

On guidance and volatility[☆]Mary Brooke Billings^{a,*}, Robert Jennings^b, Baruch Lev^a^a New York University, USA^b Indiana University, USA

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ABSTRACT

In contrast to theoretical and empirical evidence linking disclosure to information environment benefits, recent research concludes that guidance increases volatility, but leaves open the question of whether volatility plays a role in prompting the issuance of guidance. Consistent with the notion that managers react to rising volatility by providing guidance, we document a link between abnormal run-ups in volatility and the decision to issue a forecast after controlling for the market's ability to anticipate the guidance. Upon disentangling pre-guidance volatility changes from post-guidance volatility changes, we find no evidence that guidance increases volatility. Indeed, our evidence consistently supports the view that managers seek to and do mitigate share price volatility with guidance.

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1. Introduction

Theory and empirical evidence establish a close link between voluntary, value-relevant disclosure and share price volatility. Theoretical models indicate that managers engage in voluntary disclosure in order to decrease information asymmetry (Diamond, 1985; Diamond and Verrecchia, 1991) and reduce investor uncertainty (Dye, 1985; Lewellen and Shanken, 2002; Pastor and Veronesi, 2003). In these models, investors are uncertain about the parameters of the distribution of firms' future cash flows and earnings, and learn about the parameters of the distribution over time as information is revealed about the firm. Investors' uncertainty positively correlates with future stock return volatility and, as disclosure lowers uncertainty, it also lowers subsequent return volatility (Barry, 1978; Brown, 1979). In other words, disclosure increases the precision of investors' beliefs regarding the parameters of the distribution of future cash flows/earnings, and this belief precision links to forward-looking volatility of stock returns.¹ Consistent with this literature's focus on the volatility of firms' future stock returns, this paper examines the link between a specific type of disclosure—earnings guidance—and a forward-looking measure of the market's estimate of stock price volatility—option implied volatility. In so

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¹ Thus, in a Capital Asset Pricing Model setting, managerial supplied information about a firm's future prospects influences the stock's beta. Barry and Brown (1985) demonstrate that differential amounts of disclosure among firms affect the firm's equity cost of capital.

doing, we provide evidence that speaks to the hotly debated question of whether managers seek to and do mitigate share price volatility with earnings guidance (Hsieh et al., 2006; Rogers et al., 2009).

A wealth of empirical evidence indicates that managers care about their firms' information environment, and specifically about stock return volatility: large stock price movements have been linked to decreased liquidity (Chordia et al., 2005), and the increased likelihood of both lawsuit filings (Kim and Skinner, 2012) and CEO turnover (Engel et al., 2003), all naturally of great concern to corporate managers. Indeed, consistent with the notion that volatility concerns influence managers' disclosure decisions, research documents that managers respond to shocks to their firm's information environment with increased disclosure (Leuz and Schrand, 2009) and, in particular, with increased guidance (Anantharaman and Zhang, 2011; Balakrishnan et al., 2014). Accordingly, a substantial literature connects managers' curative guidance efforts with various information environment benefits, including decreased information asymmetry (Coller and Yohn, 1997), reduced litigation risk (Billings and Cedergrén, 2015), increased analyst coverage (Anantharaman and Zhang, 2011), economically meaningful improvements in liquidity (Balakrishnan et al., 2014), and compliance with disclose-or-abstain insider trading regulations (Li et al., 2014).²

Survey evidence corroborates the above findings: when asked about their ongoing communication with investors, managers express concern about excessive share price volatility, which they widely believed to escalate investors' risk perceptions about the firm and increase the likelihood of costly shareholder litigation. Consequently, executives often mention guidance's effectiveness in promoting a reputation for transparency, attracting analyst following, and constraining volatility, when explaining why they are committed to guidance (Graham et al., 2005; Johnson, 2009; National Investor Relations Institute, 2009). Thus, from managers' points of view, reducing volatility is an important objective, and guidance is an effective means for achieving this objective.

Yet, in contrast to the theoretical and empirical evidence linking disclosure to information environment benefits, recent research links guidance to both *increased* volatility (Rogers et al., 2009) and increased crash risk (Hamm et al., 2014). In so doing, it provides support for consultants and influential institutions (including McKinsey, Deloitte, the Business Roundtable and the CFA Institute) who advise against providing guidance — citing litigation and market penalties associated with missed earnings targets, as well as a lack of evidence that disclosure actually curbs volatility (Hsieh et al., 2006). Thus, while empirical evidence suggests that managers can use guidance to positively shape their firm's information environment, recent research examining volatility and crash risk contends that guidance achieves just the opposite.

Weighing in on this important debate, we consider the interplay between guidance and volatility. Consistent with recent theoretical work by Clinch and Verrecchia (2015) that underscores the importance of considering the endogeneity of disclosure choice when examining hypothesized benefits to disclosure, we begin our analysis by investigating whether volatility concerns play a role in prompting the issuance of guidance—a question left open by the prior literature. Then, controlling for determinants of disclosure, we examine the link between guidance and subsequent share price volatility. In particular, as shown in Panel A of Fig. 1, we focus on: (1) whether abnormal increases in volatility are associated with managers' decisions to bundle a forecast (guidance) with current-quarter earnings news, and (2) how volatility changes after the issuance of a bundled forecast compare to volatility changes in quarters in which earnings are released without guidance.

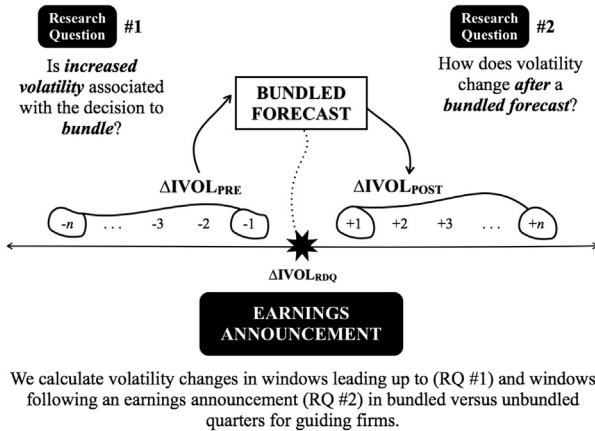
Our analyses examine a sample of 107,307 quarterly earnings announcements made during the decade since Regulation Fair Disclosure (“Reg FD”) took effect in October of 2000. In our primary empirical tests, we compare the volatility dynamics surrounding quarterly earnings announcements bundled with guidance to quarterly earnings announcements without guidance. Recognizing that not all managers may seek to quiet volatility and because the theoretical disclosure literature emphasizes that it is a sustained commitment to disclosure that improves a firm's information environment (Diamond and Verrecchia, 1991; Leuz and Verrecchia, 2000; Clinch and Verrecchia, 2015), our tests concentrate on firms with a demonstrated willingness to guide.³ Thus, because we aim to predict *when* a firm with a guiding history chooses to supply guidance (as opposed to *if* a firm chooses to be a guiding firm), we use firms' guiding histories to narrow our focus to the firm-quarters in which guiding firms choose whether to guide or not.

Prior work linking guidance to increases in volatility examines volatility *surrounding unbundled forecasts* (Rogers et al., 2009) and in the context of crash risk studies a yearly count of only *annual forecasts* (Hamm et al., 2014). Our research design and main tests, in contrast, focus on whether a *bundled quarterly or annual forecast* is given and the volatility dynamics *both before and after* that forecast (although we do examine unbundled forecasts in some of our empirical tests to corroborate our results). The overwhelming majority of guidance now arrives bundled with a quarterly earnings release. Over our sample period, approximately 80% of all forecasts are bundled and, in later years, the proportion climbs above 90%. Further, excluding either quarterly or annual forecasts leaves out approximately half of all post-Reg-FD guidance. Thus, bundled forecasts of *both* quarterly and annual earnings offer the most representative sample of guidance practices. Consistent with

² Prior work also links improvements in analysts' ratings of firms' disclosure policies to capital market benefits (Lang and Lundholm, 1993, 1996; Healy et al., 1999; Healy and Palepu, 2001).

³ In particular, it is possible that some management teams face conflicting incentives that cause them to remain silent in the face of rising volatility. For example, So (2013) finds that firms with high sensitivities of firm value to changes in underlying volatility (i.e., “high-vega” firms) are more likely to be firms that abstain from giving guidance (i.e., “non-guiding” firms), consistent with the notion that these managers enjoy benefits associated with increased volatility. In our analyses, we test whether volatility concerns help to explain when a guiding firm chooses to give guidance.

Panel A: This Study



Panel B: Rogers, Skinner and Van Buskirk (2009)

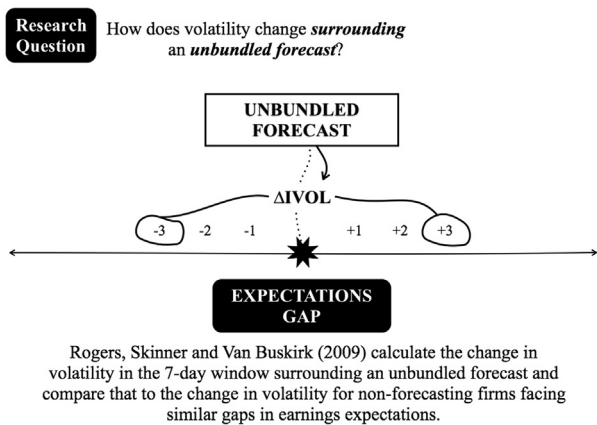


Fig. 1. Timeline and Setup.

this notion, Rogers and Van Buskirk (2013) document the shift in guidance practices toward the issuance of bundled forecasts and caution against drawing inferences from non-representative samples of unbundled guidance.⁴

In contrast to prior work's focus on the volatility changes *surrounding* unbundled forecasts (as depicted in Panel B of Fig. 1), in this study we separate pre-forecast changes from post-forecast changes in volatility (as depicted in Panel A of Fig. 1). Disentangling the change in volatility surrounding the forecast into two distinct windows (pre- and post-guidance) allows us to examine the role that volatility plays in prompting firms to guide. Further, and just as important, this measurement precision allows us to control for pre-forecast movements in volatility when examining post-forecast volatility changes. Absent separation of pre-guidance changes from post-guidance changes in volatility, tests examining the link between guidance and volatility are biased in favor of finding a positive relation if managers issue forecasts in response to some other volatility-provoking event and the measurement window commingles pre-guidance movement with post-guidance movement.

Supporting the notion that volatility concerns factor into managers' quarterly decisions to guide, we find that guidance is more likely to be bundled with earnings announcements when the release follows an abnormal run-up in forward-looking stock price volatility. Thus, in an attempt to calm a particularly turbulent pre-earnings release information environment, some managers choose to accompany current-quarter earnings news with forward-looking guidance. Shifting attention to the effectiveness of managers' guidance efforts, we find no evidence that guidance increases volatility. To the contrary, we document that earnings releases bundled with guidance are associated with abnormally large post-announcement reductions in volatility—after controlling for both the run-up in pre-announcement volatility and the average (typical) post-announcement rundown in volatility.

Our evidence of a link between pre-announcement run-ups in volatility and the decision to guide is consistent with: (1) managers reacting to the rising volatility with guidance, and/or (2) investors anticipating the arrival of a forecast (and its impact on prices). Because we are interested in examining the presence of the former effect, we make a number of adjustments to our research design in an effort to control for (or hold constant) investors' expectation of guidance (the latter effect). Most notably, all of our regressions explaining current-quarter guidance include the average run-up in volatility for the prior four quarters. This average run-up serves as a proxy for the expected (and well-documented) run-up around earnings releases and allows the current-quarter run-up to capture the abnormal increase in uncertainty. Further, all of our regressions explaining post-announcement reductions in volatility control for the current-quarter run-up as well as the average rundown in volatility from the prior four quarters. This allows our tests to link the decision to guide to abnormally large reversion in volatility.

In a further effort to hold constant the market's expectation of guidance, we re-estimate our regressions focusing on subsamples where investors are either very unlikely or are very likely to anticipate guidance. Focusing on subsets of *unlikely* guiders and *unexpected* guiders for which guidance is *unanticipated*, we continue to find that an abnormally *high* run-up in current quarter volatility predicts the quarters in which these firms that rarely bundle (and for which bundling should be *unexpected* by the market) choose to bundle. In contrast, focusing on the subset of *likely* guiders for which guidance is to be

⁴ Although researchers often limit analysis to a small sample of unbundled forecasts in an effort to isolate guidance effects, the decision to provide a forecast (bundled or unbundled) is endogenous and, as we document later, unbundled forecasts are frequently accompanied by value-relevant information events that contaminate the analysis. This prior work that examines unbundled forecasts controls for the endogeneity of managers' disclosure decisions only by matching on the gap in earnings expectations (Rogers et al., 2009). Because earnings announcements are well-defined information events that occur routinely for all firms (Bushee et al., 2010), in our analyses we control for various determinants of managers' disclosure decisions documented by prior work and augment these models to control for other factors, most notably, firms' guiding histories, as well as the presence of "disclose-or-abstain" insider trading incentives (as discussed in Li et al., 2014). See Section 5 for further discussion.

expected, we find that an abnormally *low* run-up in current quarter volatility predicts the quarters in which these firms that bundle almost 9 out of every 10 quarters (and for which bundling should be expected by the market) choose *not* to bundle. Taken collectively, these subsample tests provide further support for the notion that abnormal changes in volatility explain the quarters in which guiders do and do not give guidance.

We execute a number of additional robustness tests that continue to lend support to our hypotheses and all of our findings hold: (1) when we examine uncontaminated (and seemingly unexpected) instances of unbundled guidance, (2) when we employ backward-looking measures of *realized* volatility and abnormal news items, and (3) when managers do not appear to be using guidance to adjust gaps in earnings expectations (i.e., when we control for the expectations gap faced by managers). Thus, our tests provide robust evidence of an important interplay between guidance and volatility.

Our evidence consistently supports the view that managers seek to and do mitigate share price volatility with guidance. Consequently, by considering the interplay between guidance and volatility, this paper helps to reconcile the recent findings linking guidance to increased uncertainty with the wealth of prior literature that suggests disclosure improves firms' information environments. In so doing, we enhance research that seeks to explain the decision to bundle guidance with the firm's quarterly earnings announcement—improving the explanatory power of existing models by greater than 50%. Given the recent shift in guidance practices and the importance of controlling for endogeneity associated with disclosure choice, our findings offer researchers an approach to studying bundled guidance, which represents the predominant form of guidance in recent years.

The remainder of this paper progresses as follows. [Section 2](#) reviews the relevant literature and presents our predictions. [Section 3](#) discusses our data and [Section 4](#) provides descriptive statistics. [Section 5](#) presents our findings concerning the motives of guidance. [Section 6](#) discusses alternative explanations. [Section 7](#) presents findings on the consequences of guidance. [Section 8](#) concludes the study.

2. Related literature and hypotheses

[Patell and Wolfson \(1979, 1981\)](#) document that implied volatility increases before an earnings announcement and subsequently falls, while [Rogers et al. \(2009\)](#) document a similar pattern surrounding bundled forecasts. Shifting attention to unbundled forecasts, [Rogers et al. \(2009\)](#) observe a rise in pre-issuance volatility, but note that volatility remains elevated thereafter (see their Fig. 2 on p. 96). Thus, their work establishes that volatility escalates before the market receives a management forecast, but leaves open the important question of whether this pre-forecast rise in volatility reflects investors' expectation of a the forthcoming forecast, or if the pre-forecast rise in volatility motivates managers to issue a forecast aimed at calming the market. As [Rogers et al. \(2009\)](#) observe:

“This increase in volatility likely occurs for two reasons. First, the sample includes some regular forecasts for which timing is predictable. Second, forecasts may be issued in response to some other event that caused an increase in volatility.” (footnote 13 of [Rogers et al., 2009](#)).

The second possibility (i.e., guidance is given in response to volatility increases) suggests that managers believe that they can use guidance to positively shape their firm's information environment.

Thus, we begin by examining the question of whether volatility plays a role in the decision to supply a forecast. Given that managers committed to the practice of guidance do so because they believe that it aids in reducing investor uncertainty (e.g., [Verrecchia \(1983\)](#), [Diamond \(1985\)](#), and [Diamond and Verrecchia \(1991\)](#)) and in curbing volatility ([Graham et al., 2005](#); McKinsey survey 2006), our first prediction focuses on the role that an unsettled information environment, as measured by volatility, plays in prompting managers to provide guidance in a given quarter. We posit that recent upturns in volatility induce managers to provide a forecast along with the current quarter's regularly scheduled earnings release. In particular, for managers who guided in the past, even sporadically, we expect that a recent increase in volatility (or the presence of volatility-generating events, such as an increase in material news items) will give guiding managers increased incentive to provide a forecast that quarter. Accordingly, our first hypothesis predicts:

H1. Abnormally large increases in pre-earnings announcement share price volatility are associated with an increased likelihood of bundling guidance for managers with a history of providing guidance.

The prior literature examining the benefits and costs to disclosure emphasizes that it is a sustained commitment to disclosure that affects a firm's information environment ([Diamond and Verrecchia, 1991](#); [Leuz and Verrecchia, 2000](#); [Clinch and Verrecchia, 2015](#)). Consistent with this literature, **H1** focuses on making predictions about when a firm with a demonstrated willingness to guide in the past chooses to guide in the current quarter. In other words, **H1** suggests that an abnormal run-up in volatility explains when guiding firms guide versus remain silent in a particular quarter.

Shifting attention to the consequences of guidance, we note that prior evidence suggests that guidance might not result in reductions in volatility. While some work connects earnings guidance (and/or improvements in disclosure ratings) to decreased stock price volatility and other information environment benefits ([Welker, 1995](#); [Bushee and Noe, 2000](#); [Balakrishnan et al., 2014](#)), other work links the issuance of negative earnings guidance to increased volatility ([Rogers et al., 2009](#)) and the frequency of annual guidance to heightened crash risk ([Hamm et al., 2014](#)). Collectively, these studies suggest that guidance not only fails to decrease volatility, but might actually increase it. Consequently, these latter findings lead us to

examine whether bundled guidance (pertaining to both annual and quarterly earnings), which now constitutes the vast majority of guidance cases, alters the typical post-earnings-announcement decline in volatility documented by Patell and Wolfson (1979, 1981). Accordingly, we make the following prediction with respect to post-announcement declines in volatility during quarters in which managers bundle guidance with earnings news:

H2. The general post-earnings-announcement decrease in volatility is further enhanced by the presence of guidance with the earnings release.

3. Data

We begin our data collection by obtaining the report date of quarterly earnings announcements (*RDQ*) for all firm quarters in Compustat from the beginning of 2001 through the end of 2010. To these firm-quarter observations, we add guidance data from First Call's Company Issued Guidelines files maintained by Thomson Reuters.⁵ We code a variable (*BUNDLE*) to indicate when a management forecast occurs during the 5 trading days centered on the earnings announcement.⁶ We also code several indicator variables that reflect the firm's guidance history. *GUIDE_CQTR* indicates whether the firm previously provided guidance for the current quarter's earnings. *BUNDLE_PRIOR* reflects whether the firm bundled earnings guidance with the prior quarter's earnings announcement. *BUNDLE_SQLY* equals one for firm-quarters in which the firm bundled earnings guidance with the earnings announcement for the same fiscal quarter of the previous year. *RECENT_GUIDER* denotes firms with at least three instances of guidance in the prior 12 quarters. Finally, *UNBUNDLED* indicates instances when the firm provides guidance this quarter outside of the five-day window around the *RDQ*.

Within guiding firms (i.e., *RECENT_GUIDER*=1), we code two additional variables that allow us to examine subsamples of firms where the market is likely/unlikely to expect guidance: *LIKELY_GUIDER* denotes guiding firms that bundled in the prior quarter (i.e., *BUNDLE_PRIOR*=1) and also bundled in the same quarter of last year (i.e., *BUNDLE_SQLY*=1). In contrast, *UNLIKELY_GUIDER* denotes guiding firms that did not bundle in the prior quarter (i.e., *BUNDLE_PRIOR*=0) and also did not bundle in the same quarter of last year (i.e., *BUNDLE_SQLY*=0).

Next, we collect analyst forecast data from I/B/E/S, using the unadjusted, detail file three days prior to each earnings announcement. From this file, we derive the number of analyst forecasts (*NUMEST*), conditional on the forecast being no more than 90 days old (i.e., non-stale), the median non-stale analyst forecast, and the standard deviation of non-stale analyst forecasts (*DISPERSION*). We measure each quarter's earnings surprise (*SURPRISE*) as the reported actual earnings (obtained from Compustat quarterly files) minus the most recent median analyst estimates, deflated by stock price three trading days prior to the earnings release date. That is, we examine the typical standardized unexpected earnings (*SUE*). Following Rogers and Van Buskirk (2013), we create indicator variables for positive earnings surprises (*P_SURPRISE* equals one if *SURPRISE* > +0.0001) and for negative earnings surprises (*N_SURPRISE* equals one if *SURPRISE* < −0.0001). In addition, we code an indicator variable (*LOSS*) for firm quarters where the firm reports negative earnings. To capture the recent history of earnings surprises, we compute the proportion of the four prior quarters that *SURPRISE* was non-negative, i.e., the proportion of quarters the firm met or beat analysts' median forecasts (*PROPMB*). For earnings announcements with a bundled management forecast of future earnings, we also compare the guidance to the prevailing median analyst forecast for the same horizon. Three binary variables are used to denote instances where the management forecast exceeds the analysts' forecast (*POSITIVE_BUNDLE*), is equal to (i.e., confirms) the analysts' forecast (*NEUTRAL_BUNDLE*), or is less than the analysts' forecast (*NEGATIVE_BUNDLE*).⁷

In addition to actual and forecasted earnings information, we collect share price, return, number of shares and volume data from CRSP. We use these data to compute the market value of a firm's equity each quarter (*MVE*), the 90-day return ending three days prior to the earnings release date (*PRIOR_RET*), and the standard deviation of returns over that 90-day period (*SVOL_LEVEL*).

Earnings announcements often generate substantial anticipatory news and uncertainty about a firm's prospects. Our intuition is that managers can use earnings forecasts (guidance) to help investors digest the many, possibly disparate, pieces of information about the firm that occur around the earnings release date. In the theoretical models linking disclosure behavior to cost of capital, disclosure is useful to investors in forming beliefs about the distribution of future earnings/cash flows. Early work studying the effect of parameter uncertainty (e.g., Barry, 1978; Brown, 1979) suggests that the volatility of future stock returns is positively correlated with the uncertainty regarding these distributional parameters. Therefore, in selecting an empirical proxy for investor uncertainty, we wish to employ a statistic that is forward-looking. Option implied

⁵ Limiting attention to the guidance behavior of firms with a history of guidance in the post-Reg-FD time period helps to address concerns as to bias in First Call's coverage, as all firms included in this analysis appear in the guidance dataset at least once (and often many times) in the prior 12 quarters. In addition, other sample selection and data availability constraints lead us to examine a sample of firms with high analyst following and large institutional ownership, which prior research also suggests mitigates concerns as to coverage issues. Refer to the appendix of Anilowski et al. (2007) for a discussion of the evolution of First Call as a provider of earnings forecast data and to Chuk et al. (2013) for a discussion of possible incompleteness of the CIG dataset.

⁶ The 5-day window follows from prior work (Anilowski et al., 2007; Rogers et al., 2009). All results remain if we exclude the 3% of our firm-quarter observations where the forecast does not arrive exactly on the *RDQ*.

⁷ Rogers and Van Buskirk (2013) identify econometric problems associated with classifying news of bundled forecasts and describe an alternative approach to classifying bundled forecast news based on conditional expectations. All of our results remain when we reclassify the nature of the guidance news using their conditional approach to measurement.

Table 1**Descriptive statistics.**

The sample consists of 107,307 firm-quarter observations from 2001 through 2010. This table provides descriptive statistics for the full sample partitioned based on the presence of bundled forecast. ●●● denotes instances where the subsamples differ significantly at the 1% level for two-tailed tests. Please refer to the [Appendix A](#) for variable definitions.

Full sample (n = 107,307), partitioned based on bundled earnings guidance.

	Bundle = 1 (n = 32,910)			Bundle = 0 (n = 74,397)			Differences	
	Mean	Median	Std. dev.	Mean	Median	St. dev.	Mean	Median
recent_guider	1.000	1	0.000	0.433	0	0.495	●●●	●●●
guide_cqtr	0.620	1	0.485	0.114	0	0.317	●●●	●●●
bundle_prior	0.816	1	0.388	0.086	0	0.281	●●●	●●●
unbundled	0.214	0	0.467	0.037	0	0.266	●●●	●●●
surprise	0.001	0.001	0.034	−0.010	0.000	0.379	●●●	●●●
p_surprise	0.671	1	0.470	0.542	1	0.498	●●●	●●●
n_surprise	0.194	0	0.395	0.354	0	0.478	●●●	●●●
loss	0.083	0	0.277	0.253	0	0.435	●●●	●●●
dispersion	0.022	0.013	0.036	0.036	0.014	0.064	●●●	●●●
prior_ret	0.029	0.039	0.209	0.035	0.040	0.252	●●●	●●●
mve	6.796	1.355	21.981	3.775	0.594	15.519	●●●	●●●
numest	6.495	5.000	5.314	5.034	3.000	4.989	●●●	●●●
propmb	0.808	0.750	0.230	0.655	0.750	0.287	●●●	●●●
insidertrade_{qtr}	1.372	0.114	2.521	1.007	0.000	2.273	●●●	●●●
insidertrade_{post15d}	0.510	0.000	1.036	0.387	0.000	0.934	●●●	●●●
ceo/cfo_trade_{qtr}	0.276	0.000	0.621	0.184	0.000	0.516	●●●	●●●
ceo/cfo_trade_{post15d}	0.077	0.000	0.206	0.050	0.000	0.169	●●●	●●●
abnews15d	10.1%	0.0%	128.0%	−2.7%	−25.0%	122.0%	●●●	●●●
abnews30d	29.5%	0.0%	133.3%	15.7%	0.0%	129.7%	●●●	●●●
abnews90d	47.2%	9.1%	174.3%	37.0%	0.0%	158.9%	●●●	●●●

volatility is a common proxy used to capture uncertainty about a firm's prospects: it is a reasonably available, market-determined estimate of the stock price's fluctuation between the date of observation and the option's expiration. Thus, changes in investor belief precision are reflected in the value of options and, thereby, implied volatility. Consequently, following [Rogers et al. \(2009\)](#), we gather close-of-day implied volatility data from the standardized option files of OptionMetrics. These are the implied volatilities on 30-day, standardized at-the-money options during the days before and after each earnings release date. This allows us to determine an average level of implied volatility in the days before a quarterly earnings release (*IVOL_LEVEL*) and the changes in implied volatility over various time periods before (*ΔIVOL_PRE*) and after quarterly earnings releases (*ΔIVOL_POST*).⁸ We also collect closing levels of the Chicago Board Option's Exchange volatility index (*VIX_LEVEL*) from their website during the three-day window centered on an earnings announcement date to control for market-wide volatility effects.

As noted by ([Rogers et al., 2009, Table 1](#)), although options exchanges exhibit a coverage bias toward larger firms, exchanges now list options covering a wide spectrum of over 3,000 publicly-traded firms, which increases the generalizability of the results. Further, in robustness tests, we use alternative proxies for changes in uncertainty to replicate our findings using the full sample of firms. This addresses concerns about sample selection bias introduced by restricting the sample to firms with traded options. But, because of the strong theoretical ties and measurement advantages associated with the use of implied volatility measures, we tabulate all of our main analyses using implied volatility metrics.⁹

We suggest that at informationally intense times, managers aim to influence the firm's information environment by releasing guidance. We use two measures of informational intensity in our tests. In addition to the implied volatility measures discussed above, we count the number of material news events using the Key Developments database from Capital IQ. For this measure, we count the number of news items during the 15, 30 and 90 days leading up to each quarter's earnings release. For a given quarter, we also compute "abnormal" news items as the percentage difference between the number of news items in the quarter of interest and the number in the same quarter in the prior year (*ABNEWS15D*, *ABNEWS30D*, and *ABNEWS90D*).

Finally, we gather insider trading data (sales + purchases) from Thomson Reuters Stock Transactions file. In constructing our trading measures, we concentrate on the behavior of directors and officers, consistent with prior work (e.g., [Johnson et al., 2007](#); [Li et al., 2014](#)). This focuses our attention on the trading decisions of insiders who are most likely to be aware of impending earnings news and also most likely to be in a position to influence the firm's disclosure decisions. To further

⁸ As depicted in [Fig. 1](#), [Rogers et al. \(2009\)](#) study movements in volatility in the 7-day period surrounding the forecast. Because we are interested in disentangling the role that volatility plays in prompting the forecast from post-forecast movements in volatility, we measure volatility changes before, during and after the forecast.

⁹ Please refer to page 91 of [Rogers et al. \(2009\)](#) for a discussion of the advantages of using implied volatility as an empirical proxy for investor uncertainty and page 95 for a discussion of potential bias in OptionMetrics coverage. Because we require First Call and I/B/E/S data, our sample is already predisposed toward larger capitalization firms.

concentrate on the trading behavior of individuals most central to disclosure choices, we restrict our measure of insider trading to actions of the CEO and CFO. Insider trading is measured both within the quarter of interest ($INSIDERTRADE_{qtr}$ and CEO/CFO_TRADE_{qtr}) and in the 15-day period of time after the earnings release ($INSIDERTRADE_{post15d}$ and $CEO/CFO_TRADE_{post15d}$). This 15-day window corresponds to the period of time when Bettis et al. (2000) find that managers are typically not restricted in trading shares of the firm's stock. We fully define all the variables used in our analyses in Appendix A.

4. Descriptive statistics

Table 1 characterizes the variables of interest for the 107,307 sample observations. We condition the data on whether the earnings announcement is or is not accompanied by guidance (i.e., *BUNDLED*). In the overall sample, about 31% (32,910 of 107,307) of the quarterly earnings announcements are bundled with guidance, which aligns with prior work (Anilowski et al., 2005; Rogers and Van Buskirk, 2013). Consistent with idea that the guidance decision is sticky, this fraction increases substantially when we examine the subsample of recent guiders. Specifically, in untabulated analyses, we find that over 55% of current-quarter earnings announcements contain guidance if we condition on a recently demonstrated willingness to guide (i.e., *RECENT_GUIDER*=1).

As shown in last two columns of Table 1, we find statistically significant differences between the means and medians of the bundled and non-bundled earnings announcements for all the variables tabulated. Notably, the current quarter bundling decision is highly correlated with past guiding decisions (*GUIDE_CQTR*, *BUNDLE_PRIOR*, *UNBUNDLED*). Managers who report positive current and past earnings news (*P_SURPRISE* and *PROPMB*) are more likely to bundle guidance with the earnings release than managers reporting less favorable earnings news. Firms providing bundled guidance tend to have greater market capitalizations (*MVE*) and be more widely followed by analysts (*NUMEST*) than non-guiders. There also tends to be less disagreement among analysts following firms that guide than those that do not guide (*DISPERSION*). The decision to provide guidance with earnings is positively correlated with insiders' (either in general or just the CEO and CFO) total trading behavior both in the quarter leading up to the earnings release or in the typically open trading window after the earnings release. That is, total insider trades are larger for the firm quarters where firms choose to guide than for quarters where firms do not guide. This association between insider trading and disclosure decisions is consistent with recent research highlighting the disclosure incentives created by “disclose-or-abstain” insider trading rules (Li et al., 2014).

The final three variables in Table 1 provide insight into the public news activity of the sample firms in the 15, 30, and 90 days leading up to the earnings announcement date (*ABNEWS15D*, *ABNEWS30D*, and *ABNEWS90D*). In all cases, we find that the percentage change in news activity leading up to a quarter with a bundled earnings release is larger than that leading up to an earnings release without a bundled forecast. For example, firm-quarters without bundled guidance are associated with a mean increase in abnormal news of −2.7%, while firm-quarters with bundled guidance are associated with a significantly larger mean increase in news events (10.1%) in the 15 days prior to the earnings announcement.

5. The decision to bundle guidance with an earnings release

This section reports the results of our investigation into the association between pre-announcement changes in uncertainty (as measured by option implied volatility and abnormal news activity) and the decision to bundle guidance with a particular earnings release. Because theory emphasizes a commitment to disclosure as being key to obtaining disclosure benefits, our empirical tests identify firms with a history of guidance (i.e., *RECENT_GUIDER*=1).

5.1. Univariate findings

Table 2 provides descriptive statistics for the stock price volatility measures we use in our analyses. We include only firm-quarters of recent guiders with OptionMetrics data (47,947 observations), but note that results are nearly identical when tabulated for the full sample (and all statistical differences remain). To get a sample-wide idea of volatility levels and changes in volatility around earnings, we compute the (unreported) overall sample means by combining the bundlers and the non-bundlers in Table 2. On average, the realized stock price volatility (*SVOL_LEVEL*) in the 90 days prior to the earnings announcement is 2.8% per day, or about 44.1% annualized (assuming identically and independently distributed returns) to a 252 trading-day year. Implied volatility from OptionMetrics, *IVOL_LEVEL*, is, on average, 47.6%. As noted in prior literature, implied volatility rises in the days prior to an earnings announcement (by 1.98% over three days, as evidenced by $\Delta IVOL_PRE3D$, and by 3.48% over 15 days, as evidenced by $\Delta IVOL_PRE15D$, on average), and falls substantially on the earnings announcement day (2.44%, on average, as evidenced by $\Delta IVOL_RDQ$) and the immediately following days (by 6.92% to 7.7%, $\Delta IVOL_POST3D$ or $\Delta IVOL_POST15D$).

Using the conditional statistics from Table 2, consistent with prior work (e.g., Waymire, 1985), we document that guiding firms have lower volatility levels (either historical or implied) than non-guiding firms. We also find that bundled quarters are associated with larger increases in volatility prior to the earnings release than non-bundled quarters. The average volatility increase in the 15 days prior to earnings announcements of bundled quarters (4.2% or 1.9 volatility points based on the 0.447 mean *IVOL_LEVEL* for bundlers) exceeds that of all non-bundled quarters (2.6% or 1.3 volatility points relative to the 0.512 mean *IVOL_LEVEL* for non-bundlers that recently guided). This suggests that the decision to bundle might be related to the pre-earnings volatility increase—a finding not reported in the existing literature, but consistent with Rogers et al. (2009)'s

Table 2

Volatility dynamics surrounding earnings announcements.

This table provides descriptive statistics for the 47,947 firm-quarter observations of recent guiders with data available from OptionMetrics. (Results are nearly identical when tabulated for the full sample and all statistical differences remain.) ●●● denotes instances where the subsamples differ significantly at the 1% level, for two-tailed tests. Please refer to the [Appendix A](#) for variable definitions.

Recent guider sample, partitioned based on bundled earnings guidance (bundle).

	Bundle=1 (n=26,428)			Bundle=0 (n=21,519)			Differences	
	Mean	Median	St. dev.	Mean	Median	St. dev.	Mean	Median
svol_level	0.025	0.021	0.014	0.031	0.026	0.019	●●●	●●●
ivol_level	0.447	0.408	0.198	0.512	0.468	0.233	●●●	●●●
Δivol_pre15d	0.042	0.032	0.162	0.026	0.016	0.182	●●●	●●●
Δivol_pre3d	0.022	0.017	0.108	0.017	0.011	0.111	●●●	●●●
Δivol_rdq	−0.028	−0.019	0.161	−0.020	−0.013	0.160	●●●	●●●
Δivol_post3d	−0.080	−0.058	0.174	−0.056	−0.040	0.173	●●●	●●●
Δivol_post15d	−0.086	−0.073	0.193	−0.066	−0.059	0.199	●●●	●●●
vix_level	0.219	0.201	0.108	0.221	0.207	0.096	●●●	●●●

findings for unbundled forecasts. This result is also consistent with our finding (see [Table 1](#)) that firm-quarters having guidance bundled with earnings are associated with a larger number of news stories than firm-quarters without such guidance. Further, it corroborates the univariate evidence presented in [Coller and Yohn \(1997\)](#), as they find bid-ask spreads rise in the year prior to a sample of 278 unbundled forecasts.

We also document significantly larger declines in post-earnings volatility for bundled quarters (around 11%, consisting of 2.8% on the earnings announcement day and at least 8% in the days thereafter) than for non-bundled quarters (less than 9%)—as evidenced by contrasting $\Delta IVOL_RDQ$, $\Delta IVOL_POST3D$ and $\Delta IVOL_POST15D$ across the bundled guidance partition. To gain understanding of the overall movement in volatility surrounding the earnings announcement, we define the net overall change in volatility as the pre-announcement change in implied volatility ($\Delta IVOL_PRE$), which is typically positive, combined with report date change ($\Delta IVOL_RDQ$) as well as the post-earnings change ($\Delta IVOL_POST$), which are both typically negative. On average, bundled firm-quarters are associated with a more negative net change (i.e., a larger overall decrease) in implied volatility as compared to non-bundled quarters. For example, the mean seven-day net volatility change from three days before the announcement through three days afterward is −8.6% for bundled quarters as compared to −5.9% for non-bundled quarters.

5.2. Multivariate findings

H1 predicts that increased uncertainty is associated with a higher likelihood of bundled guidance. To test this hypothesis, we estimate the following logistic regression model that builds on the model supplied in [Rogers and Van Buskirk \(2013\)](#):

$$\begin{aligned}
 BUNDLE_{i,t} = & \alpha_0 + \alpha_1 (\Delta UNCERTAINTY_{i,t}) \\
 & + \alpha_2 (AVG\Delta UNCERTAINTY_4Q_{i,t}) + \alpha_3 (VOL_LEVEL_{i,t}) \\
 & + \alpha_4 (GUIDE_CQTR_{i,t}) + \alpha_5 (UNBUNDLED_{i,t}) + \alpha_6 (BUNDLE_PRIOR_{i,t}) \\
 & + \alpha_7 (INSIDER_TRADE_QTR_{i,t}) + \alpha_8 (INSIDER_TRADE_POST15D_{i,t}) + \alpha_9 (VIX_LEVEL_{i,t}) \\
 & + \alpha_{10} (\Delta VIX_{i,t}) + \alpha_{11} (P_SURPRISE_{i,t}) + \alpha_{12} (N_SURPRISE_{i,t}) + \alpha_{13} (|SURPRISE_{i,t}|) + \alpha_{14} (LOSS_{i,t}) \\
 & + \alpha_{15} (DISPERSION_{i,t}) + \alpha_{16} (PRIOR_RET_{i,t}) + \alpha_{17} (LOG_MVE_{i,t}) + \alpha_{18} (LOG_NUMEST_{i,t}) \\
 & + \alpha_{19} (PROPMB_{i,t}) + \varepsilon_{i,t}.
 \end{aligned} \tag{1}$$

The presence of a bundled forecast with the current quarter's earnings announcement (i.e., *BUNDLE*) serves as the dependent variable. H1 predicts a positive coefficient for $\Delta UNCERTAINTY$: increased uncertainty in the current quarter (as measured by $\Delta ABNORMAL_NEWS$ or $\Delta IVOL_PRE15D$) is associated with an increased likelihood of a bundled forecast. Given the positive correlation between the decision to bundle and pre-release changes in volatility ([Table 2](#)) and the stickiness of the decision to guide ([Table 1](#)), the inclusion of $AVG\Delta UNCERTAINTY_4Q$ captures the “typical” information environment leading into earnings releases and, thereby, provides a control for the market's anticipation of guidance in the current quarter. This allows the current-quarter variable, $\Delta UNCERTAINTY$, to capture the *abnormal* or *unanticipated* increase in uncertainty.

In addition to controlling for the expected/typical rise in uncertainty prior to the firm's earnings announcement, we also include controls for firm-level volatility. Prior work indicates that managers tend to disclose more frequently when earnings are less volatile ([Waymire, 1985](#)) and easier to predict ([Chen et al., 2011](#)). Consistent with this, [Cotter, et al. \(2006\)](#) find that “management guidance is more likely when... analysts' forecast dispersion is low.” Similarly, [Houston et al. \(2010\)](#) argue that forecast dispersion reflects greater difficulty in predicting earnings and document a positive relation between guidance cessation and increased dispersion. Collectively, these studies indicate that managers are less likely to commit to guidance (and, accordingly, be a guiding firm) when the *level* of stock price volatility is high. When $\Delta ABNORMAL_NEWS$

($\Delta\text{VOL_PRE15D}$) is our proxy for the change in uncertainty we use SVOL_LEVEL (IVOL_LEVEL) to control for firm-level volatility in our regressions. Using historical volatility instead of implied volatility allows us to follow extant work with the largest possible sample by not requiring option data. Following Kim et al. (2014), we also control for market-wide volatility by using the Chicago Board Option Exchange's volatility index (VIX_LEVEL and ΔVIX).

Further, recent work by Li et al. (2014) underscores the importance of controlling for the presence of “disclose-or-abstain” insider trading incentives. Consequently, we also include measures of total insider trading during the quarter ($\text{INSIDER_TRADE}_{\text{QTR}}$) and in the typically open trading window following the report date of quarterly earnings ($\text{INSIDER_TRADE}_{\text{POST15D}}$) in the regression. Because we expect the disclosure and trading decisions to be most salient for the CEO and CFO, we tabulate results using measures of trading based exclusively on the trades of the CEO and CFO (i.e., $\text{CEO/CFO_TRADE}_{\text{QTR}}$ and $\text{CEO/CFO_TRADE}_{\text{POST15D}}$). Our results are robust to either approach to measurement.¹⁰

As mentioned, our model adjusts and augments the model introduced by Rogers and Van Buskirk (2013). Accordingly, the remaining control variables follow directly from their analysis. In particular, consistent with Rogers and Van Buskirk (2013), we predict that the likelihood of current-quarter guidance increases with past guidance (i.e., GUIDE_CQTR and BUNDLE_PRIOR).¹¹ In addition, because the existence of an earlier unbundled management forecast in the current quarter might alter the relation we anticipate between pre-announcement changes in volatility and the decision to bundle guidance, we also include a binary variable (UNBUNDLED) to indicate if the firm issued an unbundled piece of guidance earlier in the quarter of interest. Again following Rogers and Van Buskirk (2013) we also control for the current quarter's earnings news (P_SURPRISE , N_SURPRISE , ISURPRISE , and LOSS), the information environment of the firm (DISPERSION , LOG_NUMEST , LOG_MVE), and recent performance (PRIOR_RET and PROPMB).¹²

We report results from two samples and two measures of uncertainty in Table 3. The two samples are all firm-quarter observations and the firm-quarter observations associated with recent guiders. Uncertainty measures include abnormal news items and changes in option implied volatilities using options with 30 days until expiration during the 15 days prior to the earnings announcement.¹³

In columns [1] and [2], we use all observations in the sample with complete relevant data. This includes all 107,307 firm quarters in column [1], while column [2] uses all 72,016 firm quarters with available OptionMetrics data. In column [3], we use only the observations characterized as coming from recently guiding firms ($\text{RECENT_GUIDER}=1$) with options data. The advantage of focusing the sample on recent guiders is that we consider only firms with a demonstrated willingness to provide guidance. These firms are more consistent with the theory motivating disclosure as a means to impact firms' information environments and less consistent with the firms highlighted in So (2013). Thus, while the regressions in columns [1] and [2] at least partially distinguish guiding firms from non-guiding firms, the regression in column [3] focuses more sharply on explaining why a firm with a history of guiding chooses to guide or remain silent in a particular quarter.

In all specifications in Table 3 the relation between the change in “unexpected” pre-earnings uncertainty (volatility) and management's decision to bundle guidance with the earnings is positive. We also report the coefficient estimates of variables designed to control for the typical/normal increase in volatility prior to an earnings release ($\text{AVG}\Delta\text{UNCERTAINTY}$), the level of earnings volatility (VOL_LEVEL), the firm's guidance history (GUIDE_CQTR and BUNDLE_PRIOR), the existence of a management forecast during the quarter of interest that is not bundled with earnings (UNBUNDLED), and insider trading ($\text{CEO/CFO_TRADE}_{\text{qtr}}$ and $\text{CEO/CFO_TRADE}_{\text{post15d}}$).

Although we do not report the coefficient estimates for the remaining control variables, our conclusions are consistent with prior findings. Further, the addition of our volatility and trading variables significantly improves the fit of the model, as the Pseudo R^2 for our model estimated on the full sample is 65.5%. This improves considerably upon the 42.49% shown in (Rogers and Van Buskirk, 2013, Table 3) for a similar time period—suggesting a 54% increase in explanatory power for the model.

¹⁰ Although sample size is reduced by approximately 20%, all of our results are robust when we exclude all observations where any trading occurs in the 15-day window following the report date of quarterly earnings (and, hence, the management forecast). Thus, our results remain robust to the exclusion of management forecasts that are potentially issued in response to disclose-or-abstain rules (Li et al., 2014).

¹¹ BUNDLE_PRIOR and GUIDE_CQTR are highly correlated (61% Spearman correlation in the full sample of firm-quarter observations and 38% Spearman correlation in the subsample of firm-quarter observations for recent guiders). Following Rogers and Van Buskirk (2013) we include both in our tabulated regressions. All of our results remain when we re-estimate our regressions excluding either BUNDLE_PRIOR or GUIDE_CQTR . More important, in the subsample analyses below that predict bundling within the groups of firms that are more/less likely to guide, both of these variables are no longer needed in the model, as they are held constant within these subsamples.

¹² Rogers and Van Buskirk (2013) also include an indicator variable to identify earnings announcements that are accompanied by conference calls. When we re-estimate all of our regressions using a subset of data for which we have available conference call data, all of our results remain when we include a conference call indicator. Because we conduct all of our main tests using the subsample of firms with guiding histories and for which publicly traded options exist, the vast majority of our firms host conference calls surrounding their earnings announcements.

¹³ In addition to examining shorter-term measures of uncertainty, we also examine longer-term measures of uncertainty (based on 60- and 91-day volatility). Our results are robust to the use of these alternative measures. Further, Patell and Wolfson (1979, 1981) document that implied volatility increases before an earnings announcement and subsequently falls. Consequently, this causes concern that our tests are picking up the normal rise in volatility associated with investors' anticipation of the forthcoming earnings and perhaps forecast news. Although we believe that including $\text{AVG}\Delta\text{UNCERTAINTY}_{40}$ addresses this concern because it allows our tests to focus on the abnormal, current-quarter run-up in volatility, we further address this concern by moving the window over which we measure the run-up back to ten days prior to the report date of quarterly earnings (i.e., we measure from day -20 to day -10), as Figure 2 of Rogers et al. (2009) indicates that most of this rise in volatility occurs in the 10 days before the announcement. Our results are robust to this alternative measurement.

Table 3

Increased uncertainty and the likelihood of supplying a forecast.

This analysis tests the likelihood that an earnings announcement is bundled with a forecast. We expect that pre-earnings announcement *increases* in uncertainty are associated with an increased likelihood of bundled guidance. The full sample consists of 107,307 firm-quarter observations from 2001 through 2010; the availability of OptionMetrics data reduces sample size (as indicated) in all specifications that include implied volatility measures. In specification [1], *vol_level* = *svol_level*. In specifications [2] and [3], *vol_level* = *ivol_level*. Note: *bundle_prior* and *guide_cqtr* are highly correlated. Following Rogers and Van Buskirk (2013) we include both in our tabulated regressions. All of our results remain when we re-estimate our regressions excluding either *bundle_prior* or *guide_cqtr*. ●●●, ●●, ● denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		Dependent variable = BUNDLE. Coefficient effect (p-value below)		
		All Firms	Recent Guiders Only	
		[1]	[2]	[3]
<i>Proxy for uncertainty:</i>				
<i>abnormal_news</i>		×		
<i>Δivol_pre15d</i>			×	×
<i>Δuncertainty</i>	(+)	+0.020● 0.051	+0.043●●● <.0001	+0.067●●● <.0001
<i>avgΔuncertainty_{4q}</i>	(+)	−0.020●●● <.0001	+0.034●●● 0.006	+0.042●● 0.027
<i>vol_level</i>	(−)	−0.723●●● <.0001	−0.061●●● <.0001	−0.088●●● <.0001
<i>guide_cqtr</i>	(+)	+0.070●●● <.0001	+0.069●●● <.0001	+0.065●●● <.0001
<i>unbundled</i>	(+)	+0.037●●● <.0001	+0.042●●● <.0001	+0.038●●● <.0001
<i>bundle_prior</i>	(+)	+0.313●●● <.0001	+0.341●●● <.0001	+0.380●●● <.0001
<i>ceo/cfo_trade_{cqtr}</i>	(+)	+0.011●●● <.0001	+0.012●●● <.0001	+0.016●●● <.0001
<i>ceo/cfo_trade_{post15d}</i>	(+)	+0.010● 0.082	+0.022●●● 0.001	+0.026●●● 0.007
Other controls included: Industry effects, time effects, level of and changes in the VIX (i.e., <i>vix_level</i> , <i>Δvix</i>), Rogers and Van Buskirk (2013) variables (i.e., <i>p_surprise</i> , <i>n_surprise</i> , <i> surprise </i> , <i>loss</i> , <i>dispersion</i> , <i>prior_ret</i> , <i>mve</i> , <i>numest</i> , <i>probbmb</i>).				
<i>n</i>		107,307	72,016	47,947
Pseudo R ²		65.4%	65.1%	50.2%
ROC area		0.925	0.919	0.859

Focusing on the full-sample specifications, we find that both *ABNORMAL_NEWS* and *ΔIVOL_PRE15D* (our proxies for *ΔUNCERTAINTY*) are associated with an increased likelihood of bundled guidance. Because we control for the “typical” increase in uncertainty prior to earnings with *AVGΔUNCERTAINTY_{4Q}*, this mitigates the likelihood that the increases in uncertainty reflect the market’s anticipation of the bundling decision. Thus, the coefficient estimate for *ΔUNCERTAINTY* represents the effect that the current-quarter elevation in *unanticipated* uncertainty has on the bundling decision. For the most part, reported control variables have the expected sign. Firms with higher volatility levels are less likely to bundle. Firms that guided in the past (either via bundled or unbundled forecasts) are more likely to continue to provide guidance in the quarter of interest. Finally, consistent with the idea that managers must disclose or abstain from trading (Li et al., 2014), we find that guidance positively relates to both backward-looking and forward-looking measures of insider trading.

Because we aim to predict *when* a firm with a demonstrated willingness to guide chooses to issue guidance (as opposed to *if* a firm chooses to be a guiding firm), the specification presented in column [3] narrows our focus to *recent* guiders. Said differently, we remove non-guiding firms from the analysis in order to allow our tests to focus on explaining the quarters in which guiders do and do not guide. In so doing, we increase the difficulty of predicting when firms will choose to bundle. Here too, we find strong evidence that an abnormal run-up in volatility helps to explain when recent guiders choose to bundle a forecast with the current-quarter earnings news. Thus, the evidence in Table 3 indicates that regardless of whether we measure the current-quarter pre-announcement rise in uncertainty using news stories or option implied volatility, we detect a consistently robust, positive relation between abnormal run-ups in investor uncertainty and the decision to issue earnings guidance.

6. Is the run-up in volatility related to the market’s expectation of guidance?

Evidence of a link between run-ups in volatility prior to providing guidance is consistent with two explanations: (1) the market anticipating the act of bundling (and its associated impact on stock price), and (2) managers reacting to the rising volatility by providing guidance. The fact that managers of firms with a history of guidance are also more likely to guide

following quarters containing an *abnormal* increase in uncertainty provides initial evidence consistent with the latter effect: the presence of a managerial reaction. In our next analyses, we provide additional evidence in support of the presence of a managerial reaction effect by limiting variation in the extent to which investors might reasonably anticipate guidance (Table 4), by substituting backward-looking realized volatility for forward-looking implied volatility in our tests (Table 5), and by examining the run-up in volatility prior to unbundled guidance (Table 6).

6.1. Holding constant investors' expectation of guidance: subsample analyses

As shown in Panel A of Table 4, focusing on the subset of *likely* guiders for which guidance is expected (as measured by the *presence* of a bundled forecast in the same quarter of last year as well as the *presence* a bundled forecast last quarter—i.e., *BUNDLE_PRIOR*=1 and *BUNDLE_SQLY*=1), we find that this set of firms bundles 87.2% of the time in the current quarter. Given that these firms bundle the vast majority of the time (i.e., nearly 9 out of every 10 quarters), investors should rationally anticipate a bundled forecast in the current quarter. In contrast, focusing on the subset of *unlikely* guiders, for which guidance is *not* expected (as measured by the *absence* of a bundled forecast in the same quarter of last year, as well as the *absence* a bundled forecast last quarter—i.e., *BUNDLE_PRIOR*=0 and *BUNDLE_SQLY*=0), we find that these firms only

Table 4

Is the run-up in volatility related to the market's expectation of guidance?

Panel A: Is the run-up in volatility greater when the market is more likely to expect guidance? Is the run-up in volatility greater when the firm actually gives guidance?

In this analysis, we test whether the run-up in volatility prior to earnings announcements (as measured by $\Delta ivol_pre15d$) is greater when bundled guidance is actually given in the current quarter (i.e., *bundle*=1 as compared to *bundle*=0) after we narrow our focus to firm-quarters in which investors are *likely* to expect guidance or to firm-quarters in which investors are *unlikely* to expect guidance. If run-ups in volatility are driven by investors' expectations of forthcoming guidance, we expect to see greater run-ups when guidance is *likely* (i.e., $[a] > [b]$). In contrast, if run-ups in volatility reflect managers' reactions to rising volatility, we expect to see greater run-ups for the firm-quarters where guidance is actually given (i.e., $[1] > [3]$; $[2] > [4]$), regardless of the expectation of guidance. ●●●, ●●, ● denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		BUNDLE=1		BUNDLE=0		Differences							
		Mean	Median	Mean	Median	Mean	Median						
LIKELY GUIDERS: (<i>bundle_sqly</i> =1) and (<i>bundle_prior</i> =1) Bundle 87.2% of the time						Managerial reaction?							
						[1]		[2]		[3]		[4]	
						[1]>[3]		[2]>[4]					
						<i>GROUP 1</i>		<i>GROUP 2</i>					
$\Delta ivol_pre15d$	[a]	+0.043	+0.036	+0.023	+0.017	+0.020*** <0.001	+0.019*** <0.001						
<i>n</i>		13,498		1,974									
UNLIKELY GUIDERS: (<i>bundle_sqly</i> =0) and (<i>bundle_prior</i> =0) Bundle 24.2% of the time						<i>GROUP 3</i>		<i>GROUP 4</i>					
$\Delta ivol_pre15d$	[b]	+0.044	+0.033	+0.031	+0.022	+0.013** 0.029	+0.011** 0.019						
<i>n</i>		941		2,951									
						<i>Difference ([a]-[b])</i>		+0.007 0.213					
								+0.008 0.201					
Differences						Investor anticipation?							
$\Delta ivol_pre15d$	[a]>[b]	-0.001 0.857	+0.003 0.768	-0.008 0.144	-0.005 0.364								

Panel B: Holding constant the expectation of guidance.

This analysis tests the likelihood that an earnings announcement is bundled with a forecast. In an effort to limit variation in the extent to which investors might reasonably anticipate guidance (i.e., to hold constant the market's expectation of guidance), we examine subsamples where investors are *likely/unlikely* to anticipate the presence of the guidance. In all cases, we expect that *increases* in uncertainty (as measured by $\Delta\text{ivol_pre15d}$) are associated with an increased likelihood of bundled guidance. **LIKELY TO EXPECT GUIDANCE:** In [1], we focus on the firm-quarters where investors are *likely* to expect guidance. In particular, we examine firm-quarters where managers of guiding firms bundled in the same quarter of last year and they also bundled in the prior quarter ($\text{bundle_sqly}=1$ and $\text{bundle_prior}=1$); in this subsample, managers guide 87.2% of the time. **UNLIKELY TO EXPECT GUIDANCE:** In specification [2], we focus on the firm-quarters where investors are *unlikely* to expect guidance. In particular, we examine firm-quarters where managers of guiding firms did not bundle in the same quarter of last year and they also did not bundle in the prior quarter ($\text{bundle_sqly}=0$ and $\text{bundle_prior}=0$); in this subsample, managers guide only 24.2% of the time. In specification [3], we use the prediction model in Table 3 to generate the quartile of firm-quarters of the full sample where bundled guidance is least likely to be expected in the current quarter; in this bottom quartile of firm-quarters, managers guide only 2.5% of the time. ●●●, ●●, ● denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		Dependent variable = BUNDLE. Coefficient effect (t-stat below)					
		EXPECT: Likely Guiders		DO NOT EXPECT: Unlikely Guiders Unexpected Guiders			
		[1]		[2]		[3]	
Δuncertainty	(+)	+0.058	***	+0.093	***	+0.015	**
		<.0001		0.010		0.022	
avgΔuncertainty _{4q}	(?)	-0.046		-0.032		+0.010	
		0.129		0.619		0.391	
guide_cqtr	(+)	+0.007		+0.117	***	+0.045	***
		0.252		<.0001		<.0001	
unbundled	(+)	+0.030	***	+0.092	***	+0.053	***
		<.0001		<.0001		<.0001	
bundled_prior	(+)	N.A.		N.A.		N.A.	
ceo/cfo_trade _{qtr}	(+)	+0.022	***	+0.004		+0.005	
		<.0001		0.763		0.123	
ceo/cfo_trade _{post15d}	(+)	+0.038	***	+0.073	**	+0.001	
		0.008		0.036		0.976	
Other controls included: Industry effects, time effects, level of and changes in the VIX (i.e., vix_level, Δvix), vol_level, Rogers and Van Buskirk (2013) variables (i.e., p_surprise, n_surprise, surprise , loss, dispersion, prior_ret, mve, numest, probmb).							
n		15,472		3,892		16,356	
% BUNDLE=1		87.2%		24.2%		2.5%	
Pseudo R ²		5.6%		22.2%		11.6%	
ROC area		0.648		0.758		0.772	

bundle 24.2% of the time in the current quarter. Thus, partitioning based on firms' guidance histories allows us to isolate subsamples where investors are more and less likely to expect the guidance.

In Panel A of Table 4, we compare the pre-earnings run-up in volatility across four groups within these subsamples:

- (1) **Likely guiders who DO guide:** firms that are more likely to bundle this quarter and, as expected, *do* bundle in the current quarter (i.e., $\text{BUNDLE_PRIOR}=1$, $\text{BUNDLE_SQLY}=1$ and $\text{BUNDLE}=1$),
- (2) **Likely guiders who DO NOT guide:** firms that are more likely to bundle this quarter and, unexpectedly, *do not* bundle in the current quarter (i.e., $\text{BUNDLE_PRIOR}=1$, $\text{BUNDLE_SQLY}=1$ and $\text{BUNDLE}=0$),
- (3) **Unlikely guiders who DO guide:** firms that are less likely to bundle this quarter and, unexpectedly, *do* bundle in the current quarter (i.e., $\text{BUNDLE_PRIOR}=0$, $\text{BUNDLE_SQLY}=0$ and $\text{BUNDLE}=1$), and
- (4) **Unlikely guiders who DO NOT guide:** firms that are less likely to bundle this quarter and, as expected, *do not* bundle in the current quarter (i.e., $\text{BUNDLE_PRIOR}=0$, $\text{BUNDLE_SQLY}=0$ and $\text{BUNDLE}=0$).

First, we hold constant the likelihood of bundling and compare $\Delta\text{IVOL_PRE15D}$ for GROUP 1 to that of GROUP 2 and $\Delta\text{IVOL_PRE15D}$ for GROUP 3 to that of GROUP 4—i.e., we compare $\Delta\text{IVOL_PRE15D}$ across the bundled columns *within* the likely (row [a]) and unlikely (row [b]) subsamples. These comparisons are less plausibly influenced by differences in the market's anticipation of bundling and more likely to represent management's reaction to changes in uncertainty. For firms likely to bundle (row [a]), the mean volatility increase is 4.3% for the firms that actually bundle (GROUP 1) in the current quarter compared to 2.3% for firms that do not bundle (GROUP 2). For firms unlikely to bundle (row [b]), the mean volatility increase is 4.4% for the current-quarter bundlers (GROUP 3) and 3.1% for the current-quarter non-bundlers (GROUP 4). Both of these differences are statistically significant. Thus, holding constant the market's anticipation of bundling, $\Delta\text{IVOL_PRE15D}$ is higher in quarters when the firm actually bundles as compared to non-bundled quarters. These differences are consistent

Table 5

Is there a run-up in realized volatility prior to guidance?

This analysis tests the likelihood that an earnings announcement is bundled with a forecast. In these tests we replace our forward-looking implied volatility measure of uncertainty (i.e., $\Delta ivol_pre15d$) with a backward-looking realized volatility measure of uncertainty (i.e., **abnormal_rvol_pre15d**). Specifically, **abnormal_rvol_pre15d** equals the standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the current quarter less the standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the same quarter of last year. If the increase in implied volatility solely reflects investors' anticipation of guidance, then backward-looking realized volatility should not be associated with an increased likelihood of bundled guidance. If the increase in implied volatility reflects a managerial reaction to rising uncertainty, we expect that abnormal realized volatility is associated with an increased likelihood of bundled guidance. ●●●, denotes instances where the subsamples differ significantly at the 1% level for two-tailed tests. Refer to [Appendix A](#) for variable definitions.

		Dependent variable = BUNDLE. Coefficient effect (p-value below)	
		All Firms	Recent Guiders Only
		[1]	[2]
abnormal_rvol_pre15d	(+)	+0.188*** <.0001	+0.365*** <.0001
vol_level	(–)	–0.954*** <.0001	–1.668*** <.0001
guide_cqtr	(+)	+0.068*** <.0001	+0.068*** <.0001
unbundled	(+)	+0.043*** <.0001	+0.041*** <.0001
bundle_prior	(+)	+0.318*** <.0001	+0.378*** <.0001
ceo/cfo_trade_{qtr}	(+)	+0.012*** <.0001	+0.016*** <.0001
ceo/cfo_trade_{post15d}	(+)	+0.009 0.118	+0.009 0.278
Other controls included: Industry effects, time effects, level of and changes in the VIX (i.e., vix_level , Δvix), vol_level , Rogers and Van Buskirk (2013) variables (i.e., $p_surprise$, $n_surprise$, $ surprise $, $loss$, $dispersion$, $prior_ret$, mve , $numest$, $probmmb$).			
n		107,307	65,116
Pseudo R²		66.6%	51.7%
ROC area		0.927	0.866

with a managerial reaction to rising volatility in the current quarter, as the likelihood of bundling is similar across compared groups.

Next, we hold constant the presence/absence of a bundled forecast in the current quarter and compare $\Delta IVOL_PRE15D$ for GROUP 1 to that of GROUP 3 and $\Delta IVOL_PRE15D$ for GROUP 2 to that of GROUP 4—i.e., we compare $\Delta IVOL_PRE15D$ across groups that differ with respect to the market's ability to anticipate guidance based on historical guiding history but identical with respect to the current quarter's guidance choice. For firms that bundle in the current quarter, the mean volatility run-up is 4.3% for firms for which the market should anticipate guidance (i.e., GROUP 1) and 4.4% for firms that the market should not anticipate guidance (i.e., GROUP 3). Likewise, the mean volatility increase in non-bundled quarters is 2.3% for likely bundlers (i.e., GROUP 2) as compared to 3.1% for unlikely bundlers (i.e., GROUP 4). None of these differences in means (or medians) is statistically significant at traditional levels. Hence, holding constant the guidance decision in the quarter of interest, we detect no differences in volatility run-up between likely and unlikely bundlers. The absence of significant differences in these comparisons is inconsistent with notion that the volatility increase is due solely to the market's anticipation of bundled guidance.

Building upon the univariate evidence of a managerial reaction effect presented in Panel A of [Table 4](#), in Panel B of [Table 4](#) we re-consider the multivariate analysis presented in [Table 3](#) but this time we differentiate between instances where investors are more or less likely to anticipate current-quarter guidance from guiding firms. In column [1], we consider firm-quarter observations where the market is *more* likely to expect guidance (i.e., the group described in row [a] of Panel A). In column [2], we consider firm-quarter observations where the market is *less* likely to expect guidance (i.e., the group described in row [b] of Panel A).

Column [1] reports the results of estimating Eq. (1) using firm quarters of likely guiders. The incidence of guiding increases with changes in implied volatility. Recall from Panel A, 87.2% of these sample firms guided with the current quarter's earnings. Thus, for this subset of firms, the variation in the dependent variable that remains to be explained by our logistic regression is limited (as the overwhelming majority of these observations come with bundled forecasts). Yet, we continue to find strong evidence of a positive association between the abnormal run-up in volatility ($\Delta UNCERTAINTY$) and the decision to bundle. Said differently, we find that the abnormal run-up in current quarter volatility predicts the quarters in which firms that bundle the vast majority of the time (and for which bundling should be largely expected by the market)

Table 6**Is there a run-up in volatility prior to unbundled guidance?**

In this analysis, we test whether the run-up in volatility prior to an unbundled forecast (as measured by $\Delta\text{ivol_pre15d_unbundled}$) is greater than the run-up in volatility during the same time in the prior quarter (as measured by $\Delta\text{ivol_pre15d_unbundled_prior}$) or than the run-up in volatility during the same time in the same quarter last year (as measured by $\Delta\text{ivol_pre15d_unbundled_sqly}$). If unbundled guidance is unexpected by the market, then evidence of a significant difference between the run-up prior to an unbundled forecast as compared to the run-up during the same time last quarter (i.e., $[a] > [b]$) or same time in the same quarter of last year (i.e., $[a] > [c]$) supports the hypothesis that managers react to rising volatility with guidance. We identify contaminating news events in the 3-day window prior to the date of unbundled guidance using the Key Developments database from Capital IQ. Because of data limitations from Capital IQ, we limit this analysis to 6,197 unbundled forecasts occurring after 2004. Of those 6,197 forecasts, 3,655 (59%) contain a contaminating news item in the 3-day window prior to and including the date of the forecast, leaving an uncontaminated sample of 2,542 forecasts. If the same time in the prior quarter or same time in the same quarter last year also includes a contaminating event, we move the window to the closest uncontaminated window. If *uncontaminated* unbundled guidance is unexpected by the market, then evidence of a significant difference between the run-up prior to an unbundled forecast as compared to the run-up during the same time last quarter (i.e., $[a] > [b]$) or same time in the same quarter of last year (i.e., $[a] > [c]$) supports the hypothesis that managers react to rising volatility with guidance. ●●●, ●●, ● denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to [Appendix A](#) for variable definitions.

		Unbundled Guidance <i>n</i> = 8,039		Uncontaminated * Unbundled Guidance <i>n</i> = 2,542	
		Mean	Med.	Mean	Med.
$\Delta\text{ivol_pre15d_unbundled}$	[a]	0.026	0.016	0.016	0.014
$\Delta\text{ivol_pre15d_prior}$	[b]	0.005	0.000	−0.002	−0.001
$\Delta\text{ivol_pre15d_sqly}$	[c]	0.003	0.002	0.001	0.001
Differences					
[a] > [b]?		0.021●●●	0.016●●●	0.018●●●	0.015●●●
		< 0.001	< 0.001	< 0.001	< 0.001
[a] > [c]?		0.023●●●	0.014●●●	0.015●●	0.013●●●
		< 0.001	< 0.001	0.013	0.010

***Note:** Of the forecasts that accompany other value-relevant news, the most frequent contaminating news events are:

Conference presentation calls	21%
Client announcements	19%
CEO/CFO and other executive board change announcements	17%
Product-related announcements	14%
Monthly sales announcements/calls	9%

choose *not* to bundle. In column [2], we shift attention to the unlikely guiders for which guidance is *less* likely to be anticipated, as Panel A indicates that these firms bundle 24.2% of the time. Thus, for this subset of firms, the market should not be routinely anticipating guidance. Yet, we continue to find strong evidence of a positive association between the abnormal run-up in volatility ($\Delta\text{UNCERTAINTY}$) and the decision to bundle. Because investors are unlikely to be assessing a high likelihood of bundling for these firms, we argue that the decision to bundle is a reaction to the larger increase in volatility rather than the volatility increasing because the market anticipates guidance.

Finally, in column [3], we re-estimate our logistic regression using a sample of “unexpected” guiders. To construct this subsample, we begin with the full sample of 72,016 firm-quarter observations having complete data. Using this sample, we estimate the likelihood of bundling in the current quarter using Eq. (1) and select the quartile of firm-quarters with the lowest estimated likelihood of bundling. As shown in the bottom row of [Table 5](#), this subsample only bundles 2.5% of the time. Thus, guidance is very unlikely to be anticipated by investors for this subset of firms. Nonetheless, the run-up in uncertainty prior to the earnings release continues to be significantly positively associated with the decision to guide in the current quarter for firm-quarters where there should be virtually no anticipation of guidance. While the coefficient drops in magnitude for this subset of firms, that is exactly what we would expect as firms that rarely guide would need to be provoked with a greater shock to volatility before providing guidance.

Taken collectively, these subsample tests support the notion that guidance is prompted by an abnormal volatility run-up, even after we hold constant the expectation of bundling (by narrowing in on the firm-quarters where bundling is expected the vast majority of the time or by narrowing in on the firm-quarters where bundling is unexpected).

Importantly, we notice that when we limit the analysis to the subsamples that hold constant the expectation of guidance (i.e., Panel B), we do not detect a significant relation between the average run-up ($\text{AVG}\Delta\text{UNCERTAINTY}_{4Q}$) and the decision to bundle in the current quarter. In contrast, when estimating the regression on the full sample of guiding firms (i.e., [Table 3](#)) we detect a significantly positive relation. The lack of significance in the subsample regressions is consistent with the notion that focusing on subsamples successfully controls for the expectation of guidance in the current quarter and, thus, the inclusion of the normal run-up is no longer important in explaining *BUNDLE*.¹⁴

¹⁴ The magnitude of the coefficient estimate on $\Delta\text{UNCERTAINTY}$ is reduced if observations with extremely large and extremely small uncertainty changes are removed (or if the sample is winsorized at the 5% tails), but the coefficient remains significant in all specifications.

6.2. Substituting backward-looking realized volatility for forward-looking implied volatility

If investors anticipate that a firm will guide in the upcoming quarter's earnings release, then pre-earnings implied volatility could increase because of the added information potential of guidance. Although we believe that the subsample results examined in Table 4 mitigate this concern, we take an alternative approach to addressing this issue in Table 5. In particular, we replace the forward-looking option implied volatility with backward-looking realized (actual) stock price volatility into our estimate of Eq. (1). Backward-looking measures of volatility lack the theoretical tie to asset pricing, but are less likely to be influenced by future events. We report results using the standard deviation of stock returns in the 15 days prior to the earning release (as this matches the windows used to evaluate implied volatility) but results are not sensitive to using longer windows to compute this metric. To compute an abnormal change in uncertainty we subtract the 15-day pre-earnings standard deviation of returns from the same quarter last year (i.e., *abnormal_rvol_pre15d*). If the previously documented positive association between the decision to bundle and the pre-earnings increase in uncertainty is purely an anticipation effect, then we do not expect to find any relation between the decision to bundle this quarter and changes in backward-looking, *realized* volatility. If the manager reacts to increasing uncertainty by bundling, however, then we expect that realized volatility is indicative of an unsettled information environment and also positively correlates with the guiding choice.

In Table 5, we report the results of substituting realized (backward-looking) volatility for implied (forward-looking) volatility. The results documented in Table 4 are confirmed; firm-quarters with higher abnormal *realized* volatility are those where management tends to bundle. This is inconsistent with the notion that our results solely reflect market anticipation of bundling and, instead, supports the hypothesis that managers react to increased uncertainty by guiding.¹⁵

6.3. Examining volatility movement before unbundled guidance

Finally, in Table 6 we aim to limit the expectation of guidance by examining whether there is an abnormal run-up in volatility prior to *unbundled* guidance. As unbundled guidance can be issued at any date, not just with earnings, it is arguably more difficult for the market to anticipate. We focus on the 8,039 firm-quarters in which guiding firms supplied an unbundled piece of guidance during the quarter (i.e., *UNBUNDLED*=1). In this analysis, we test whether the run-up in volatility prior to an unbundled forecast (as measured by $\Delta IVOL_PRE15D_UNBUNDLED$) is greater than the run-up in volatility during the same time in the prior quarter (as measured by $\Delta IVOL_PRE15D_UNBUNDLED_PRIOR$) or than the run-up in volatility during the same time last year (as measured by $\Delta IVOL_PRE15D_UNBUNDLED_SQLY$). We find evidence of a significant difference between the run-up prior to an unbundled forecast as compared to the run-up during the same time last quarter (i.e., $[a] > [b]$) and as compared to the run-up same time in the same quarter of last year (i.e., $[a] > [c]$). This again supports the hypothesis that managers react to rising volatility with guidance.

Yet, as Clement et al. (2003) find and Rogers et al. (2009) note a sample of unbundled forecasts may include some forecasts for which the timing is predictable or forecasts that are issued in response to a volatility-provoking news event. Using the Key Developments database from Capital IQ, we find support for this notion: 3,655 (59%) of the 6,197 unbundled forecasts (with available OptionMetrics data) occurring after 2004 (the point at which Capital IQ data becomes stable) contain a contaminating news item in the 3-day window prior to and including the date of the forecast, some of which can be anticipated by investors.¹⁶ To address this issue of potential anticipation by investors, we limit our analysis to the 2,542 uncontaminated, unbundled forecasts that are not contemporaneous with another announcement or event. Although the mean/median changes in volatility run-ups are now smaller in magnitude, we continue to find evidence consistent with a managerial reaction to rising volatility, as the increase in volatility before unbundled forecasts is greater than the volatility change in the same 15 days of the prior quarter or the same 15 days of the prior year.

Given that recent research cautions against drawing inferences from small samples of unbundled guidance, our main analyses focus on the decision to supply bundled guidance. Nonetheless, this small sample evidence is consistent with volatility concerns influencing the decision to supply unbundled guidance. This provides further evidence of a managerial reaction to rising volatility, as uncontaminated, unbundled forecasts are relatively infrequent and are less likely to be anticipated by investors.

Collectively, the evidence presented in Tables 4–6 indicates that managers aim to calm short-term investor uncertainty with guidance in the current quarter. In our next set of tests, we examine the extent to which this anticipated benefit manifests.

¹⁵ Abnormal number of news items (see Table 4) is a similar backward-looking measure of an informationally unsettled environment and produces similar results.

¹⁶ Additional (untabulated) analysis of the Key Developments database indicates that from 2005 through 2010, the mean (median) number of key events per firm per year is 24 (17), with a lower quartile of 7 and an upper quartile of 32. This suggests that the typical firm experiences a key event approximately every two weeks, although many key events cluster in time. Of the 8,913 unbundled forecasts occurring during this period, 3,431 (38.5%) of those forecasts are given on the same date that the firm holds a conference call (which are announced in advance) and in total 5,838 (65.5%) of those forecasts have a contaminating event in the 7-day window surrounding the forecast. The most frequent contaminating events are conference presentation calls, client announcements, CEO/CFO/executive board change announcements, product related announcements, and monthly sales announcements/calls. Because some of these events have predictable timing, investor anticipation can be an issue even with unbundled guidance.

7. The change in implied volatility following the guidance

In this section, we investigate whether bundled earnings releases are associated with larger declines in volatility than the volatility declines following earnings releases that are not accompanied by guidance. We do this by estimating the following regression equation for the sample of recent guiders:

$$\begin{aligned} \Delta IVOL_POST15D_{i,t} = & \beta_0 + \beta_1 (BUNDLE_{i,t}) \\ & + \beta_2 (AVG\Delta IVOL_POST15D_4Q_{i,t}) + \beta_3 (\Delta IVOL_PRE15D_{i,t}) + \beta_4 (\Delta IVOL_RDQ_{i,t}) \\ & + \beta_5 (|SURPRISE|_{i,t}) + \beta_6 (INSIDER_TRADE_QTR_{i,t}) + \beta_7 (INSIDER_TRADE_POST15D_{i,t}) \\ & + \beta_8 (VIX_LEVEL_{i,t}) + \beta_9 (\Delta VIX_{i,t}) + \beta_{10} (VOL_LEVEL_{i,t}) + \beta_{11} (LOG_MVE_{i,t}) \\ & + \beta_{12} (LOG_NUMEST_{i,t}) + \beta_{13} (PROBMB_{i,t}) + \varepsilon_{i,t}. \end{aligned} \quad (2)$$

The change in implied volatility measured in the 15 days subsequent to the earnings announcement, $\Delta IVOL_POST15D$, serves as the dependent variable in this regression. H2 predicts a negative coefficient for *BUNDLED*: bundled guidance is associated with abnormally large reversions in post-announcement volatility.

The above regression equation follows from Rogers et al. (2009), with a few notable exceptions. First, we disentangle the change in volatility surrounding the forecast into two distinct windows (pre- and post-guidance). Absent efforts to separate pre-guidance changes from post-guidance changes in volatility, tests examining the link between guidance and volatility are biased in favor of finding a positive relation if managers issue forecasts in response to some other volatility-provoking event (such as an abnormal amount of news) and the measurement window commingles pre-guidance movement with post-guidance movement. Consequently, we adjust Rogers et al. (2009)'s research design to disentangle the pre- and post-guidance movements in volatility, which allows us to sharpen our tests.

In addition, this measurement allows us to control for pre-forecast movements in volatility when examining post-forecast volatility changes. In particular, if the run-up is greater, then we expect that the reversion will likely be greater. Our analyses address this issue with the inclusion of the current-quarter run-up ($\Delta IVOL_PRE15D$), the day 0 movement ($\Delta IVOL_RDQ$), and the average rundown from the prior four quarters $AVG\Delta IVOL_POST15D_{4Q}$. As such, our analysis speaks to the relation between *BUNDLED* and the abnormal rundown in volatility ($\Delta IVOL_POST15D$) after the current-quarter earnings announcement. In our opinion, this is a strong test, as the average rundown will be higher for frequently guiding firms, as there may have been bundled guidance in the prior four quarters. Hence, our tests link abnormally large reversions to guidance after controlling for the run-up in volatility and after controlling for the typical rundown that follows the firm's earnings announcement.

Our main findings, as shown in Table 7, is that the firm-quarters including guidance (regardless of the contemporaneous earnings news) consistently have *larger* post-earnings announcement *decreases* in volatility than firm-quarters without guidance, as evidenced by the significantly negative coefficient for *BUNDLED*. This result holds after controlling for the earnings news (i.e., moving across the negative (columns [1] and [2]), neutral (columns [3] and [4]), and positive (columns [5] and [6]) current-quarter earnings news samples), as well as the typical run-down in volatility post earnings, the change in volatility levels leading up to the earnings release, and the change in volatility on the earnings release date. The clear message is that bundling guidance with earnings announcement is associated with larger decreases in post-earnings announcement volatility than unbundled earnings releases. The coefficients in the 15-day regression average almost -0.015 across the various subsamples, suggesting that bundling firms' implied volatility falls an additional 1.5%, on average ceteris paribus, than non-bundlers. That compares to an overall mean post earnings 15-day volatility change of -7.7% for the recent-guider sample (Table 2). Thus, bundling is associated with a 19% greater run-down (1.5% marginal effect compared to an unconditional average of 7.7%). As we have selected our sample from guiding firms, this result is not simply due to a distinction between firms that never guide and firms that guide, but reflects differences in firms that are willing to guide between quarters when they guide and quarters when they do not guide.

In additional (untabulated) analyses, we repeat these analyses: (1) replacing forward-looking option implied volatility with backward-looking realized (actual) volatility examined earlier (see Table 5) and (2) focusing on the subsamples of Unlikely/Unexpected guiders examined earlier (see Panel B of Table 4). Despite the added measurement error (associated with imprecise measurement of changes in realized volatility) and reduced sample size, we continue to find strong support for our predictions, as the presence of a bundled forecast is associated with abnormal reductions in post-announcement volatility in all of these tests.

As noted by Rogers et al. (2009), under the "expectations adjustment hypothesis" of Ajinkya and Gift (1984), managers are more likely to provide guidance when investors' earnings expectations differ from their own. Although our tests thus far control for the amount and sign of earnings news, in additional (untabulated) robustness tests we control for managers' use of guidance to adjust gaps in investors' expectations of earnings by limiting analysis to firm-quarter observations in which (1) firms report no current-quarter earnings surprise and (2) managers either remain silent or bundle a neutral/confirming forecast with the current-quarter, no surprise earnings news (i.e., no "expectation adjustment").

In these "no news" firm-quarters, we find that managers are still more likely to bundle a confirming forecast (as opposed to remain silent) in the presence of an abnormal run-up in volatility.¹⁷ In other words, an abnormal increase in uncertainty

¹⁷ Consistent with the notion that focusing on "no news" firm-quarters (as measured by the absence of a current-quarter earnings surprise and either the absence of a bundled forecast or the presence of a neutral confirming forecast) holds constant contemporaneous news, we detect no significant

Table 7

What explains changes in volatility following earnings announcements?

This analysis examines the relation between the presence of guidance with the current quarter's earnings announcement (i.e., **bundle**=1) and the run-down in volatility after the announcement of earnings (i.e., $\Delta\text{ivol_post15d}$). We expect to observe larger post-earnings-announcement reductions (i.e., more negative changes) in volatility for earnings announcements bundled with guidance. Results are robust to categorizing forecast news based on conditional analyst forecast revisions, as described in Rogers and Van Buskirk (2013). ●●●, ●●, ● denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

Earnings news =		Dependent variable = $\Delta\text{ivol_post15d}$. Coefficient effect (p-value below)					
		NEGATIVE		NEUTRAL		POSITIVE	
		[1]	[2]	[3]	[4]	[5]	[6]
bundle	(–)	–0.014*** 0.002		–0.011** 0.013		–0.016*** <.0001	
negative_bundle	(–)		–0.015*** 0.0001		–0.010** 0.043		–0.018*** <.0001
positive_bundle	(–)		–0.014** 0.046		–0.012* 0.091		–0.015*** <.0001
neutral_bundle	(–)		–0.015** 0.036		–0.011* 0.075		–0.016*** <.0001
avg$\Delta\text{ivol_post15d}_{4q}$	(+)	+0.160*** <.0001	+0.160*** <.0001	+0.279*** <.0001	+0.279*** <.0001	+0.219*** <.0001	+0.219*** <.0001
$\Delta\text{ivol_pre15d}$	(–)	–0.282*** <.0001	–0.282*** <.0001	–0.344*** <.0001	–0.344*** <.0001	–0.305*** <.0001	–0.305*** <.0001
$\Delta\text{ivol_rdq}$	(–)	–0.596*** <.0001	–0.596*** <.0001	–0.613*** <.0001	–0.613*** <.0001	–0.667*** <.0001	–0.667*** <.0001
 surprise 	(?)	+0.243** 0.012	+0.244** 0.012	N.A.	N.A.	+0.465*** <.0001	+0.462*** <.0001
ceo/cfo_trade_{qtr}	(?)	–0.004 0.315	–0.004 0.314	+0.001 0.874	+0.001 0.859	+0.001 0.556	+0.001 0.579
ceo/cfo_trade_{post15d}	(?)	+0.013 0.254	–0.013 0.255	–0.020* 0.089	–0.035* 0.093	–0.009* 0.055	–0.010** 0.050
log(Δvix)	(+)	+0.210*** <.0001	+0.210*** <.0001	+0.180*** <.0001	+0.180*** <.0001	+0.212*** <.0001	+0.212*** <.0001
vix	(+)	+0.230*** <.0001	+0.231*** <.0001	+0.236*** <.0001	+0.235*** <.0001	+0.209*** <.0001	+0.208*** <.0001
vol_level	(?)	–0.157*** <.0001	–0.157*** <.0001	–0.154*** <.0001	–0.154*** <.0001	–0.174*** <.0001	–0.174*** <.0001
log(mve)	(–)	–0.017*** <.0001	–0.017*** <.0001	–0.014*** <.0001	–0.014*** <.0001	–0.014*** <.0001	–0.014*** <.0001
log(numest)	(–)	–0.001 0.831	–0.001 0.826	–0.002 0.583	–0.002 0.541	–0.001 0.883	–0.001 0.908
dispersion	(–)	–0.003 0.897	–0.004 0.896	–0.128 0.119	–0.128 0.133	–0.035 0.136	–0.035 0.138
Industry and time effects included.							
n		9,657	9,657	5,810	5,810	27,891	27,891
Adjusted R²		27.1%	27.1%	33.0%	33.0%	36.5%	36.5%

explains when managers bundle verbal indications of their agreement with the market's expectations of their future earnings versus when managers tacitly confirm their agreement with the market's expectations via silence.

Further, we continue to find that the abnormal rundown in volatility is greater when managers bundle verbal indications of their agreement with the market's expectations of their future earnings than when managers tacitly confirm their agreement with the market's expectations via their silence. Consequently, we view this evidence as supporting the notion that explicit (verbal) guidance that confirms the consensus has a volatility benefit that exceeds the benefit of implicit (non-verbal) agreement with the prevailing consensus.

8. Conclusion

In this study, we consider the interplay between guidance and volatility after separating pre-earnings run-ups in volatility from post-earnings declines in volatility. Our motivation for this investigation comes from the tension between the

(footnote continued)

differences in the means, medians or standard deviations of the 3- or 5-day abnormal return surrounding the report date of quarterly earnings when we compare the bundled (i.e., neutral/confirming guidance) quarters to the non-bundled (silent) quarters.

theoretical and empirical literature that links disclosure to various information environment benefits and recent academic evidence indicating that guidance increases volatility and crash risk (Rogers et al., 2009).

Consistent with the notion that volatility does indeed factor into managers' decisions to provide earnings guidance, we find that abnormal run-ups in volatility predict the quarters in which guiding firms choose to guide. And what happens to share price volatility after the guidance release? In contrast to recent work, we find no evidence that guidance increases volatility. In fact, our evidence indicates that earnings releases bundled with guidance are associated with abnormally large post-announcement reductions in volatility.

Thus, consistent with managers' perceptions (as reflected in survey evidence regarding the perceived benefits of disclosure) as well as theoretical work, guidance appears to reduce share price volatility. This finding, along with recent work connecting guidance to meaningful improvements in liquidity, reductions in litigation risk and the attraction of analyst coverage, speaks to the potential benefits of guidance.

Given the endogeneity of managers' disclosure decisions, in our analyses we control for various determinants of managers' disclosure decisions documented by prior work and augment these models to control for other factors—including firms' guiding histories, as well as the presence of “disclose-or-abstain” insider trading incentives. Although the explanatory power of our models examining the quarterly decision to guide improves upon existing models by greater than 50%, we cannot completely rule out alternative factors at play in this setting. Nevertheless, we execute a number of additional robustness tests in an effort to address concerns that the volatility patterns we document merely reflect investors' anticipation of forthcoming guidance. In so doing, our results are robust: (1) when we hold constant the expectation of guidance by focusing on subsamples of likely and unlikely/unexpected guiders, (2) when we examine uncontaminated (and seemingly unexpected) instances of unbundled guidance, and (3) when we examine backward-looking measures of *realized* volatility and abnormal news items. Thus, while these findings do not (and cannot) suggest the absence of anticipation effects at play in our setting, we believe these findings do offer compelling evidence of the presence of a reaction effect. That is, our evidence consistently and robustly supports the notion that, on average, managers react to rising volatility with guidance and that those efforts ultimately do positively shape their firms' information environment.

Appendix A. Variable definitions

We assemble a sample of 107,307 firm-quarter observations for the period of 2001 through 2010 with available Compustat, CRSP, I/B/E/S and First Call data. In our main tests, we focus on the 47,947 firm-quarter observations associated with firms with guidance in their recent history (i.e., *recent_guider*=1) and with standardized option data available from OptionMetrics. We winsorize all continuous firm-quarter observations at the 1% and 99% levels. We code industry fixed effects based on 2-digit SIC codes.

<i>bundle</i>	An indicator variable set to 1 if the firm provided an earnings forecast during the 5-day window surrounding the report date of quarterly earnings.
<i>negative_bundle</i>	An indicator variable set to 1 if <i>bundle</i> =1 and the forecast estimate is less than the pre-forecast prevailing median analyst estimate.
<i>positive_bundle</i>	An indicator variable set to 1 if <i>bundle</i> =1 and the forecast estimate is greater than the pre-forecast prevailing median analyst estimate.
<i>neutral_bundle</i>	An indicator variable set to 1 if <i>bundle</i> =1 and the forecast estimate is equal to the pre-forecast prevailing median analyst estimate.
<i>guide_cqtr</i>	An indicator variable set to 1 if the firm previously provided earnings guidance for the current quarter's earnings.
<i>bundle_prior</i>	An indicator variable set to 1 if the firm issued an earnings forecast during the 5-day window surrounding the report date of quarterly earnings last quarter.
<i>bundle_sqly</i>	An indicator variable set to 1 if the firm issued an earnings forecast during the 5-day window surrounding the report date of quarterly earnings same quarter of last year.
<i>unbundled</i>	An indicator set to 1 if the firm provided any unbundled guidance during the current quarter.
<i>recent_guider</i>	An indicator set to 1 if the firm is a guiding firm, as measured by the presence of at least 3 pieces of guidance in the prior 12 quarters.
<i>likely_guider</i>	An indicator set to 1 if the firm is a guiding firm (<i>recent_guider</i> =1) and the firm bundled in the prior quarter (<i>bundle_prior</i> =1) and bundled in the same quarter of last year (<i>bundle_sqly</i> =1).
<i>unlikely_guider</i>	An indicator set to 1 if the firm is a guiding firm (<i>recent_guider</i> =1) but the firm did not bundle in the prior quarter (<i>bundle_prior</i> =0) and did not bundle in the same quarter of last year (<i>bundle_sqly</i> =0).
<i>unexpected_guider</i>	An indicator set to 1 if the firm is in the lowest quartile of firm-quarters of the full sample where bundled guidance is least likely to be expected in the current quarter based on the prediction model tabulated in Table 3.
<i>surprise</i>	Actual earnings minus the prevailing median analyst estimate, deflated by stock price 3 trading days prior to the report date of quarterly earnings.
<i>p_surprise</i>	An indicator variable set to 1 if this quarter's earnings surprise exceeds +0.0001.
<i>n_surprise</i>	An indicator variable set to 1 if this quarter's earnings surprise falls below −0.0001.
<i>loss</i>	An indicator variable set to 1 if actual earnings is less than 0.
<i>dispersion</i>	The standard deviation of prevailing analyst estimates for the current period's earnings.
<i>prior_ret</i>	The cumulative stock return over the 90-day period ending 3 trading days prior to the report date of quarterly earnings.
<i>mve</i>	The market value of equity (i.e., price multiplied by shares outstanding) measured 3 trading days prior to the report date of quarterly earnings.
<i>numest</i>	The number of analysts with outstanding estimates 3 trading days prior to the report date of quarterly earnings.
<i>propmb</i>	The proportion of the previous 4 quarters that the firm's reported earnings met or exceeded analysts' prevailing median consensus estimates.

insidertrade_{qtr}	The total insider trades (i.e., sales+urchases) of directors and officers (scaled by shares outstanding at the beginning of the quarter) during the current quarter.
insidertrade_{post15d}	The total insider trades (i.e., sales+urchases) of directors and officers (scaled by shares outstanding at the beginning of the quarter) during the 15 days after the report date of quarterly earnings.
ceo/cfo_trade_{qtr}	The total insider trades (i.e., sales+urchases) of the CEO and CFO (scaled by shares outstanding at the beginning of the quarter) during the current quarter.
ceo/cfo_trade_{post15d}	The total insider trades (i.e., sales+urchases) of the CEO and CFO (scaled by shares outstanding at the beginning of the quarter) during the 15 days after the report date of quarterly earnings.
abnews15d	The percentage change in news in the last 15 days of the current quarter compared to news in the last 15 days of the same quarter of last year (news15_sqly).
abnews30d	The percentage change in news in the last 30 days of the current quarter compared to news in the last 30 days of the same quarter of last year (news30_sqly).
abnews90d	The percentage change in news in the 90 days of the current quarter compared to news in the 90 days of the same quarter of last year (news90_sqly).
svol_level	The standard deviation of daily stock returns over the 90-day period ending 3 trading days prior to the report date of quarterly earnings.
abnormal_rvol_pre15d	The standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the current quarter less the standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the same quarter of last year.
ivol_level	The average level of implied volatility (ivol) for a 30-day duration, at-the-money option in the 5 trading days prior to the report date of quarterly earnings.
Δivol_pre15d	The natural logarithm of the ratio of ivol (for a 30-day duration standardized option) measured at the close of the day prior to the report date of quarterly earnings to ivol measured 15 days prior to the report date of quarterly earnings (i.e., the change in ivol in the 15 days prior to the earnings release).
Δivol_rdq	The natural logarithm of the ratio of ivol (for a 30-day duration standardized option) measured at the close of the report date of quarterly earnings to ivol measured at the close of the day prior to the report date of quarterly earnings (i.e., the change in ivol on the day of the earnings release).
Δivol_post15d	The natural logarithm of the ratio of ivol (for a 30-day duration standardized option) measured 15 days after the report date of quarterly earnings to ivol measured as of the close of the report date of quarterly earnings (i.e., the change in ivol in the 15 days following the earnings release).
avgΔivol_pre15d_{4q}	The average of Δivol_pre15d for the prior 4 quarters.
avgΔivol_post15d_{4q}	The average of Δivol_post15d for the prior 4 quarters.
Δivol_pre15d_unbundled	The natural logarithm of the ratio of ivol (for a 30-day duration standardized option) measured at the close of the day 15 days prior to the issuance of an unbundled forecast to ivol measured 1 day prior to the issuance of an unbundled forecast (i.e., the change in ivol in the 15 days prior to an unbundled forecast). Δivol_pre15d_prior is Δivol_pre15d_unbundled measured in the same time of the prior quarter. Δivol_pre15d_sqly is Δivol_pre15d_unbundled measured in the same time of the same quarter of last year.
vix_level	The level of the Chicago Board Options Exchange Volatility Index on the report date of quarterly earnings.
Δvix	The natural logarithm of the ratio of vix_level measured 1 day after the earnings announcement to the vix_level measured 1 day prior to the earnings announcement.

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