The Impact of Earnings Announcements on a Firm's Information Environment^{*}

Mark T. Bradshaw Professor Boston College

Marlene A. Plumlee Associate Professor University of Utah

Benjamin C. Whipple Assistant Professor University of Georgia

Teri Lombardi Yohn Professor Indiana University

May 2016

ABSTRACT

A broad stream of research suggests that firms' earnings announcements reduce information asymmetry and level the playing field among investors. In contrast with that work, a series of studies find that investor consensus (the proportion of total information that is due to common information) decreases around earnings announcements, suggesting earnings announcements actually decrease the proportion of common information in capital markets. We expand this research by (1) identifying firm and earnings announcement characteristics that are associated with higher pre-announcement levels of investor consensus, (2) documenting that, after controlling for the level of investor consensus, earnings announcements increase investor consensus, (3) showing that earnings announcements affect investor consensus through common and private information, or by changing the information environment about revenues or expenses. We also consider the impact on the firms' information environments of two voluntary disclosures provided in earnings announcements: bundled management forecasts and non-GAAP earnings measures. Our results suggest that bundled management forecasts (non-GAAP earnings) are associated with increases (decreases) in investor consensus around earnings, although bundled forecasts are associated with increases in both common and private information, while non-GAAP earnings are associated with decreases in common information. When we disaggregate earnings into revenues and expenses, we find that both bundled forecasts and non-GAAP earnings are associated with increases in investor consensus and private information around revenues. In contrast, bundled forecasts (non-GAAP earnings) are positively (negatively) associated with increases in investor consensus and public and private information around expenses. These findings suggest that understanding the link between earnings announcements and firms' information environments is enhanced by disaggregating consensus into common and private information and by examining both revenues and expenses.

JEL Classification: M41, G21

Keywords: Investor consensus, Private Information, Common Information, Information Advantage

^{*} We gratefully acknowledge the financial support of Boston College (Bradshaw), the University of Utah (Plumlee), the University of Georgia (Whipple), and Indiana University (Yohn). We appreciate helpful comments from seminar participants at Claremont McKenna, Emory University, and Washington University. An earlier version of this paper benefitted from helpful comments from Dan Givoly and Erin McKenzie.

I. INTRODUCTION

The public disclosure of financial information is viewed as a mechanism that reduces information asymmetry in capital markets and levels the playing field among investors. The Securities and Exchange Commission (SEC) argues that public disclosure is beneficial for sound investing decisions:

The laws and rules that govern the securities industry in the United States derive from a simple and straightforward concept: all investors, whether large institutions or private individuals, should have access to certain basic facts about an investment prior to buying it, and so long as they hold it...This provides a common pool of knowledge for all investors to use to judge for themselves whether to buy, sell, or hold a particular security. Only through the steady flow of timely, comprehensive, and accurate information can people make sound investment decisions.¹

The SEC's argument for public disclosure suggests that increasing the common pool of knowledge levels the playing field and increases the health of capital markets. This intuition is supported by analytical research into the effect of public announcements on information asymmetry. Such research suggests that public disclosures reduce information asymmetry by providing information otherwise held by only a subset of investors (Verrecchia 1982). In addition, empirical research suggests that information asymmetry decreases after earnings announcements, a public disclosure, because of the dissemination of information to all investors (Lev 1989).

Despite these predictions, using a proxy developed by Barron, Kim, Lim, and Stevens (1998) (hereafter BKLS) that measures the proportion of the total information set that is common across all analysts (consensus), several related studies provide evidence of a *decrease* in this measure around quarterly earnings announcements. For example, Barron, Byard, and Kim (2002) show that consensus decreases around earnings announcements, and conclude that this decrease is due to an increase in the private information component of the total information set. Similarly, Barron, Byard, and Yu (2008) examine changes in consensus around large or negative earnings surprises. They find that the decrease in consensus is due to an increase in the private information precision, which is attributed to analysts' relying more on private information after large earnings surprises. In general, these studies conclude that

¹ See "The Investor's Advocate: How the SEC Protects Investors, Maintains Market Integrity, and Facilitates Capital Formation" available at <u>http://www.sec.gov/about/whatwedo.shtml</u>.

(1) earnings announcements lead to a reduction in consensus and (2) this reduction is due to changes in the private information around those information releases.² The finding that earnings announcements lead to an overall reduction in consensus (i.e., a reduced reliance on common information) is provocative because it suggests that an SEC-mandated public disclosure actually reduces the common pool of knowledge. This idea runs counter to the spirit of the SEC's remarks that public disclosure levels the playing field among investors.

We revisit the research question of whether earnings announcements increase the common pool of knowledge and extend it in several ways. In doing so, we use the framework and methodology developed by BKLS and employed by the earlier studies to construct firm-specific measures of information precision: *common* information precision (information shared by all analysts) and *private* information precision (information held by an individual analyst). The sum of these two measures captures the precision of the total information set. Following BKLS, we use the ratio of common precision to total precision to capture the extent to which the average beliefs reflect common rather than private information. We refer to this combined measure as "investor consensus".³

Our study extends the prior work in three significant ways. First, we document the associations between firm and earnings announcement characteristics and the pre-earnings announcement level of investor consensus and its two dimensions: common precision and private precision. Most of the literature in this area has focused on understanding changes in these measures. As documented by Barron et al. (2002) and others (e.g., Botosan, Plumlee and Xie 2004; Horton, Serafeim, and Serafeim 2013), however, there is significant cross-sectional variation in the level of investor consensus. Establishing the determinants of the pre-announcement level of investor consensus and its two dimensions enhances our understanding of when and how earnings announcements affect changes in them. In our analyses, we

 $^{^{2}}$ For example, although earnings announcements increase the precisions of both common and private information, Barron et al. (2002) find that the percentage increase in the precision of private information is larger, which results in an overall reduction in investor consensus.

³ BKLS are careful to highlight that their notion of "consensus" differs from the typical use of the term, where practitioners and researchers mean the "average" analyst forecast. We label the BKLS measure "investor consensus" to minimize potential confusion.

consider the impact of well-established covariates such as firm size, analyst following, profitability, expected growth, and two voluntary disclosures (i.e., management forecasts and non-GAAP reporting). We find that the pre-earnings announcement level of investor consensus is positively associated with analyst following and firm profitability, and negatively associated with the market value of equity and growth opportunities. We also find that the pre-earnings announcement level of investor consensus decreases across fiscal quarters, is higher for firms that issued a management forecast in the prior quarter and for firms with a greater absolute earnings surprise in the previous earnings announcement, and is lower for firms that reported earnings on a non-GAAP basis in the previous earnings announcement. Our examination of the determinants of the pre-existing levels of common and private information provides insight into how these determinants affect investor consensus. For example, when more analysts provide forecasts we find that firms' information environments are comprised of less precise common and private information, although this leads to higher levels of investor consensus. In contrast, more profitable firms' information environments are comprised of *more precise* common and private information precision and have a higher level of investor consensus. In both cases the level of investor consensus is higher, although the increased level occurs due to different means (less versus more precise information). This highlights the need to consider the links between the firm and earnings announcement characteristics that determine investor consensus and the dimensions of investor consensus to more fully understand how those firm and earnings announcement characteristics influence firms' information environments.

In the second part of our study, we reexamine changes in investor consensus and its two dimensions around earnings announcements. We make several modifications to the methodology used in the prior studies, including controlling for the pre-existing level of investor consensus.⁴ Given the links between firm and earnings announcement characteristics and the pre-announcement level of investor consensus

⁴ Some of our modifications (discussed in more detail in Section II) have, at times, been considered in the prior studies. For example, we include all analysts in our sample, instead of "active analysts" (those that issue forecasts both shortly before and shortly after earnings announcements), which make up the samples in the earlier studies. Barron et al. (2008) expand their sample to include all analysts instead in a robustness test, and report that doing so does not impact the study's inferences about the impact of the magnitude and sign of the earnings announcement. (page 317 of their study).

and of common and private information precision, we control for the pre-existing levels in our change analysis. We predict that an earnings announcement is more (less) likely to be associated with increases in investor consensus and common and private information precisions when the pre-announcement levels of each are low (high). Consistent with this expectation, we document a negative association between the pre-existing level of investor consensus and the change in investor consensus. More importantly, after controlling for the pre-existing level, we document an increase in investor consensus around earnings announcements, contrary to earlier findings. In addition, while our findings confirm the associations between changes in investor consensus and firm and earnings announcement characteristics documented in earlier studies, we extend those studies by documenting how two voluntary disclosures made within earnings announcements – bundled management forecasts and non-GAAP earnings – impact changes in investor consensus.

Our third set of tests is an examination of the level and the change in investor consensus, and its dimensions, measured using the primary components of earnings – revenues and expenses. Prior research documents that analysts have more difficulty forecasting expenses than revenues (e.g., Bradshaw, Lee, and Peterson 2016), which leads us to examine how firm and earnings announcement characteristics differentially affect the information environments related to these components of earnings. Overall, we document that the level of investor consensus (change in investor consensus) is greater (lower) for revenues than expenses. We also find that the association between firm and earnings announcement characteristics and the level/change in investor consensus and its dimensions differ across revenues and expenses. For example, we find that when a firm included a non-GAAP earnings number in a prior quarter, the level of investor consensus around revenues (expenses) is significantly greater (smaller) than if the firm did not provide a non-GAAP earnings number. The positive association with investor consensus around expenses is due to a decrease in the precision of both common and private information. If we trace these findings back to the evidence about earnings, we see that, although non-GAAP earnings increases investor consensus about revenues, the reduction in investor

consensus about expenses is larger, resulting in non-GAAP earnings reducing overall consensus for earnings. This evidence highlights how moving beyond a simple focus on earnings provides insights into disclosure's differential effects on firms' information environments.

These findings provide insight into how firm and earnings announcement characteristics impact the firms' overall information environment and the precision of common and private information, as well as how these characteristics influence changes in these aspects of the information environment. Certain firm characteristics – including size, profitability, and growth – affect the information environment but are not easily controlled by managers. However, other characteristics that *are* under managements' control, such as the decision to bundle a management forecast or to report non-GAAP adjustments within the earnings announcement, affect investor consensus through changes to the precisions of common and private information. While analyzing investor consensus establishes the net effect of the explanatory variables on information environments, our analysis of how those variables are related to common and private precision provides a more complete understanding of the complex process by which firms' information environments are changed.

While our results provide some support for findings from prior studies, they also suggest that understanding how an earnings announcement impacts a firm's information environment is more complex than earlier studies might suggest. When a firm issues an earnings announcement, there is significant cross-sectional variation in characteristics like the firm's pre-announcement information environment, the type of firm issuing the announcement, and in the information provided within that announcement. After controlling for these differences, our findings suggest that earnings announcements, on average, increase investor consensus and that the precision of both common and private information increases. As noted in earlier studies, an increase in the precision of private information at a rate that exceeds the rate of increase in common information can lead to a decrease in consensus. Our findings suggest that, in this case, the positive impact on investor consensus from increasing the common information precision has a greater effect than the negative impact on investor consensus from increasing the private information precision. Overall, our analysis provides greater clarity into how the disclosure of accounting information affects the information environment at the firm level, and revises our understanding from prior studies on how earnings announcements influence investor consensus.

II. BACKGROUND AND RESEARCH QUESTIONS

Background

Prior research

Theoretical research suggests that earnings announcements affect information asymmetry in the market for a company's stock because they provide information that is otherwise held by only a subset of investors (Diamond and Verrecchia 1991). McNichols and Trueman (1994) and Demski and Feltham (1994) show that if traders have short investment horizons, they intensify their private information search at earnings announcement dates in order to profit from the earnings release. In the same spirit, Kim and Verrecchia (1994) show that, if investors differ in their ability to process earnings information, the release of earnings announcements will temporarily increase information asymmetry at the announcement date. These studies focus primarily on the affect that an information release has in terms of triggering an increase in private information search and, thus, an increase in information asymmetry among investors at the announcement.

In contrast, studies like Lev (1989) argue that information asymmetry decreases after an earnings announcement as investors have more available information – more common information – that levels the playing field across investors. The argument follows analytical models demonstrating that financial statement information helps reduce information asymmetry between the firm and investors (Verrecchia 1982; Diamond 1985; Bushman 1991). Several empirical studies corroborate the implications of these models and demonstrate that earnings announcements ultimately decrease overall information asymmetry (Krinksy and Lee 1996; Lee, Mucklow and Ready 1993; Yohn 1998).

Thus, both theoretical and empirical research supports the notion that earnings announcements temporarily increase information asymmetry in the short-term but level the playing field over the longer-term. In contrast with these findings, a series of studies (e.g., Barron et al. 2002; Barron et al. 2005, 2015) provide evidence of a decrease in investor consensus due to an increase private information precision

around earnings announcements that are inconsistent with this notion. Their findings suggest (1) earnings announcements trigger the generation of new, private information by sell-side analysts such that investor consensus about earnings is reduced, (2) larger magnitude and bad news earnings surprises trigger an increased reliance on private information, and (3) balance sheet and segment disclosures, but not management forecasts, impact investor consensus.⁵ These studies primarily focus on how information releases change investor consensus and private information, based on a subset of analysts who provide forecasts immediately before and immediately after the earnings announcement. Decreases in investor consensus is attributed to the increasing precision of private information outpacing the increasing precision of common information, resulting in private information precision crowding out common information precision across quarters within a fiscal year. Numerous studies build on this evidence that earnings announcements lead to more private information and greater information asymmetry in the capital markets (Mayew, Sharp and Venkatachalam 2013; Mayew 2008; Botosan et al. 2004).

We revisit the issue of how earnings announcements shape firms' information environments using the framework employed in the prior studies (e.g., Barron et al. 2002; Barron et al. 2008, 2015), with two significant modifications. First, we explicitly examine the determinants of the pre-earnings announcement *level* of investor consensus in our study and include the level in our change analyses.⁶ We contend that understanding how firm characteristics and earnings announcement disclosures are related to the pre-earnings announcement level of investor consensus. We argue that it is more (less) likely that an earnings announcement will increase investor consensus when the pre-announcement level of the variable is lower (higher); therefore, we include the level of investor consensus in our change model. This conditioning allows for greater insight into how earnings announcements *change* investor consensus.

⁵ Barron et al. (2015) find the some information disclosed with earnings announcements (e.g., balance sheets and segment disclosures) lead to changes in the precision of private information while other information (e.g., balance sheet disclosures and management forecasts) lead to changes in the precision of common information, although the net impact on investor consensus is insignificant. As noted by the authors, however, their regression models have low explanatory power and their findings might be due to a lack of power due to their small sample size and focus on bundled management forecasts.

⁶ Barron et al. (2008) include the pre-announcement level of investor consensus as a robustness test, and report that doing so has no impact on their analysis of how earnings surprises motivate analysts to increase their private information searches.

Our second major modification to the prior research is our extension of the analysis to the two primary components of earnings – revenue and expenses. Several studies document differences between revenues and expenses in terms of predictability (Ertimur, Livnat, and Martikainen 2003; Bradshaw et al. 2016) and the idiosyncratic nature of expenses (Kim and Prather-Kinsey 2010; Baumgarten, Berens, and Homburg 2011). These differences likely give rise to differences in the information environment around the two components of earnings that cannot be disentangled by examining aggregate earnings. To address this issue, we re-estimate our investor consensus and common and private information models based on revenues and expenses separately. This analysis shows that the revenue and expenses information environments are differentially impacted by earnings announcements.

Hypotheses Development

Level of EPS investor consensus.

We begin by identifying firm characteristics that we expect to be associated with the *level* of preearnings announcement investor consensus. Prior research finds that firms with greater analyst following have lower information asymmetry (Frankel and Li 2004; Roulstone 2003).⁷ Thus, we conjecture that firms with greater analyst following are likely to experience a higher investor consensus prior to a quarterly earnings announcement. Some prior studies suggest that larger firms are more complex with multiple products spanning multiple geographic areas and are likely to provide more extensive disclosures (Buzby 1975). The increased complexity and more extensive disclosures would lead to a lower overall level of investor consensus. We therefore expect a negative relation between the pre-earnings announcement level of investor consensus and firm size⁸, after controlling for analyst following.

We also expect that more profitable firms and firms with lower expected growth are likely to be associated with a higher level of pre-earnings announcement investor consensus. We argue that characteristics that lead to more persistent profitability will trigger higher levels of pre-earnings

⁷ Barron et al. (2008) include the number of analysts that update their earnings forecasts before and after an earnings

announcement in their changes analysis, although they fail to document a significant relation in that setting.

⁸ Barron, Byard, and Yu (2008) find that firm size is negatively associated with changes in investor consensus.

announcement investor consensus and common information and lower levels of pre-earnings announcement private information, as there is less need for analysts to search for and interpret private information to forecast future earnings. Indeed, prior research suggests that higher profitability (Hayn 1995) and lower growth (Fairfield, Whisenant, and Yohn 2003) are associated with more persistent profitability. Finally, Barron et al. (2002) find that investor consensus decreases across fiscal quarters, which would lead to lower levels of pre-earnings announcement investor consensus in subsequent fiscal quarters. These arguments lead to our first hypothesis:

Hypothesis 1: The pre-earnings announcement level of investor consensus about annual earnings is positively associated with analyst following and profitability and negatively associated with firm size, expected growth, and fiscal quarter.

We are also interested in understanding how firm voluntary disclosures affect the information environment, which is the focus of numerous studies (e.g. Firth 1979; Pownall and Waymire 1989; Pownall, Wasley and Waymire 1993; Francis, Nanda and Olsson 2008). We examine two significant voluntary disclosures frequently included in earnings announcements: management earnings forecasts and non-GAAP earnings disclosures. Management earnings forecasts are often provided concurrently with earnings announcements (Hutton, Miller, and Skinner 2003; Rogers and Van Buskirk 2013) and are viewed as informative by investors (Waymire 1984; Ajinkya and Gift 1985).⁹ Prior studies have documented that management earnings forecasts impact investors' and analysts' earnings expectations and equity prices (e.g., Baginski, Conrad, and Hassel 1993) and reduce information asymmetry (Coller and Yohn 1997). Thus, we expect investors to rely less on private information production and more on common information in management forecasts, leading to an increase in investor consensus.

Prior research also documents that non-GAAP earnings disclosures within the earnings announcement are increasingly common in capital markets (e.g., Bradshaw and Sloan 2002; Bentley, Christensen, Gee, and Whipple 2015). While this research suggests that non-GAAP earnings disclosures are viewed as informative, they have conflicting effects on investor beliefs. For example, Bhattacharya, Black,

⁹ Rogers and VanBuskirk (2013) document that 'bundled' forecasts (management earnings forecasts provided within a five-day period around an earnings announcement) are increasingly common and constitute more than 63 percent of their sample.

Christensen and Larson (2003) conclude that investors view non-GAAP metrics as more reflective of core operating performance than GAAP earnings, and Lougee and Marquardt (2004) find that non-GAAP earnings are particularly useful when GAAP earnings informativeness is low. In contrast, several studies find evidence consistent with opportunism motivating non-GAAP reporting for certain firms (e.g., Doyle, Lundholm, and Soliman 2013; Curtis, Lundholm, and McVay 2014), consistent with Bradshaw and Sloan's (2002) speculation that managers might report non-GAAP metrics for opportunistic reasons.

Non-GAAP metrics also appear to generate different responses across investor types. For example, Bhattacharya, Black, Christensen, and Mergenthaler (2007) find that non-GAAP reporting in earnings announcements encourages trading by less sophisticated investors, while sophisticated investors are unaffected. In addition, Christensen, Drake, and Thornock (2014) find that short sellers trade as if non-GAAP reporting creates an exploitable information advantage. Based on this research, we hypothesize that various investors process non-GAAP earnings differently, leading to lower investor consensus. These arguments lead to the following hypothesis:

Hypothesis 2: The pre-earnings announcement level of the investor consensus about annual earnings is positively associated with the prior disclosure of a management forecast and is negatively associated with the prior disclosure of non-GAAP earnings.

Finally, based on Barron et al. (2008), who find the magnitude and the sign of the firm's concurrent earnings surprise affects changes in investor consensus, we include the magnitude and the sign of the prior earnings announcement earnings surprise in our examination of the level of investor consensus.

Changes in EPS investor consensus.

Prior analytical and empirical research suggests that the information asymmetry faced by investors decreases around earnings announcements. Specifically, prior theoretical research suggests that public disclosure increases private information acquisition prior to the public disclosure and generates differential interpretation of the information at the public disclosure (e.g., Holthausen and Verrecchia 1990; Kim and Verrecchia 1994, 1997). Likewise, prior archival research documents greater information asymmetry prior to and at public disclosures (e.g., Krinksy and Lee 1996; Yohn 1998). However, research also suggests that public information disclosure reduces information asymmetry because it provides

information that is otherwise held by only a subset of investors (Verrecchia 1982). This research suggests that information asymmetry decreases from before to after an earnings announcement as the announcement levels the playing field in terms of the information available to investors (Lev 1989). This prediction is also supported by empirical research (e.g. Krinsky and Lee 1996; Yohn 1998). In contrast with these findings, Barron et al. (2002) show that investor consensus decreases across earnings announcements.¹⁰ Based on the bulk of the evidence presented, we expect investor consensus about annual earnings to increase around quarterly earnings announcements. This leads to our third hypothesis:

Hypothesis 3: After controlling for the level of pre-earnings announcement investor consensus, earnings announcements increase investor consensus about annual earnings.

We also explore the affect of two voluntary disclosures included in earnings announcements on changes in investor consensus: a bundled management forecast¹¹ and non-GAAP earnings disclosure. We expect that a management forecast bundled with an earnings announcement will increase investor consensus and the disclosure of a non-GAAP earnings number will decrease investor consensus. Our expectations are based on the discussion provided around these two types of voluntary disclosures and hypothesis 1. For example, as discussed earlier, management forecasts have been shown to reduce information asymmetry (e.g., Coller and Yohn 1997), while non-GAAP earnings have been associated with earnings management (Bradshaw and Sloan 2002), leading to contrasting expectations. This leads to the following hypothesis.

Hypothesis 4: The change in investor consensus around earnings announcements is positively associated with the disclosure of a management forecast and is negatively associated with the disclosure of non-GAAP earnings.

Revenues and expenses – level and change in investor consensus.

Our final hypotheses are related to the effect of earnings announcements on the information environment around the two primary components of earnings – revenues and expenses. Consistent with

¹⁰ As noted by Gow, Taylor, and Verrecchia (2013), a key issue in understanding the impact of a public announcement on the information environment is whether the public information substitutes for or complements private information.

¹¹ Barron et al. (2015) explicitly examine whether a management forecast affects changes in investor consensus. They fail to document a significant association, which they note is a surprising outcome. They go on to suggest that their results might be due to a lack of power due to sample size and a focus on bundled forecasts. (page 17).

our aggregate earnings analyses, we examine both the level of and the change in investor consensus. Revenues are more persistent than earnings and are demonstrably easier to predict (Ertimur et al. 2003; Bradshaw et al. 2016). In contrast, expenses are more complicated and idiosyncratic than revenues, leading analysts to not fully incorporate the behavior of expenses into their forecasts. For example, Kim and Prather-Kinsey (2010) suggest that analysts assume equal growth rates for expenses and revenues and do not consider fixed costs, and Baumgarten et al. (2011) find that analyst forecasts appear to disregard cost stickiness, where costs decrease less with declines in revenue than they increase with revenue growth. As a result, we expect lower investor consensus about expenses relative to revenues, in general, and that earnings announcements will lead to a larger increase in investor consensus about revenues than about expenses. We also hypothesize that management forecasts will increase investor consensus around revenues more than expenses and that the non-GAAP earnings disclosures will reduce consensus around expenses more than revenues. This leads to our final set of hypotheses:

Hypothesis 5a: The associations between firm and earnings announcement characteristics and the pre-earnings announcement level of investor consensus about expenses are different that about revenues; the level of investor consensus about annual expenses is lower than about annual revenues.

Hypothesis 5b: The increase in investor consensus is larger for annual revenues than for annual expenses.

Hypothesis 5*c*: *The increase in investor consensus due to management earnings forecasts is greater for annual revenues than for annual expenses.*

III. SAMPLE SELECTION AND RESEARCH DESIGN

We use I/B/E/S to identify analysts' forecasts of annual performance for fiscal years ending 2004-2014. We begin our sample in 2004, the year analyst component forecasts first became widely available. Because we are interested in how firms' information environments for annual performance change throughout the fiscal year, we compare the information environments around the first, second, and third fiscal quarters. For each quarter, we examine analysts' forecasts of earnings per share, revenue, and expenses (EPS, REV, and EXP) around the associated earnings announcement. Because I/B/E/S does not contain explicit expense forecasts, we infer each analyst's expense forecast by taking the difference

between their revenue and net income forecasts. We merge the I/B/E/S analyst data with the Compustat dataset and the I/B/E/S management guidance dataset and limit our analysis to observations with non-missing variables used in our regression analyses. This selection process yields a final sample of 54,894 firm-quarter observations.

As discussed earlier, we employ a measure provided by BKLS – ρ (investor consensus) – to capture the firm's information environment. The BKLS models allows us to exploit observable aspects of analysts' forecasts (the squared error of the median forecast and the dispersion) to capture two key dimensions of firms' information environments – the precision of common and private information (h and s) and the proportion of the total information that is common, investor consensus. The combination of these two dimensions enhances our ability to isolate the aspects of the information environment of interest. Thus, in contrast with prior studies that rely on the error in the mean forecasts or forecast dispersion to proxy for investor consensus or uncertainty, the model allows us to calculate the precision of common and private information within our sample, which we use to calculate the firm-specific investor consensus, our primary variable of interest. As noted by Barron et al. (2002) (pg. 827) "the use of dispersion as a proxy either for commonality alone (as in Ziebart 1990) or for uncertainty alone (as in Imhoff and Lobo 1992) may lead to erroneous interpretations of empirical evidence."

When all analysts' private information is of equal precision, BKLS show that ρ can be calculated as:

$$\rho = \frac{h}{h+s} = \frac{(SE - \frac{D}{N})}{\left(SE - \frac{D}{N}\right) + D},$$

where *h* is the precision of common information (information that is common to all analysts) and *s* is the precision of private information (information that is available to only one analyst). BKLS demonstrate that *h* and *s* can be calculated based on observable features of analysts' forecasts¹²: *SE* is the squared error in the median forecast, *D* is the dispersion in the forecasts, and *N* is the number of analysts that provide a forecast. Investor consensus is the portion of the total information precision (*h*+*s*) that is due to reliance

¹² The formulas for h and s are: $h = \frac{SE - \frac{D}{N}}{\left[\left(1 - \frac{1}{N}\right)D + SE\right]^2}$ and $s = \frac{D}{\left[\left(1 - \frac{1}{N}\right)D + SE\right]^2}$.

on common information (*h*). In theory, ρ can range from zero (no common information is reflected in average beliefs) to one (average beliefs are a function of only common information).¹³ Our hypotheses and primary analysis are based on explaining the level and changes in ρ . We also present results using *h* (precision of common information) and *s* (precision of private information) and changes in those values as the dependent variable in lieu of ρ , however. We calculate these metrics before and after quarterly earnings announcements for earnings per share (*EPS*), revenues (*REV*), and expenses (*EXP*). See Appendix A for a more detailed variable definition.

To provide evidence on hypothesis 1 and hypothesis 2, we examine the determinants of the preearnings announcement investor consensus, based on the following model.

$$\rho = \alpha + \beta_1 Q_2 + \beta_2 Q_3 + \beta_3 MV E_{q-1} + \beta_4 A F_E P S_{q-1} + \beta_5 ROA_{q-1} + \beta_6 B/M_{q-1} + \beta_7 MEF_{q-1} + \beta_8 NonGAAP_E P S_{q-1} + \beta_9 Pos_Surp_{q-1} + \beta_{10} |EPSSurp|_{q-1} \varepsilon$$
(1)

The level of ρ , the dependent variable in our model, is calculated based on outstanding annual EPS forecasts prior to the quarterly earnings announcement. Our independent variables include *Q2* (*Q3*), which equals one when the dependent variable is measured prior to the second (third) fiscal quarter and zero otherwise. The remaining explanatory variables are lagged values (by one quarter) of the relevant firm and earnings announcement characteristics. We predict the following firm characteristics are related to the firms' information environment: firm size (market value of equity – *MVE*), analyst following (the number of analysts that provide EPS forecasts – *AF_EPS*), profitability (return on assets – *ROA*), and expected growth (book to market – *B/M*). The quarterly indicator variables (*Q1* and *Q2*), along with the intercept, provide insight into how investor consensus and the precisions of common and private information vary across the fiscal year. The coefficients on the fiscal quarter indicators and the proxies for firm characteristics provide evidence related to the association with investor consensus (hypothesis 1). *MEF (NonGAAP_EPS)* is an indicator variable set equal to one if a firm provided a management earnings

¹³ As noted in prior studies (e.g., Botosan et al. 2004), this calculation results in a negative value for ρ when SE is quite small or zero (the consensus forecast is either very close or equal to the reported value) and/or when D/N (dispersion divided by the number of analysts providing forecasts) is large. In untabulated analyses, we confirm that observations with negative ρ do not influence our inferences.

forecast in the prior quarter (reported non-GAAP earnings in its prior quarter's earnings announcement).¹⁴ The coefficients on *MEF* and *NonGAAP_EPS* provide evidence on their associations with investor consensus – hypothesis 2. We also include two variables to control for prior period earnings announcements, based on the findings in Barron et al. (2008). *Pos_Surp* is an indicator variable equal to one if the firm had a positive earnings surprise and *|EPSSurp|* is the absolute value of that earnings surprise (i.e., the magnitude of the surprise). Finally, we include year and industry fixed effects, use robust standard errors, and cluster the standard errors by firm.

To provide evidence related to hypotheses 3 and 4, we examine the association between the *change* in the investor consensus and firm and earnings announcement characteristics using the following model:

$$\Delta \rho_{EPS} = \alpha + \beta_1 \rho_{EPSq} + \beta_2 Q^2 + \beta_3 Q^3 + \beta_4 M V E_q + \beta_5 A F_EPS_q + \beta_6 R O A_q + \beta_7 B / M_q + \beta_{10} B undled EPS_q + \beta_{11} N on GA A P_EPS_q + \beta_8 Pos_Surp_q + \beta_9 |EPSSurp|_q + \varepsilon$$
(2)

The dependent variable is the change in investor consensus ($\Delta \rho_{EPS}$), calculated as the difference between ρ measured after the quarterly earnings announcement and ρ measured before the earnings announcement. Thus, a positive (negative) value reflects an increase (decrease) in ρ around the earnings announcement. As discussed earlier, we control for the level of the pre-earnings announcement investor consensus in the change model. We then examine the intercept term (α) to provide evidence about the effect of earnings announcements on changes in investor consensus (hypothesis 3). The coefficients on the indicator variables that capture whether a firm issues a management earnings forecast or a non-GAAP earnings disclosure concurrent with earnings announcement are used to provide evidence on hypothesis 4.

To provide evidence on our final set of hypotheses, we re-estimate model (1) with the level of investor consensus measured using *revenue* and *expense* forecasts (instead of earnings forecasts) as the dependent variables and model (2) with the change in investor consensus measured based on *revenue* and *expense* forecasts (instead of earnings forecasts) as the dependent variables. This allows us to provide evidence on how firm and earnings announcement characteristics are associated with the information environments around the components of earnings – revenues and expenses. In addition to examining how

¹⁴ Detailed variables definitions for all analyses are in Appendix A.

these factors are associated with level and change in investor consensus around revenues and expenses, we examine differences in the overall explanatory power of the models and the coefficients on the explanatory variables. Results from model (1) using revenue and expense forecasts provide evidence on whether the *level* of investor consensus about these components is differentially associated with firm and disclosure characteristics (hypothesis 5a). Estimating Model (2) using revenue and expense forecasts provides evidence on whether the *changes* in the information environment around these components are differentially associated with earnings announcements (hypothesis 5b) and disclosures within earnings announcements (hypothesis 5c).

IV. EMPIRICAL RESULTS

Descriptive Statistics

Table 1 provides descriptive statistics for the variables we use in our study. We rely on fiscal quarter one values to calculate all our variables. Panel A presents means, medians, and the standard deviations of the firm and disclosure variables, while Panel B presents the same for the information environment variables: investor consensus, common and private information precision based on EPS, revenue, and expenses forecasts and changes in those measures. Consistent with other studies that require analyst forecasts of EPS, revenues, and expenses, our sample is comprised of larger firms, with a mean (median) *MVE* of \$7.85 (1.99) billion and an average of 12.1 analysts providing an annual EPS forecast prior to the first-quarter earnings announcement. Mean (median) *ROA* is 0.007 (0.010) and 21 percent of our sample firms report negative quarterly earnings. Within our sample, just over 29 percent of firms issued a management earnings forecast (either bundled with the last earnings announcement or outside of that time frame) over the last fiscal quarter. Just over 27 percent bundled a management earnings forecast concurrent with the earnings number (non-GAAP earnings) with their quarterly earnings announcement. The high proportion of firms that include these additional voluntary disclosures within an earnings announcement highlight the need to control for these in order to assess how an earnings

announcement changes the firm's information environment. In our analysis, we control for the sign and magnitude of the earnings surprise. About 71 percent of our sample report positive earnings surprises; the mean and median values are 0.07 and 0.04, respectively.

In Panel B we present mean, median, and standard deviations of the information environment variables and changes in those variables. We document that investor consensus (ρ) around earnings is higher than around revenues or expenses (ρ_{EPS} has a mean (median) value of 0.657 (0.823)¹⁵ versus a mean (median) value of ρ_{REV} of 0.589 (0.746) and of ρ_{EXP} of 0.560 (0.697)). Mean and median changes in investor consensus ($\Delta \rho$) measured using EPS, REV, and EXP forecasts are all negative, which is consistent with decreases in investor consensus around earnings announcements. Interestingly, we find that the decrease in investor consensus is larger for expenses than revenues, suggesting that expenses are a meaningful component of the changes in investor consensus around earnings. We also present the level and changes in common and private information precision, the two dimensions that are combined to form investor consensus. The levels of common an public precisions are highly skewed, consistent with prior studies (e.g., Botosan, Plumlee, and Xie 2004).¹⁶ The mean values of COMMON are smaller than the mean values of *PRIVATE* across all three specifications; the median values have the opposite relation. Mean and median changes in these values ($\triangle COMMON$ and $\triangle PRIVATE$) are positive, consistent with intuition and the precision of both common and private information increasing when earnings are announced. As noted by Barron et al. (2002), however, the rate of change in private information precision is greater relative to the change in common information precision, which could lead to a decrease in investor consensus.

We provide a graphical representation of changes in investor consensus around earnings announcements by plotting the median levels of investor consensus before and after the quarterly earnings

¹⁵ This value is similar to prior studies. For example, Barron et al. (2002) report a median value of 0.89. Our sample median is slightly lower than Barron et al. Their sample differs from ours in several ways, including the sample time period (2004-2014 versus 1986-1997), the overall firm/analyst coverage, and differences in sample selection criteria.

¹⁶ Consistent with prior studies, we also estimated our *COMMON* and *PRIVÂTE* regressions using ranks rather than the skewed values. Our inferences are unaffected by this change.

announcements (Figure 1), similar to the graph provided in Barron et al. (2002). Consistent with that study, we document a decrease in the median investor consensus about EPS across all three fiscal quarters' earnings announcements. In addition, the rate of that decrease increases across the fiscal quarters. We provide a similar plot of the levels of investor consensus around revenue and expenses. We again find that investor consensus decreases around earnings announcements, although the decrease is greater for expenses than for revenues. In addition, the decrease in investor consensus throughout the year for revenues is relatively stable when compared to that for expenses, which decreases at an increasing rate throughout the year. Overall, this figure provides visual evidence that investor consensus about EPS decreases around earnings announcements and that the decrease is primarily attributable to decreases in the investor consensus for expenses, particularly in the second and third quarters.

Level of investor consensus

Table 2 provides results when we regress the level of investor consensus (ρ_{EPS}) on firm and earnings announcement characteristics to provide evidence related to hypotheses 1 and 2. While the hypotheses relate to the level of investor consensus, we also regress the level of common and of private information (*COMMON*_{EPS}, and *PRIVATE*_{EPS}) on the explanatory variables to provide insights into how the firm and earnings announcement characteristics relate to the level of investor consensus through their associations with the common and private information precision. The first (second, third) column presents results for ρ_{EPS} (*COMMON*_{EPS}, and *PRIVATE*_{EPS}).

We find that the average pre-earnings announcement level of investor consensus (column (1)) is high (0.80); the first quarter pre-earnings announcement level of investor consensus is significantly higher than the second or third quarter levels (the coefficients on Q_2/Q_3 are negative (-0.05/ -0.13, respectively)).¹⁷ In addition, investor consensus is higher when the firm has more analysts providing forecasts (AF_EPS_{q-1}), is more profitable (ROA_{q-1}), and has lower growth potential (B/M_{q-1}), and is lower when the firm is larger (MVE_{q-1}). These results are consistent with hypothesis 1. We also document a positive (negative)

¹⁷ In untabulated analysis, we limit the independent variables to Q_2 and Q_3 . In that model we document nearly identical coefficients.

association between investor consensus and the issuance of management earnings forecasts in the prior quarter (a non-GAAP earnings disclosure in the prior period earnings announcement), consistent with hypothesis 2.

In columns (2) and (3) we document that the explanatory variables included in our model have the same association with COMMON_{EPS} as they do with PRIVATE_{EPS}. Specifically, both common and private information precisions are higher in later fiscal quarters (Q_2 and Q_3) and when firms are larger (MVE_{q-l}), more profitable (ROA_{q-1}) , issue a management earnings forecast (MEF_{q-1}) , or report a positive earnings surprise in the prior quarter (Pos_Surp_{q-1}). When more analysts provide forecasts (AF_EPS_{q-1}), firms have lower growth opportunities (B/M_{q-1}) , or report larger magnitude earnings surprises $(|EPSSurp|_{q-1})$, or non-GAAP earnings (*NonGAAP_EPS_{q-1}*) in the prior quarter, both common and private information are lower. The sign of the associations with common and private information, however, does not always translate to a specific association with investor consensus differs, however. For example, while larger and more profitable firms both are associated with higher levels of common and of private information, we find that larger firms are associated with lower levels of consensus while more profitable firms are associated with higher levels of consensus. Similarly, we find lower levels of common and private information precisions when more analysts provide forecasts or when a firm provides a non-GAAP earnings number, although we document higher levels of consensus when more analysts provide forecasts and lower levels of consensus when a firm provides a non-GAAP earnings number. These results highlight the need to examine the links between the variable of interest and investor consensus, common, and private information to understand the complex nature that underlies how firm and earnings announcement characteristics are associated with firms' information environments.

Change in investor consensus

In Table 3, we present the results of regressing the change in investor consensus around quarterly earnings announcements on the pre-earnings announcement level of consensus and concurrent values of the explanatory variables. Our analysis differs from models employed in earlier studies (e.g., Barron et al. 2002; Barron et al. 2008) as we employ a multivariate analysis that controls for the pre-existing level of

investor consensus along with the explanatory variables. This analysis provides evidence of a change in consensus around the earnings announcement (hypothesis 3) and the impact of voluntary disclosures (i.e., management earnings forecast and non-GAAP earnings) on the change in investor consensus (hypothesis 4). We include controls for a series of firm and earnings announcement characteristics based on prior studies in this area. Similar to Table 2, our primary analysis is related to the change in investor consensus ($\Delta \rho_{EPS}$), although we present results where $COMMON_{EPS}$, and $PRIVATE_{EPS}$ are substituted for ($\Delta \rho_{EPS}$).

The first column of Table 3 reports the results of regressing $\Delta \rho_{EPS}$ on ρ_{EPS} and our explanatory and control variables. Consistent with our expectations, change in investor consensus ($\Delta \rho_{EPS}$) is negatively associated with the pre-existing level of ρ_{EPS} (coefficient of -0.45). Intuitively, when the pre-earnings announcement investor consensus is high, changing investor consensus around an earnings announcement is more difficult. More importantly, and consistent with our hypothesis 3, we report a positive intercept in this model – after controlling for the pre-existing level of investor consensus, investor consensus *increases* around earnings announcements.¹⁸ On average, it increases around each quarterly earnings announcement, although the change is greatest for the first quarter. We document that when a firm issues a management earnings forecast concurrent with its earnings announcement (*BundledEPS*), there is a greater increase in investor consensus. This opposite is true when a firm discloses non-GAAP earnings in its earnings announcement. These results are consistent with hypothesis 4. We find that larger firms (*MVE*) and firms with larger magnitude earnings surprises (*JePSSurp*|) are associated with decreases in investor consensus, while firms with more analysts providing forecasts (*AF_EPS*), greater profitability (*ROA*), and lower growth (*B/M*), and earnings announcements with positive earnings surprises (*Pos_Surp*) are associated with increases in investor consensus.

In columns (2) and (3), we present results after substituting $\Delta COMMON_{EPS}$ and $\Delta PRIVATE_{EPS}$ for change in investor consensus ($\Delta \rho_{EPS}$). In contrast with the results reported in Table 2, we find that the signs on the independent variables differ across the two dimensions. For example, the pre-existing level

¹⁸ In untabulated analysis, we estimate the model with the pre-existing level of ρ_{EPS} and Q_2 and Q_3 . We explain almost 20 percent of the variation in the change in investor consensus. The intercept in that model is positive as well (0.315).

of common information precision is positively associated with the change in common information precision, while the pre-existing level of private information precision is negatively associated with the change in private information precision. In addition, the number of analysts that provide EPS forecasts is associated with increases in common information precision and decreases in private information precision. Furthermore, we document that some of the independent variables are not associated with the change in common information precision (e.g., profitability, lower growth opportunities, and the sign of the earnings news) or the change in private information precision (e.g., the issuance of non-GAAP earnings) but are significantly associated with the change in investor consensus. Finally, even when a variable is associated with both common and private information, the net impact on investor consensus can vary. For example, the magnitude of the EPS surprise is positively associated with the change in both common and private information precision but is negatively associated with the change in consensus.

Test of Hypothesis 4

Table 4 provides results related to hypothesis 5a, where we examine the association between the preearnings announcement level of investor consensus based on the components of earnings (ρ_{REV} and ρ_{EXP}) and firm and earnings announcement characteristics. Column (1) presents results when ρ_{REV} is the dependent measure and column (4) presents results when ρ_{EXP} is the dependent measure. We also regress the difference between ρ_{REV} and ρ_{EXP} on the explanatory variables. In column (7) we indicate when the explanatory variables in that regression are significant. Consistent with the results for ρ_{EPS} , we find that the mean level of investor consensus is high for both revenues and expenses (0.78 and 0.79, respectively): those levels do not differ between REV and EXP (the value in column 7 is not different from zero). In addition, the level of investor consensus around revenues and expenses is lower when it is measured immediately prior to the second quarter earnings announcement and lower still when investor consensus is measured immediately prior to the third quarter earnings announcement. Our results suggest that the average level of ρ_{EXP} is lower than the average level of ρ_{REV} in both the second and third quarters.¹⁹

¹⁹ The negative coefficients on Q2 and Q3 are statistically greater in the ρ_{EXP} model than the ρ_{REV} model.

We also document a positive association between ρ_{REV} and ρ_{EXP} and the previous issuance of a management earnings forecast (MEF) and firm profitability (ROA), and a negative association between investor consensus about both earnings components and firm size (MVE), consistent with our ρ_{EPS} model. In contrast to our ρ_{EPS} findings, however, we find that firms with lower growth potential (B/M) are associated with *lower* levels of ρ_{REV} and ρ_{EXP} . We also find that the issuance of non-GAAP earnings is associated with greater ρ_{REV} , but with lower ρ_{EXP} . Finally, we document that analyst following and a previous positive earnings surprise is associated with a higher level of ρ_{REV} but is unrelated to ρ_{EXP} . Column (7) in Table 4 suggests that several firm and earnings announcement characteristics explain the difference in the investor consensus about revenues versus expenses (ρ_{REV} less ρ_{EXP}). Specifically, analyst following (AF EPS), growth potential (B/M), the sign and the magnitude of the prior period earnings surprise (*Pos Surp* and *EPSSurp*), and the issuance of a non-GAAP earnings metric in the previous earnings announcement (NonGAAP EPS) explain the difference in the change of investor consensus about revenues versus expenses. Overall, we explain almost 10 percent of the level of ρ_{REV} and just over seven percent of the level of ρ_{EXP} compared to our ability to explain 5.6 percent of the variation in the level of ρ_{EPS} – the sum of *REV* and *EXP* (see Table 2). Similar to the results related to the level of investor consensus, common, and private precision around earnings in Table 2, we find that the signs of the coefficients on the independent variables in the COMMON and PRIVATE regressions are generally consistent. If a firm or earnings announcement characteristic is positively (negatively) associated with COMMON, it is also positively (negatively) associated with PRIVATE. Again, however, the net effect of the increases or decreases in the precision of common and private information varies. This is consistent with different rates of changes across common and private information. It is also consistent with the contention in Gow et al. (2013) that some common information substitutes for private information while other common information complements private information.

Table 5 provides the results of regressing $\Delta \rho_{REV}$ and $\Delta \rho_{EXP}$ and the difference between these two values on the explanatory variables. The signs of the coefficients in the $\Delta \rho_{REV}$ and $\Delta \rho_{EXP}$ regression models are generally consistent with the findings when we employ $\Delta \rho_{EPS}$ as the dependent variable. Even

so, there are some important differences across revenues and expenses, as highlighted in column 7-9. These columns indicate when regressing the difference between $\Delta \rho_{REV}$ and $\Delta \rho_{EXP}$ on the explanatory variables results in statistically significant coefficients. For example, the increase in investor consensus about revenues is more pronounced than the increase in investor consensus about expenses around earning announcements. Moreover, the change in investor consensus about revenues around earnings announcements is more negatively associated with firm size than the change in investor consensus about expenses around earnings announcement. Further, the increase in investor consensus about revenues around earnings announcements is positively associated with analyst following and negatively associated with B/M while the increase in investor consensus about expenses around earnings announcements is not associated with these factors. The increase in investor consensus about revenues is less positively associated with profitability than the investor consensus about expenses. With respect to the earnings announcement characteristics, we find that the reporting of non-GAAP measures in the earnings announcement is associated with a larger increase in investor consensus about revenues but with a decrease in investor consensus about expenses. A positive earnings surprise is associated with an increase in investor consensus about revenues but not expenses. Examining the results of the $\triangle COMMON$ and $\Delta PRIVATE$ regression models provides additional insights into the process by which firm and earnings announcement characteristics affect consensus. That analysis suggests that each of our explanatory variables is associated with a change in the precision of private information, although the magnitudes of those associations differ based on whether the dependent variable is related to revenues or expenses. Furthermore, we document that there are several explanatory variables that are associated with the precision of common information related to revenues but not expenses (e.g., MVE, AF_EPS, ROA), and that are associated with precision of common information related to expenses but not revenues (e.g., BundledEPS, NonGAAP EPS).

The results provided in Tables 4 and 5 suggest that the impact of earnings announcements and firm and earnings announcement characteristics on the level and change in investor consensus about revenues differs from the impact on the level and change in investor consensus about expenses. Decomposing investor consensus around earnings into its components (investor consensus around revenues and expenses) and investor consensus into its dimensions (common and private information precision) enhances our understanding of firm information environments and how they are impacted by earnings announcements.

V. CONCLUSION

This study provides evidence on the determinants of the level of investor consensus and the effect of quarterly earnings announcements on changes to it. We also document how the determinants of investor consensus are related to the dimensions of investor consensus – common and private information. These findings suggest that examining the level and change in investor consensus fails to fully reflect essential aspects of a firm's information environment. In addition to considering the dimensions of investor consensus to improve our understanding of how firm and disclosure characteristics impact firms' information environments, we also decompose earnings into revenues and expenses and investigate differences across these two components of earnings. We document a number of differences in the magnitudes and the signs of the associations between the firm and disclosure characteristics and revenues and expenses, suggesting that disaggregating earnings into its components will enhance our understanding of how firm and disclosure characteristics impact firms' information environments relative to examining earnings alone.

We provide evidence that the pre-earnings announcement level of investor consensus about earnings is a function of the firms' prior period profitability, growth opportunities, earnings surprises, and whether they provide voluntary disclosures (e.g., management earnings forecasts or non-GAAP earnings). We also find that, after controlling for the pre-existing level of investor consensus, earnings announcements are associated with an increase in investor consensus. We explore the source of these effects by re-estimating our models using revenues and expenses to calculate investor consensus.

25

REFERENCES

- Ajinkya, B.B., and M.J. Gift, 1985. Dispersion of financial analysts' earnings forecasts and the (option model) implied standard deviations of stock returns. *The Journal of Finance*, 40(5), 1353-1365.
- Baginski, S., E. Conrad, and J. Hassell. 1993. The effects of management forecast precision on equity pricing and on the assessment of earnings uncertainty. *The Accounting Review*, Vol. 68 (4):913-927.
- Barron, O., D. Byard, and O. Kim. 2002. Changes in analysts' information around earnings announcements. *The Accounting Review*, Vol. 77 (4): 821-846.
- Barron, O., D. Byard, and Y. Yu. 2008. Earnings surprises that motivate analysts to reduce average forecast error. *The Accounting Review*, Vol. 83 (2): 303-325.
- Barron, O., D. Byard, and Y. Yu. 2015. Earnings announcement disclosures and changes in analysts' information. *Contemporary Accounting Research*, Forthcoming.
- Barron, O., D. Harris, and M. Stanford. 2005. Evidence that investors trade on private event-period information around earnings announcements. *The Accounting Review*, Vol. 80 (2):403-421.
- Barron, O., M. Stanford, and Y. Yu. 2009. Further evidence on the relation between analysts' forecast dispersion and stock returns. *Contemporary Accounting Research*, Vol. 26 (2): 329-357.
- Baumgarten, D., M. Berens and C. Homburg, 2011. Analysts' implied cost forecasts and cost stickiness. Working paper, University of Cologne.
- Bentley, J., T.E. Christensen, K.H. Gee, and B.C. Whipple, 2015. Disentangling managers' and analysts' non-GAAP reporting incentives. Working Paper, University of Georgia.
- Bhattacharya, N. E. Black, T. Christensen, and C. Larson. 2003. Assessing the relative informativeness and permanence of pro forma earnings and GAAP Operating Earnings." *Journal of Accounting and Economics*, Vol. 36: 285–319.
- Bhattacharya, N., E. Black, T. Christensen, and R. Mergenthaler. 2007. Who trades on pro forma earnings information? *The Accounting Review*, Vol. 82 (3):581-619.
- Botosan, C, M. Plumlee, and Y. Xie. 2004. The role of information precision in determining the cost of equity capital. *Review of Accounting Studies*, Vol. 9, 233-259.
- Bradshaw, M.T., and R.G. Sloan, 2002. GAAP versus the street: An empirical assessment of two alternative definitions of earnings. *Journal of Accounting Research*, 40(1), 41-66.
- Bradshaw, M., L.F. Lee, and K. Peterson, 2016. The interactive role of difficulty and incentives in explaining the annual earnings forecast walkdown. Forthcoming, *The Accounting Review*.
- Bushman, R., 1991, Public disclosures and the structure of private information markets. *Journal of Accounting Research*, Vol. 38, pp. 261–276.
- Buzby, S. 1975. Company size, listed versus unlisted stocks, and the extent of financial disclosure. *Journal of Accounting Research* 13 (1): 16-37.
- Christensen, T.E., M.S. Drake, and J.R. Thornock, 2014. Optimistic reporting and pessimistic investing: do pro forma earnings disclosures attract short sellers? Contemporary Accounting Research, Vol. 31, 67-102.
- Coller, M., and T.L. Yohn, 1997. Management forecasts and information asymmetry: An examination of bid-ask spreads. *Journal of Accounting Research*, 181-191.
- Curtis, A., R. Lundholm, and S. McVay. 2014. Forecasting sales: A model and some evidence from the retail industry. *Contemporary Accounting Research*, Vol. 31(2): 581-607.

- Demski, J.S., and G.A. Feltham, 1994. Market response to financial reports. *Journal of Accounting and Economics*, 17(1), 3-40.
- Diamond, D. W., 1985. Optimal release of information by firms. *The Journal of Finance*, 40(4), 1071-1094.
- Diamond, D. W., R.E. Verrecchia, 1991. Disclosure, liquidity, and the cost of capital. *The Journal of Finance*, 46(4), 1325-1359.
- Doyle, J. T., R.J. Lundholm, and M.T. Soliman, 2003. The predictive value of expenses excluded from pro forma earnings. *Review of Accounting Studies*, 8(2-3), 145-174.
- Ertimur, Y., J. Livnat, and M. Martikainen, 2003. Differential market reactions to revenue and expense surprises. *Review of Accounting Studies* 8 (2-3): 185-211.
- Frankel, R. and X. Li. 2004. Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of Accounting and Economics* 37 (2): 229-259.
- Fairfield, P. M., J.S. Whisenant, and T.L. Yohn, 2003. Accrued earnings and growth: Implications for future profitability and market mispricing. *The Accounting Review*, 78(1), 353-371.
- Firth, M., 1979. The impact of size, stock market listing, and auditors on voluntary disclosure in corporate annual reports. *Accounting and Business Research*, 9(36), pp.273-280.
- Francis, J., Nanda, D. and Olsson, P., 2008. Voluntary disclosure, earnings quality, and cost of capital. *Journal of Accounting Research*, 46(1), pp.53-99.
- Gow, I., D. Taylor, R. Verrecchia. 2013. Can more precise public information increase information asymmetry? Evidence from earnings. Working paper University of Pennsylvania.
- Hayn, C., 1995. The information content of losses. *Journal of Accounting and Economics*, 20(2), 125-153.
- Horton, J., G. Serafeim, and I. Serafeim. 2013. Does mandatory IFRS adoption improve the information environment? *Contemporary Accounting Research* (30):1, 388-423.
- Hutton, A.P., G.S. Miller, and D.J. Skinner, 2003. The role of supplementary statements with management earnings forecasts. *Journal of Accounting Research*, 867-890.
- Kim, M., and J. Prather-Kinsey, 2010. An additional source of financial analysts' earnings forecast errors: Imperfect adjustments for cost behavior. *Journal of Accounting, Auditing and Finance*, 25(1), 27-51.
- Kim, O., and R.E. Verrecchia, 1994. Market liquidity and volume around earnings announcements. *Journal of Accounting and Economics*, 17(1), 41-67.
- Krinsky, I., and J. Lee, 1996. Earnings announcements and the elements of the bid-ask spread. *The Journal of Finance*, 51(4), 1523-1535.
- Lee, C. M., B. Mucklow, and M.J. Ready, 1993. Spreads, depths, and the impact of earnings information: An intraday analysis. *Review of Financial Studies*, 6(2), 345-374.
- Lev, B., 1989. On the usefulness of earnings and earnings research: Lessons and directions from two decades of empirical research. *Journal of Accounting Research*, 153-192.
- Lougee, B.A., and C.A. Marquardt, 2004. Earnings informativeness and strategic disclosure: An empirical examination of "pro forma" earnings. *The Accounting Review*, 79(3), 769-795.
- Mayew, W. 2008. Evidence of management discrimination among analysts during earnings conference calls. *Journal of Accounting Research* 46 (3): 627-659.

- Mayew, W., N. Sharp, and M. Venkatachalam. 2013. Using earnings conference calls to identify analysts with superior private information. *Review of Accounting Studies* 18: 386-413.
- McNichols, M., and B. Trueman, 1994. Public disclosure, private information collection, and short-term trading. *Journal of Accounting and Economics*, 17(1), 69-94.
- Pownall, G., Wasley, C. and Waymire, G., 1993. The stock price effects of alternative types of management earnings forecasts. *The Accounting Review*, pp.896-912.
- Pownall, G. and Waymire, G., 1989. Voluntary disclosure credibility and securities prices: Evidence from management earnings forecasts, 1969-73. *Journal of Accounting Research*, pp.227-245.
- Rogers, J. L., A. Van Buskirk, 2013. Bundled forecasts in empirical accounting research. *Journal of Accounting and Economics*, 55(1), 43-65.
- Roulstone, D. Analyst following and market liquidity. *Contemporary Accounting Research*, 20 (3): 551-578.
- Verrecchia, R. 1982. Information acquisition in a noisy rational expectations economy. *Econometrica* 50: 1415 1430.
- Waymire, G. 1984. Additional evidence on the information content of management earnings forecasts. *Journal of Accounting Research* 22 (2): 703-718.
- Yohn, T.L., 1998. Information asymmetry around earnings announcements. *Review of Quantitative Finance and Accounting*, 11(2), 165-182.

APPENDIX A						
MVE	Variable Descriptions					
MVE	Market value of equily (CSHOQ × PRCCQ)					
AF_EPS	earnings announcement					
ROA	Return on assets (Net income divided by total assets (NIQ/ATQ))					
Loss	One if a firm reported negative EPS for the fiscal quarter (EPSFIQ), zero otherwise					
B/M	Book to market ratio (SEQQ/MVE)					
MEF	One if a firm provided a management earnings forecast at any point during the quarter (bundled or unbundled forecasts), zero otherwise					
BundledEPS	One if a firm provided a management earnings forecast up to two days after the earnings announcement, zero otherwise					
NonGAAP_EPS	One if IBES EPS is on a non-GAAP basis (i.e., IBES EPS \neq EPSFXQ from Compustat), and zero otherwise					
Pos_Surp	One if IBES EPS is equal to or greater than the median consensus quarterly earnings forecast, zero otherwise					
EPSSurp	The absolute value of the difference between IBES EPS and the median consensus quarterly earnings forecast					
<i>Q2</i>	One if the earnings announcement is for the second fiscal quarter, zero otherwise					
Q3	One if the earnings announcement is for the third fiscal quarter, zero otherwise					
SE _{EPS, REV, EXP}	Squared error of the forecast: (Actual less forecast) squared. This value is calculated using EPS, REV, and EXP forecasts.					
D _{EPS, REV, EXP}	Dispersion in forecasts: (variance of the forecasts). This value is calculated using EPS, REV, and EXP forecasts.					
$N_{EPS, REV, EXP}$	Number of analysts that provide forecasts used in <i>D</i> . This value is calculated using EPS, REV, and EXP forecasts.					
COMMON _{EPS, REV, EXP}	Precision of common information – calculated using EPS, REV, and EXP $\frac{SE-D/N}{[(1-1/N)D+SE]^2}$					
PRIVATE _{EPS, REV, EXP}	Precision of private information – calculated using EPS, REV, and EXP					
	forecasts $\frac{1}{[(1-1/N)D+SE]^2}$					
$ ho_{\it EPS, \it REV, \it EXP}$	Investor consensus - calculated using EPS, REV, and EXP forecasts.					
	COMMON scaled by (COMMON + PRIVATE)					
$\Delta ho_{EPS, REV, EXP}$	Change in investor consensus – calculated using $\rho_{EPS, REV, EXP}$. Change is the difference between post-earnings announcement ρ less pre-earnings announcement ρ .					
ΔCOMMON _{EPS, REV, EXP}	Change in precision of common information – calculated using $COMMON_{EPS}$, $_{REV, EXP}$. Change is post-earnings announcement <i>COMMON</i> less pre-earnings announcement <i>COMMON</i> .					
ΔPRIVATE _{EPS, REV, EXP}	Change in precision of common information – calculated using $PRIVATE_{EPS, REV, EXP}$. Change is post-earnings announcement $PRIVATE$ less pre-earnings announcement $PRIVATE$.					

FIGURE 1 Commonality of Beliefs Across Fiscal Quarters



This figure presents the median commonality of beliefs for EPS, revenues, and expenses before and after the earnings announcement for each fiscal quarter.

	TABLE 1	L								
Descriptive Statistics – Firm Level Variables										
Panel A: Firm and Disclosure Characteristics										
Variable	Mean	Median	Standard Deviation							
MVE	7855	1988	17626							
AF_EPS	12.103	10.000	7.077							
ROA	0.007	0.010	0.033							
Loss	0.210	0.000	0.407							
B/M	0.496	0.408	0.383							
MEF	0.291	0.000	0.454							
BundledEPS	0.272	0.000	0.445							
NonGAAP_EPS	0.504	1.000	0.500							
Pos_Surp	0.712	1.000	0.453							
EPSSurp	0.072	0.040	0.099							
Panel B: Investor Consensus, Common, and Private Information										
$ ho$ Δho COMMON Δ COMMON Δ										

	ρ	Δho	COMMON	$\Delta COMMON$	PRIVATE	$\Delta PRIVATE$
EPS:						
Mean	0.657	-0.023	59.436	0.403	104.607	10.616
Median	0.823	-0.003	9.187	0.269	3.503	0.559
Standard deviation	0.364	0.326	166.822	8.414	415.957	53.775
Revenues:						
Mean	0.589	-0.015	0.603	-0.133	1.111	12.788
Median	0.746	-0.001	0.075	0.282	0.038	0.497
Standard deviation	0.389	0.343	2.224	18.911	4.882	69.331
Expenses:						
Mean	0.560	-0.025	0.570	0.042	1.127	10.113
Median	0.697	-0.006	0.080	0.185	0.054	0.494
Standard deviation	0.395	0.367	2.022	14.526	4.625	48.532

This table provides descriptive statistics for our sample. We rely on fiscal quarter 1 values to calculate all variables. Variables are defined in Appendix A.

TABLE 2								
Level of investor consensus, and precisions of common and private information: EPS								
		(1)	(2)	(3)				
VARIABLES	Pred. sign (p)	ρ_{EPS}	COMMON _{EPS}	PRIVATE _{EPS}				
Constant		0.803***	-41.247***	-158.309***				
		(43.52)	(-2.80)	(-4.34)				
<i>Q2</i>	-	-0.049***	20.621***	52.354***				
		(-17.35)	(12.64)	(13.01)				
<i>Q3</i>	-	-0.128***	73.523***	182.144***				
		(-36.97)	(28.10)	(26.77)				
MVE_{q-1}	-	-0.018***	25.269***	57.376***				
		(-7.75)	(12.67)	(11.28)				
$AF EPS_{a-1}$	+	0.002***	-2.784***	-8.496***				
		(3.31)	(-7.77)	(-9.69)				
ROA_{a-1}	+	0.666***	250.005***	366.702***				
- <i>q</i> -1		(10.45)	(7.24)	(4.33)				
B/M_{a-1}	+	0.019***	-25.912***	-37.250***				
9.1		(2.64)	(-6.74)	(-4.17)				
MEF _{a-1}	+	0.066***	74.928***	137.837***				
ų r		(11.32)	(13.92)	(11.33)				
NonGAAP EPS	_	-0.020***	-14.281***	-20.400***				
4		(-4.56)	(-4.39)	(-2.64)				
Pos Surp _{a-1}	?	0.005	20.097***	33.997***				
		(1.38)	(9.84)	(6.77)				
$ EPSSurp _{a-1}$?	0.179***	-198.211***	-475.142***				
, <u>1</u> 14 1		(9.00)	(-20.72)	(-20.34)				
Observations		54,894	54,894	54,894				
Adj. R-squared		0.056	0.145	0.092				

All regressions have year and industry fixed effects, standard errors clustered by firm, and use robust standard errors. *, **, *** denote statistical significance at the 10%, 5% and 1% level, respectively (two-tailed). See Appendix A for a more detailed definition of all variables used in the regressions.

		TABLE 3		
Changes in inv	estor consensus and	l precisions of con	nmon and private in	formation: EPS
		(1)	(2)	(3)
VARIABLES	Pred. Sign ($\Delta \rho$)	Δho_{EPS}	$\triangle COMMON_{EPS}$	$\Delta PRIVATE_{EPS}$
Constant	+	0.338***	1.171***	36.167***
		(24.82)	(3.03)	(13.38)
ρ,(<i>COMMON/PRIV</i>	(ATE) _{EPSq-1}	-0.446***	0.000**	-0.009***
		(-96.24)	(2.34)	(-25.37)
<i>Q2</i>	-	-0.037***	0.260**	7.841***
		(-10.84)	(2.53)	(10.93)
<i>Q3</i>	-	-0.103***	0.614***	19.648***
-		(-28.84)	(4.87)	(22.19)
BundledEPS	+	0.023***	0.479***	12.304***
		(5.738)	(3.85)	(11.92)
NonGAAP_EPS	-	-0.028***	-0.226**	-0.210
		(-8.18)	(-2.24)	(-0.27)
MVE	-	-0.006***	-0.152***	-2.490***
		(-3.84)	(-3.05)	(-7.29)
AF EPS	+	0.001***	0.042***	-0.485***
—		(2.70)	(3.89)	(-7.35)
ROA	+	0.256***	0.380	38.639**
		(4.69)	(0.19)	(2.48)
B/M	+	0.027***	-0.164	-4.129***
		(5.51)	(-1.05)	(-3.77)
Pos_Surp	+	0.018***	-0.047	-8.305***
		(5.06)	(-0.42)	(-9.54)
EPSSurp	-	-0.187***	4.008***	118.710***
		(-10.98)	(7.75)	(17.45)
Observations		54,894	54,892	54,873
Adj. R-squared		0.211	0.003	0.048

All regressions have year and industry fixed effects, standard errors clustered by firm, and use robust standard errors. *, **, *** denote statistical significance at the 10%, 5%, and 1% level, respectively (two-tailed). See Appendix A for a more detailed definition of all variables used in the regressions.

				TABLE 4					
			Reve	nue and Exp	enses				
	Lev	el of investor co	onsensus, comn	on, and priva	ate information	precision.			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	$ ho_{\scriptscriptstyle REV}$	COMMON _{REV}	$PRIVATE_{REV}$	$ ho_{\scriptscriptstyle EXP}$	$COMMON_{EXP}$	$PRIVATE_{EXP}$	ρ_{DIFF}	COMMON	F PRIVATE
Constant	0.778*** (37.12)	4.990 *** (25.57)	10.027*** (25.63)	0.789*** (38.49)	4.648*** (27.59)	10.148*** (27.20)		**	
Q2	-0.051*** (-17.42)	0.328*** (14.06)	0.776*** (14.16)	-0.060*** (-19.46)	0.233*** (11.26)	0.683*** (14.02)	***	***	
<i>Q3</i>	-0.113*** (-31.78)	1.400*** (30.22)	2.973*** (29.04)	-0.135*** (-36.18)	0.933*** (26.49)	2.399*** (29.15)	***	***	***
MVE_{q-1}	-0.026*** (-9.80)	-0.544*** (-21.35)	-1.063*** (-22.28)	-0.024*** (-9.395)	-0.463*** (-22.48)	-0.977*** (-22.40)		_***	_**
AF_EPS_{q-1}	0.003*** (4.88)	-0.012** (-2.43)	-0.025*** (-2.58)	0.001 (1.217)	-0.015*** (-3.94)	-0.041*** (-4.99)	***		**
ROA_{q-1}	0.407*** (5.85)	3.853*** (5.45)	8.466*** (5.53)	0.444*** (6.64)	4.936 *** (7.87)	9.953*** (8.30)			
B/M_{q-1}	-0.058***	-0.847***	-1.335***	-0.029***	-0.662***	-1.178***	_***	_***	
	(-7.00)	(-11.58)	(-8.42)	(-3.54)	(-10.69)	(-8.18)			
MEF_{q-1}	0.057***	0.399***	0.457***	0.052***	0.270***	0.292**		**	
	(9.04)	(5.45)	(3.42)	(8.21)	(4.88)	(2.43)			
$NonGAAP_EPS_{q-1}$	0.014***	0.145***	0.091	-0.030***	-0.091**	-0.238***	***	***	***
	(2.91)	(3.08)	(0.930)	(-6.11)	(-2.42)	(-2.81)			
Pos_Surp_{q-1}	0.011*** (2.71)	0.202*** (5.36)	0.054 (0.65)	0.006 (1.318)	0.173*** (5.33)	0.052 (0.708)	*		
$ EPSSurp _{q-1}$	-0.035	-1.309***	-2.930***	0.020	-1.209***	-2.835***	_***		
-	(-1.55)	(-9.63)	(-10.08)	(0.89)	(-11.02)	(-10.79)			
Observations	54,894	54,894	54,894	54,894	54,894	54,894			
Adj. R-squared	0.096	0.135	0.093	0.071	0.114	0.095			

All regressions have year and industry fixed effects, standard errors clustered by firm, and use robust standard errors. *, **, *** denote statistical significance at the 10%, 5% and 1% level, respectively (two-tailed). See Appendix A for a more detailed definition of all variables used in the regressions.

				TABLE	2 5				
Revenue and Expenses									
Change in investor consensus, common, and private information									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Δho_{REV}	$\triangle COMMON_{REV}$	$\Delta PRIVATE_{REV}$	Δho_{EXP}	COMMON _{EXP}	$\Delta PRIVATE_{EXP}$	$\Delta \rho_{Diff}$	$\triangle COMMON_{Diff}$	$\Delta PRIVATE_{Diff}$
Constant	0.384*** (25.83)	-0.443 (-0.46)	59.368*** (17.58)	0.353*** (23.93)	-0.145 (-0.21)	42.889*** (19.03)	**		***
Q2	-0.024*** (-6.83)	-0.008 (-0.03)	7.826*** (9.08)	-0.034*** (-9.21)	-0.047 (-0.28)	5.490*** (9.24)	***		* * *
Q3	-0.051*** (-14.02)	0.848*** (3.04)	24.609*** (22.07)	-0.087*** (-22.40)	0.068 (0.33)	13.406*** (18.43)	***		***
BundledEPS	0.016*** (3.96)	0.163 (0.62)	5.715*** (5.04)	0.014*** (3.30)	0.327* (1.66)	3.688*** (4.85)			
NonGAAP_EPS	0.009** (2.49)	0.058 (0.25)	1.853** (2.01)	-0.028*** (-7.70)	-0.438*** (-2.69)	-1.047* (-1.72)	***	*	***
MVE	-0.015***	-0.201*	-5.357***	-0.007***	0.035	-3.295***	-***		_***
	(-7.98)	(-1.68)	(-12.97)	(-3.78)	(0.42)	(-12.34)			
AF_EPS	0.002***	0.055**	-0.416***	-0.000	0.007	-0.415***	***		
ROA	(6.08) 0.228***	(2.32) 7.778*	(-5.61) 24.179	(-1.21) 0.422***	(0.45) -0.080	(-8.04) 21.295*	_**		
B/M	(4.08) -0.019***	(1.87) -0.067	(1.24) - 4.693***	(7.10) 0.008	(-0.03) 0.013	(1.85) -2.998***	_***		**
	(-3.51)	(-0.18)	(-3.56)	(1.41)	(0.05)	(-3.42)			
Pos_Surp	0.010***	-0.145	-4.323***	-0.004	-0.025	-1.693**	***		_***
	(2.89)	(-0.57)	(-4.39)	(-0.99)	(-0.14)	(-2.56)			
EPSSurp	-0.103***	1.981*	16.209***	-0.094***	1.640**	22.457***			
-	(-5.87)	(1.83)	(3.67)	(-5.23)	(2.05)	(6.21)			
Observations	54,894	54,894	54,892	54,894	54,894	54,894			
Adj. R-squared	0.224	0.006	0.037	0.215	0.002	0.030			

All regressions have year and industry fixed effects, standard errors clustered by firm, and use robust standard errors. *, **, *** denote statistical significance at the 10%, 5% and 1% level, respectively (two-tailed). See Appendix A for a more detailed definition of all variables used in the regressions.