0.089**	**0.090**	**0.023**	**-0.167**
BM	0.006	0.006	**-0.202**	**0.207**	**-0.295**	**-0.208**	**-0.023**	**0.148**	**1.000**	**0.011**	-0.002	**-0.109**
Beta	0.006	**0.012**	**-0.060**	**0.063**	**0.015**	0.005	**0.085**	**0.096**	**0.049**	**1.000**	0.002	**-0.016**
Q4	0.004	**-0.017**	**-0.058**	**0.057**	-0.005	**0.021**	-0.004	**0.023**	**-0.009**	0.003	**1.000**	**-0.064**
Revision	**0.244**	**0.229**	**0.299**	**-0.271**	**0.215**	**0.151**	**-0.084**	**-0.233**	**-0.196**	**-0.035**	**-0.036**	**1.000**

Panel A presents summary statistics for the full sample used in subsequent analyses. All continuous variables have been winsorized at their 1st and 99th percentiles. Panel B presents the Pearson (bottom-left of the diagonal) and Spearman (top-right of the diagonal) correlations between variables. Values in bold font are statistically significant at the 5% level. See Appendix C for variable definitions.

Table 4: Reconciling prior research estimation models

Panel A: ERC Estimates

	(1) *AbRet*	(2) *AbRet*	(3) *AbRet*	(4) *AbRet*	(5) *AbRet*	(6) *AbRet*
FE_NG	1.858***			1.792***	1.840***	
	(55.42)			(52.41)	(54.85)	
FE_GAAP		0.101***		0.048***		1.840***
		(20.09)		(9.67)		(54.85)
FE_EXCL			-0.063***		-0.048***	1.792***
			(-12.39)		(-9.67)	(52.41)
Constant	-0.001**	0.003***	0.003***	-0.000	-0.000	-0.000
	(-2.26)	(9.05)	(7.95)	(-0.23)	(-0.23)	(-0.23)
Equation				4a	4b	4c
Observations	55,917	55,917	55,917	55,917	55,917	55,917
Adjusted R-squared	0.052	0.007	0.003	0.054	0.054	0.054

Panel B: Omitted correlated variable biases

Effect of Interest	Est. Effect w/o Covariate	Omitted Variable	Bias in Est. Effect of Interest	Est. Effect w/ Covariate
FE_NG	1.858	*FE_GAAP*	(0.200)×(0.074÷0.011)×(0.048) = **0.066**	1.792
		FE_EXCL	(-0.055)×(0.072÷0.011)×(-0.048) = **0.018**	1.840
FE_GAAP	0.101	*FE_NG*	(0.200)×(0.011÷0.074)×(1.792) = **0.053**	0.048
		FE_EXCL	(-0.989)×(0.072÷0.074)×(1.792) = **-1.739**	1.840
FE_EXCL	-0.063	*FE_NG*	(-0.055)×(0.011÷0.072)×(1.840) = **-0.015**	-0.048
		FE_GAAP	(-0.989)×(0.074÷0.072)×(1.840) = **-1.855**	1.792

Panel C: Reconciliation of MLR models

	Marginal Effect on *AbRet* from Increase in:	While Holding Constant:	(4a) Bhattacharya et al. (2003) $AbRet_{it} = \alpha^X + \beta^X_{NG} FE\_NG_{it} + \beta^X_G FE\_GAAP_{it} + e^X_{it}$	(4b) Bradshaw et al. (2018) $AbRet_{it} = \alpha^G + \beta^G_{NG} FE\_NG_{it} + \beta^G_X FE\_EXCL_{it} + e^G_{it}$	(4c) $AbRet_{it} = \alpha^{NG} + \beta^{NG}_G FE\_GAAP_{it} + \beta^{NG}_G FE\_EXCL_{it} + e^{NG}_{it}$
Included Income Effect	*FE_GAAP*	*FE_EXCL*	$\beta^X_G + \beta^X_{NG}$ 0.048 + 1.792 = **1.840**	β^G_{NG} **1.840**	β^{NG}_G **1.840**
	FE_NG	*FE_EXCL*	$\beta^X_{NG} + \beta^X_G$ 1.792 + 0.048 = **1.840**	β^G_{NG} **1.840**	β^{NG}_G **1.840**
Composition Effect	*FE_NG*	*FE_GAAP*	β^X_{NG} **1.792**	$\beta^G_{NG} + \beta^G_X$ 1.840 + (–0.048) = **1.792**	β^{NG}_X **1.792**
	FE_EXCL	*FE_GAAP*	β^X_{NG} **1.792**	$\beta^G_{NG} + \beta^G_X$ 1.840 + (–0.048) = **1.792**	β^{NG}_X **1.792**
Excluded Income Effect	*FE_GAAP*	*FE_NG*	β^X_G **0.048**	$-\beta^G_X$ **0.048**	$\beta^{NG}_G - \beta^{NG}_X$ 1.840 – 1.792 = **0.048**
	FE_EXCL	*FE_NG*	$-\beta^X_G$ **–0.048**	β^G_X **–0.048**	$\beta^{NG}_X - \beta^{NG}_G$ 1.792 – 1.840 = **–0.048**

This table reports the results from estimating models examining investor reactions to non-GAAP and GAAP earnings surprises for our sample of 55,917 firm-quarters from 2003-2020. Panel A provides a comparison of SLR- and MLR-model estimates. Panel B quantifies the correlated omitted variable bias present in the SLR model estimates. Panel C presents the equivalency of different MLR model specifications. See Appendix C for variable definitions. We present *t*-statistics in parentheses beneath coefficient estimates. *, **, and *** indicate statistical significance in two-tailed tests at the 10%, 5%, and 1% levels, respectively.

Table 5: Investor reactions to earnings surprises (pooled sample)

	(1) *AbRet*	(2) *AbRet*	(3) *AbRet*	(4) *AbRet*
Included Income Effect				
FE_GAAP	1.840***	1.837***	1.778***	1.757***
	(30.68)	(30.55)	(30.08)	(29.77)
Composition Effect				
FE_EXCL	1.792***	1.786***	1.762***	1.741***
	(29.49)	(29.30)	(29.36)	(29.05)
Excluded Income Effect (Calculated)				
FE_GAAP – FE_EXCL	0.048***	0.051***	0.016**	0.016*
	(6.41)	(6.59)	(1.98)	(1.90)
Covariates				
LogSize			-0.001**	-0.000
			(-2.51)	(-1.41)
SalesGrowth			0.109***	0.129***
			(10.51)	(12.00)
EarnVol			0.024	0.031*
			(1.45)	(1.80)
Loss			-0.016***	-0.016***
			(-13.94)	(-14.53)
BM			0.004***	0.004***
			(4.10)	(3.65)
Beta			0.003**	0.002**
			(2.49)	(2.00)
Q4			0.002**	0.001
			(2.28)	(0.43)
Constant	-0.000	-0.018	0.001	-0.016
	(-0.22)	(-1.12)	(0.32)	(-0.91)
Observations	55,917	55,917	55,917	55,917
Adjusted R-Squared	0.054	0.058	0.062	0.068
Industry FE	No	Yes	No	Yes
Year-Quarter FE	No	Yes	No	Yes

This table reports the results from estimated pooled OLS models examining investors' reaction to GAAP earnings and exclusions surprise for our sample of 55,917 firms-quarters from 2003-2020. See Appendix C for variable definitions. We present *t*-statistics in parentheses beneath coefficient estimates. We cluster standard errors by firm. *, **, and *** indicate statistical significance in two-tailed tests at the 10%, 5%, and 1% levels, respectively.

Table 6: Investor reactions to earnings surprises (by calendar year)

	2003	2004	2005	2006	2007	2008	2009	2010	2011
	AbRet	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*
Included Income Effect									
FE_GAAP	1.754	2.410***	1.426***	2.150***	1.423***	1.660***	1.507***	1.645***	1.662***
	(1.55)	(4.64)	(3.73)	(7.58)	(5.06)	(7.46)	(10.95)	(9.81)	(9.18)
Composition Effect									
FE_EXCL	1.787	2.454***	1.386***	2.091***	1.428***	1.667***	1.468***	1.599***	1.641***
	(1.49)	(4.55)	(3.48)	(7.26)	(4.98)	(7.33)	(10.42)	(8.98)	(9.12)
Excluded Income Effect (Calculated)									
FE_GAAP – FE_EXCL	-0.033	-0.044	0.041	0.059	-0.005	-0.006	0.039**	0.046	0.021
	(-0.10)	(-0.93)	(1.01)	(1.06)	(-0.09)	(-0.24)	(1.99)	(1.38)	(0.61)
Covariates									
LogSize	0.001	0.000	0.002	0.002	-0.001	0.003*	-0.001	-0.000	-0.002*
	(0.29)	(0.13)	(1.06)	(1.63)	(-0.62)	(1.82)	(-0.65)	(-0.56)	(-1.93)
SalesGrowth	-0.019	-0.069	0.077	0.240***	0.162***	0.132**	0.069*	0.187***	0.181***
	(-0.12)	(-0.78)	(1.00)	(4.72)	(3.32)	(2.56)	(1.65)	(6.06)	(4.19)
EarnVol	0.272	-0.088	0.039	0.007	-0.181**	0.074	0.121**	0.001	0.044
	(1.46)	(-1.02)	(0.43)	(0.08)	(-2.03)	(0.80)	(2.33)	(0.03)	(0.77)
Loss	-0.040**	-0.026***	-0.011	-0.016***	-0.018***	-0.022***	-0.013***	-0.015***	-0.016***
	(-2.09)	(-3.13)	(-1.61)	(-2.77)	(-3.18)	(-3.64)	(-2.82)	(-3.98)	(-3.31)
BM	0.029	0.015	0.017*	0.023***	-0.001	0.006	0.009**	0.012***	-0.002
	(1.18)	(1.28)	(1.71)	(3.06)	(-0.16)	(0.90)	(2.06)	(2.98)	(-0.42)
Beta	-0.001	0.006	-0.012	0.006	0.003	0.013*	-0.003	0.008*	-0.002
	(-0.04)	(0.85)	(-1.57)	(1.15)	(0.63)	(1.90)	(-0.58)	(1.81)	(-0.48)
Q4	-0.057**	0.008	0.003	-0.008	-0.001	0.003	0.003	0.005	0.008*
	(-2.04)	(0.94)	(0.47)	(-1.43)	(-0.23)	(0.45)	(0.51)	(1.08)	(1.78)
Observations	160	1,021	1,344	1,951	2,171	2,605	3,338	3,353	3,432
Adjusted R-Squared	0.033	0.032	0.014	0.065	0.038	0.061	0.090	0.090	0.062
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 (Continued): Investor reactions to earnings surprises (by calendar year)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
	AbRet	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*	*AbRet*
Included Income Effect									
FE_GAAP	1.805***	1.911***	2.437***	2.289***	1.973***	2.306***	2.167***	2.116***	1.203***
	(9.75)	(9.73)	(8.76)	(10.89)	(10.14)	(7.58)	(10.08)	(10.73)	(10.31)
Composition Effect									
FE_EXCL	1.790***	1.895***	2.496***	2.269***	1.935***	2.297***	2.104***	2.092***	1.205***
	(9.69)	(9.36)	(8.35)	(10.73)	(9.62)	(7.38)	(9.57)	(10.51)	(10.13)
Excluded Income Effect (Calculated)									
FE_GAAP – FE_EXCL	0.015	0.016	-0.059	0.020	0.038	0.010	0.063	0.024	-0.003
	(0.44)	(0.50)	(-0.96)	(0.82)	(1.29)	(0.19)	(1.57)	(0.60)	(-0.12)
Covariates									
LogSize	-0.001	-0.001	0.002**	-0.001	0.001	-0.002	-0.004***	-0.000	-0.001
	(-0.93)	(-1.58)	(2.17)	(-0.95)	(1.28)	(-1.57)	(-3.87)	(-0.52)	(-0.54)
SalesGrowth	0.109***	0.110***	0.204***	0.151***	0.148***	0.176***	0.157***	0.179***	0.105***
	(2.98)	(2.94)	(4.64)	(4.48)	(4.00)	(3.60)	(3.35)	(3.66)	(2.76)
EarnVol	0.062	0.024	0.030	0.076	0.184***	-0.065	-0.102	0.042	0.061
	(1.02)	(0.41)	(0.42)	(1.03)	(2.64)	(-0.97)	(-1.59)	(0.55)	(0.84)
Loss	-0.021***	-0.016***	-0.018***	-0.021***	-0.021***	-0.015***	-0.010**	-0.019***	-0.016***
	(-4.91)	(-3.89)	(-4.43)	(-5.31)	(-5.17)	(-3.79)	(-2.55)	(-4.32)	(-4.09)
BM	-0.002	0.000	0.016***	-0.002	0.010**	0.009*	0.001	0.006	0.002
	(-0.56)	(0.07)	(2.93)	(-0.51)	(2.16)	(1.75)	(0.32)	(1.40)	(0.62)
Beta	0.007*	0.002	-0.003	0.001	-0.005	0.001	0.007	-0.003	0.016***
	(1.74)	(0.52)	(-0.72)	(0.10)	(-0.91)	(0.28)	(1.37)	(-0.70)	(3.04)
Q4	0.000	-0.001	0.002	-0.002	0.005	-0.001	0.003	0.002	-0.015***
	(0.07)	(-0.34)	(0.38)	(-0.54)	(1.10)	(-0.14)	(0.71)	(0.30)	(-3.02)
Observations	3,596	3,835	3,802	4,114	4,192	3,578	4,690	4,378	4,357
Adjusted R-Squared	0.079	0.058	0.084	0.087	0.082	0.078	0.071	0.079	0.073
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from estimated annual OLS models for each calendar year examining investors' reaction to GAAP earnings and exclusions surprise for our sample of 55,917 firms-quarters from 2003-2020. See Appendix C for variable definitions. We present *t*-statistics in parentheses beneath coefficient estimates. We cluster standard errors by firm. *, **, and *** indicate statistical significance in two-tailed tests at the 10%, 5%, and 1% levels, respectively.

Table 7: Analysts' mean forecast revisions to earnings surprises (pooled sample)

	(1)	(2)	(3)	(4)
	Revision	*Revision*	*Revision*	*Revision*
Included Income Effect				
FE_GAAP	0.152***	0.150***	0.155***	0.151***
	(15.67)	(15.61)	(16.81)	(16.57)
Composition Effect				
FE_EXCL	0.125***	0.126***	0.137***	0.135***
	(12.60)	(12.83)	(14.46)	(14.45)
Excluded Income Effect (Calculated)				
FE_GAAP – FE_EXCL	0.027***	0.024***	0.018***	0.016***
	(18.22)	(16.71)	(11.84)	(10.84)
Covariates				
LogSize			0.001***	0.001***
			(18.19)	(16.86)
SalesGrowth			0.012***	0.014***
			(10.49)	(11.80)
EarnVol			-0.006***	-0.007***
			(-2.87)	(-3.44)
Loss			-0.001***	-0.001***
			(-11.83)	(-10.51)
BM			-0.002***	-0.002***
			(-8.70)	(-9.01)
Beta			-0.000**	-0.000
			(-2.04)	(-1.47)
Q4			-0.000***	-0.000***
			(-5.85)	(-2.99)
Constant	-0.002***	-0.001	-0.005***	-0.003*
	(-34.92)	(-0.51)	(-14.21)	(-1.93)
Observations	52,718	52,718	52,718	52,718
Adjusted R-Squared	0.120	0.152	0.178	0.209
Industry FE	No	Yes	No	Yes
Year-Quarter FE	No	Yes	No	Yes

This table reports the results from estimated pooled OLS models examining the analysts' reaction to GAAP earnings and exclusions surprise for our sample of firm-quarters from 2003-2020. The sample used in this table is reduced from 55,917 to 52,718 due to missing data for *Revision*.. See Appendix C for variable definitions. We present *t*-statistics in parentheses beneath coefficient estimates. We cluster standard errors by firm. *, **, and *** indicate statistical significance in two-tailed tests at the 10%, 5%, and 1% levels, respectively.

Table 8: Analysts' mean forecast revisions to earnings surprises (by calendar year)

	2003 *Revision*	2004 *Revision*	2005 *Revision*	2006 *Revision*	2007 *Revision*	2008 *Revision*	2009 *Revision*	2010 *Revision*	2011 *Revision*
Included Income Effect									
FE_GAAP	0.052*	0.252***	0.207***	0.127***	0.093*	0.108***	0.162***	0.167***	0.168***
	(1.79)	(3.10)	(4.15)	(2.97)	(1.79)	(3.14)	(6.61)	(5.62)	(5.84)
Composition Effect									
FE_EXCL	0.041	0.231***	0.179***	0.097**	0.096*	0.096***	0.144***	0.142***	0.149***
	(1.37)	(2.75)	(3.57)	(2.35)	(1.78)	(2.77)	(5.82)	(4.53)	(5.20)
Excluded Income Effect (Calculated)									
FE_GAAP – FE_EXCL	0.011	0.021**	0.028***	0.030***	-0.003	0.012***	0.018***	0.025***	0.019***
	(1.14)	(2.22)	(3.29)	(2.60)	(-0.31)	(3.12)	(6.46)	(3.86)	(2.63)
Covariates									
LogSize	0.000	0.001***	0.001***	0.000***	0.000***	0.001***	0.000***	0.000***	0.001***
	(1.21)	(4.47)	(4.49)	(2.94)	(4.32)	(4.93)	(3.30)	(4.99)	(6.67)
SalesGrowth	0.004	0.012**	0.012*	0.013***	0.009**	0.027***	0.005	0.013***	0.020***
	(0.58)	(2.15)	(1.80)	(3.53)	(2.41)	(4.88)	(1.02)	(3.56)	(4.09)
EarnVol	-0.006	0.001	-0.003	-0.011	-0.014*	-0.014	-0.003	-0.005	-0.002
	(-0.66)	(0.19)	(-0.40)	(-1.28)	(-1.94)	(-1.34)	(-0.53)	(-1.18)	(-0.43)
Loss	0.000	-0.000	-0.001*	-0.002***	-0.001***	-0.002***	-0.001***	-0.001***	-0.001***
	(0.63)	(-0.86)	(-1.90)	(-3.40)	(-3.55)	(-3.12)	(-2.69)	(-2.79)	(-3.26)
BM	-0.002	0.001	0.000	-0.001	-0.002**	-0.004***	-0.002***	-0.001	-0.001***
	(-1.35)	(0.37)	(0.39)	(-0.79)	(-2.36)	(-5.34)	(-3.51)	(-1.05)	(-2.76)
Beta	0.000	-0.000	-0.000	0.000	-0.000	-0.001	-0.001*	0.001**	-0.001
	(0.30)	(-0.76)	(-0.50)	(1.29)	(-0.97)	(-1.04)	(-1.89)	(2.14)	(-1.40)
Q4	-0.001	-0.000	0.000	-0.000	0.000	0.000	0.000	-0.001	-0.000
	(-1.17)	(-0.56)	(0.32)	(-1.22)	(0.39)	(0.38)	(0.71)	(-1.57)	(-1.49)
Observations	151	956	1,262	1,851	2,069	2,456	3,129	3,143	3,233
Adjusted R-Squared	0.495	0.316	0.301	0.219	0.115	0.255	0.293	0.218	0.210
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 (Continued): Analysts' mean forecast revisions to earnings surprises (by calendar year)

	2012 *Revision*	2013 *Revision*	2014 *Revision*	2015 *Revision*	2016 *Revision*	2017 *Revision*	2018 *Revision*	2019 *Revision*	2020 *Revision*
Included Income Effect									
FE_GAAP	0.136***	0.172***	0.183***	0.124***	0.138***	0.178***	0.098***	0.114***	0.190***
	(4.55)	(5.38)	(4.95)	(3.84)	(4.67)	(4.82)	(2.90)	(3.95)	(9.00)
Composition Effect									
FE_EXCL	0.122***	0.159***	0.177***	0.120***	0.123***	0.166***	0.067**	0.096***	0.173***
	(4.00)	(4.64)	(4.79)	(3.72)	(4.15)	(4.37)	(1.99)	(3.30)	(8.05)
Excluded Income Effect (Calculated)									
FE_GAAP – FE_EXCL	0.014***	0.012*	0.005	0.004	0.015***	0.012*	0.031***	0.018***	0.016***
	(2.85)	(1.75)	(0.85)	(0.89)	(3.15)	(1.96)	(6.55)	(4.18)	(3.65)
Covariates									
LogSize	0.000***	0.001***	0.000***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(5.26)	(7.38)	(6.04)	(6.62)	(5.98)	(4.69)	(7.58)	(6.79)	(4.57)
SalesGrowth	0.012***	0.019***	0.015***	0.011***	0.015***	0.019***	0.012***	0.019***	0.019***
	(3.07)	(4.74)	(4.06)	(2.75)	(3.89)	(3.87)	(3.08)	(4.25)	(4.26)
EarnVol	-0.011	-0.007	-0.010**	-0.001	-0.003	-0.017**	-0.013*	-0.008	-0.024**
	(-1.45)	(-0.97)	(-2.00)	(-0.07)	(-0.44)	(-2.17)	(-1.85)	(-1.33)	(-2.12)
Loss	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.000	-0.001***	-0.001**
	(-4.69)	(-3.41)	(-4.09)	(-3.24)	(-3.49)	(-2.68)	(-1.30)	(-3.68)	(-2.18)
BM	-0.001***	-0.001	-0.001*	-0.002***	-0.002***	-0.001*	-0.001*	-0.002***	-0.002***
	(-3.11)	(-1.40)	(-1.77)	(-2.81)	(-3.33)	(-1.93)	(-1.94)	(-3.53)	(-3.69)
Beta	-0.000	-0.000	-0.000	-0.001	0.000	0.001**	-0.001	-0.000	0.000
	(-0.30)	(-0.07)	(-0.81)	(-1.62)	(0.02)	(2.03)	(-1.26)	(-0.96)	(0.07)
Q4	0.000	0.000	-0.000**	-0.001***	0.000	-0.001***	-0.001**	-0.000	-0.001
	(0.34)	(0.33)	(-2.26)	(-3.26)	(0.41)	(-3.48)	(-2.08)	(-0.95)	(-1.44)
Observations	3,370	3,638	3,610	3,913	3,933	3,375	4,415	4,129	4,085
Adjusted R-Squared	0.172	0.193	0.181	0.126	0.179	0.192	0.201	0.239	0.247
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from estimated annual OLS models for each calendar year examining analysts' reaction to GAAP earnings and exclusions surprise for our sample of 51,953 firms-quarters from 2003-2020. The sample used in this table decreases from 55,917 to 51,193 due to missing data for *Revision*. We provide variable definitions in Appendix C. We present *t*-statistics in parentheses beneath coefficient estimates. We cluster standard errors by firm. *, **, and *** indicate statistical significance in two-tailed tests at the 10%, 5%, and 1% levels, respectively.

Table 9: Proportion of observations based on firm types

Firm Type	Included Income Effect > Composition Effect	Included Income Effect = Composition Effect	Included Income Effect < Composition Effect
Investor Reaction Test	12.26%	81.05%	6.69%
Analyst Revision Test	21.97%	69.77%	8.27%

This table presents the proportion of observations based on firm types determined using time-serial data of each firm. We estimate firm specific time serial regressions of model 4c for each firm using all available data for each firm. Firms are then categorized into three groups: included income effect > composition effect, included income effect = composition effect, included income effect < composition effect based on the relative magnitude of coefficients on *FE_GAAP* and *FE_EXCL*.