JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS Vol. 53, No. 6, Dec. 2018, pp. 2431–2464

doi:10.1017/S0022109018000492

Time Will Tell: Information in the Timing of Scheduled Earnings News

Travis L. Johnson and Eric C. So*

Abstract

Using novel earnings calendar data, we show that firms' advanced scheduling of earnings announcement dates foreshadows their earnings news. Firms that schedule later-than-expected announcement dates subsequently announce worse news than those scheduling earlier-than-expected announcement dates. Despite scheduling disclosures being observable weeks ahead of earnings announcements, we show that equity markets fail to reflect the information in these disclosures until the announcement itself. By also showing that option markets respond efficiently to volatility-timing information embedded in the same scheduling disclosures, we provide novel evidence that markets fail to react to information about future earnings despite investors immediately trading on the underlying signal.

I. Introduction

A substantial literature examines the link between firms' earnings news and the timing of their announcements (e.g., Kross (1981), Chambers and Penman (1984), and Bagnoli, Kross, and Watts (2002)). The collective evidence from this literature indicates that late announcements convey worse earnings news than early announcements on average.

A central inference from prior research is that the link between firms' earnings news and announcement timing reflects a mixture of endogenous and exogenous drivers that are mutually nonexclusive and vary by circumstance. For example, prior studies suggest that firms may delay earnings announcements with

*Johnson (corresponding author), travis.johnson@mccombs.utexas.edu, University of Texas at Austin McCombs School of Business; So, eso@mit.edu, Massachusetts Institute of Technology Sloan School of Management. We thank Jarrad Harford (the editor) and Jacob Thornock (the referee) for helpful feedback. We also thank Malcolm Baker, John Campbell, Wesley Chan, Asher Curtis, Ed deHaan, Lily Fang, Sam Hartzmark (Miami Behavioral Finance (MBF) Conference discussant), John Mahler, Dawn Matsumoto, Chris Noe, Mort Pincus, Rodrigo Verdi, Joseph Weber, and seminar participants at MIT, the 2014 Citigroup Quant Research Conference, NASDAQ Economic Research, Arrowstreet Capital, Ohio State University, Arcadian Asset Management, the University of Washington, the 2014 MBF Conference, and the 2015 Power of Events Conference for helpful comments and suggestions. We also thank Wall Street Horizon for providing daily earnings calendar data and Xiang (Nicole) Liu for excellent research assistance.

negative news to allow time for manipulating accounting information (Givoly and Palmon (1982)), preparing responses to criticisms (Begley and Fischer (1998)), or "hiding" bad news in periods of low attention (deHaan, Shevlin, and Thornock (2015)). Similarly, firms may delay their announcements because of more innocuous reasons, such as scheduling conflicts for firms' management or key stakeholders or the need to account for atypically complex transactions (Kross and Schroeder (1984)).

In the decades after the original articles on announcement timing were published, a trend has emerged in which firms issue "scheduling disclosures," often weeks in advance, indicating when they intend to announce earnings. These disclosures provide an advanced signal of firms' announcement timing and thus may be linked to firms' earnings news for many of the same endogenous and exogenous reasons documented in prior research. However, unlike traditional measures of announcement timing, scheduling disclosures are available to investors well before the actual earnings announcement. As a result, the trend toward issuing scheduling disclosures offers a significant opportunity for researchers interested in studying market efficiency and investor behavior.

Using a novel data set of firms' scheduling disclosures, our study addresses the following question: Do scheduling disclosures predict firms' subsequently announced earnings news, and if so, do investors efficiently incorporate this information into market prices?

In answering this question, we also contribute to the literature by studying an alternative approach to measuring earnings announcement timing. Specifically, we show there are at least two ways to characterize the timing of earnings announcements: i) using ex post realizations of announcement dates to track whether firms report on time relative to an ex ante expected date, and ii) using ex ante data to track whether firms redefine what it means to be "on time" by scheduling an announcement date that is earlier or later than previously expected. Whereas prior research focuses on the former, we use a novel data set to focus on the latter.

Our main analyses rely on an earnings calendar data set containing a daily list of expected announcement dates for a broad cross section of firms. A key feature of this data set is that allows us to observe how the earnings calendar changes in response to firms' scheduling disclosures.[1] Throughout, we refer to the date of the disclosure as the *scheduling disclosure date*; the date the firm schedules for its earnings announcement as the *scheduled announcement date*; the date our data set indicates that the firm was expected to announce earnings prior to the scheduling disclosure as the *unconfirmed announcement date*, which we show is largely based on when the firm announced same-quarter earnings in the prior year; and the date the firm actually announces earnings as the *actual announcement date*.

To capture scheduling disclosures that are more likely to be informative, we focus on cases where the firm's scheduled announcement date differs from its unconfirmed announcement date by at least 2 days. Moreover, to study the predictive power of these disclosures for firms' earnings news and returns, we focus

[1]Scheduling disclosures explicitly state when a firm intends to announce earnings. These disclosures tend to indicate the timing of a firm's earnings announcement but make no explicit reference to its content (see Section III.A for more details and Appendix A for an example).

on scheduling disclosures observable at least 2 weeks prior to the scheduled announcement date. Our resulting sample consists of 18,959 scheduling disclosures between 2006 and 2013.

We categorize each scheduling disclosure based on how it affects the earnings calendar. Specifically, we track whether a given firm's scheduling disclosure advances (i.e., moves forward) or delays (i.e., moves back) the earnings announcement relative to the unconfirmed announcement date. We then characterize each observation based on the sign and magnitude of the resulting revision in the earnings calendar using a simple summary metric, referred to as R_SCORE, that is highest (lowest) for instances where the scheduling advances (delays) the firm's earnings announcement by more than 1 week.

Our first tests show that high-R_SCORE firms (i.e., "advancers") subsequently report better earnings news than low-R_SCORE firms (i.e., "delayers") at their earnings announcements. Specifically, advancers report statistically and economically greater return on assets (ROA), same-quarter growth in ROA, and analyst-based earnings surprises compared with delayers. Together, these results highlight the predictive power of scheduling disclosures for firms' earnings news and thus provide strong evidence that earnings scheduling is itself an information event that is commonly observable weeks ahead of firms' actual announcement dates.

Given the predictive power of scheduling information for firms' earnings news, we next examine whether investors impound scheduling signals into equity prices in a timely fashion. To conduct these tests, we examine differences in returns across high- and low-R_SCORE firms. These tests show that there is no significant difference in returns across advancers and delayers around scheduling disclosure dates, indicating that equity prices do not respond to scheduled timing as being informative of firm value.

By contrast, however, there is a striking difference in returns across advancers and delayers following the scheduling disclosure dates. Specifically, advancers predictably outperform delayers by over 260 basis points (bps) (i.e., 2.6%) in the month after the scheduling disclosure date, with advancers outperforming the market by 1.3% and delayers underperforming by 1.3%. This symmetry in returns underscores a benefit of the ex ante approach implemented in this article, which predicts both positive and negative earnings news weeks ahead of firms' actual announcement dates.

Event-time tests show that over 60% of the predictable return spread is concentrated at firms' scheduled announcement dates, indicating that prices react to the information content of scheduling disclosures at the time the earning news is announced rather than at the time of the disclosure. A calendar-time strategy involving firms scheduled to announce earnings in the subsequent week yields 4-factor alphas ranging from 62 to 138 bps per week, depending on the required portfolio size. The returns to these scheduling strategies are largely orthogonal to traditional asset-pricing factors, consistent with the returns reflecting the correction of predictable expectation errors embedded in market prices rather than exposure to sources of priced risks.

For our purpose of studying market efficiency and investor behavior, firms' scheduled announcement timing must be publicly disclosed, observable to us as researchers, and contain new value-relevant information. We show that all three conditions are met, with firms' public scheduling disclosures in our data helping to predict their earnings news. This predictability could be due to any combination of the various factors that cause a change in announcement timing, which are mutually nonexclusive and vary by circumstance. However, because our goal is to document the informativeness of scheduling disclosures and study investors' reactions to them, we are agnostic on the precise reasons for announcement timing and instead focus on establishing its predictive power for earnings news and returns.

Although the scheduled announcement dates in this study are primarily sourced from public information, one potential concern is that unconfirmed announcement dates are based on proprietary forecasting techniques specific to our calendar data. To mitigate this concern, we also show that scheduling disclosures continue to significantly predict both earnings news and returns when defining calendar revisions as the difference between the scheduled announcement date and the "random-walk" expected announcement date, defined as the date a firm reported same-quarter earnings in the prior year.

A common concern with academic evidence of anomaly returns is that they may mischaracterize the net payoffs available to investors. For example, the net payoffs may be overstated to the extent that the underlying signal is too costly to process, researchers may rely on "cleansed" data not available to investors in real time, and/or investors may face binding cognitive constraints such as limited attention (e.g., DellaVigna and Pollet (2009), Hirshleifer, Lim, and Teoh (2009), and Cohen and Lou (2012)).[2] In most anomaly settings, researchers provide evidence consistent with investor irrationality but are unable to rule out the alternative interpretation of market prices being "efficiently inefficient" with respect to the costs of obtaining and processing the necessary data. To provide evidence on the source of return predictability in our study, we leverage a unique feature of our setting that allows us to approximate when investors observe scheduling information. We find evidence consistent with investors immediately reacting to scheduling information by trading in option markets.

A distinguishing feature of our setting, relative to most other anomaly studies, is that scheduling disclosures convey two simultaneous signals. The first is a "content signal" that foreshadows the *nature* of firms' earnings news. The second is a "volatility-timing signal" that conveys the *timing* of firms' earnings news. Because advancing and delaying can shift the timing of announcements relative to option expiration dates, both content and volatility-timing signals are relevant for option prices but through separable channels. This separability allows us to test the market's response to each signal while holding the other constant.

Our option-based tests proceed in two stages. In the first stage, we study how market prices react to the content signal while holding constant the volatility-timing signal. We do so by comparing scheduling disclosures that differ in terms of the R_SCORE but do not affect whether the earnings announcement occurs before the option expiration date. We show that option prices do not react to

[2]A related stream of research points to transaction costs as another alternative explanation for anomaly returns. We discuss this alternative explanation in Section IV.

the content signal around scheduling disclosures, which results in predictable post-scheduling option returns. These findings provide further evidence that investors do not react to the cash-flow information embedded in firms' scheduling disclosures.

In the second stage of our option tests, we use delta-neutral option portfolios to study how market prices react to the volatility-timing signal while holding constant the content signal. We do so by examining scheduling disclosures for which the scheduled announcement date differs from the unconfirmed announcement date in whether it occurs before versus after the option expiration date. We show that in this case, delta-neutral option prices respond immediately to the scheduling disclosure and display no predictable drift in the post-scheduling period. Thus, a striking result from these tests is that investors appear to receive and efficiently trade on the volatility-timing information conveyed through scheduling disclosures while at the same time failing to understand the content information they reveal regarding firms' future cash flows.

The ability to separately study the volatility-timing and content signals provides a more powerful setting than prior research to distinguish between investor irrationality, costs of data acquisition and processing, and sample biases as explanations for return predictability (e.g., Rosenberg and Houglet (1974), Kothari, Shanken, and Sloan (1995), and Ljungqvist, Malloy, and Marston (2009)). Specifically, the immediate and efficient reaction in option markets to the volatility-timing signal is consistent with investors observing scheduling disclosures in a timely fashion, understanding that they imply an advance or delay in the earnings calendar but failing to unravel the information they contain regarding future cash flows. As a result, our findings complement the evidence in McLean and Pontiff (2016) that researchers can help improve market efficiency by identifying new value-relevant signals.

II. Related Literature

This article relates to studies that classify firms as "early" versus "late" based on when they actually announce earnings relative to an ex ante "expected" announcement date (e.g., Givoly and Palmon (1982), Chambers and Penman (1984), and Bagnoli et al. (2002)). By contrast, this study uses a novel data set of scheduling disclosures as ex ante signals for predicting firms' earnings news. Perhaps not surprisingly, these two dimensions of timeliness are conceptually related and are both associated with the nature of firms' earnings news. However, when using the scheduled announcement date as the "expected" announcement date to classify firms as early versus late, we show the that two dimensions are significantly *negatively* correlated, indicating that firms use the two dimensions of announcement timing as substitutes rather than compliments.[3] Additionally, in Section III.G, we

[3]Other studies use prior-year announcement dates, or dates from a statistical prediction model, as the "expected" announcement date when identifying realized announcement timing. This alternative approach results in a timing measure strongly correlated with ours. However, our approach differs because it can be measured entirely using data available to investors prior to the actual announcement date and allows us to identify approximately when the timing information becomes available to investors.

conduct a series of tests that directly compare the two classifications and show that scheduling disclosures provide incremental, economically significant predictive power for earnings news and returns.

The evidence in this study also relates to prior research showing that market prices fail to reflect low-saliency signals (e.g., Hirshleifer et al. (2009), Drake, Roulstone, and Thornock (2012), Giglio and Shue (2014), and Chang, Hartzmark, Solomon, and Soltes (2016)). Our findings suggest that investors underweight aspects of scheduling disclosures as a result of low saliency but that these disclosures should be treated as significant information events ahead of the actual announcements. Moreover, by documenting the predictive power of earnings scheduling, the results of this study are also potentially useful for investment practice and have been applied and replicated in a contemporaneous, practitioner-oriented work by Livnat and Zhang (2015).

More broadly, this article relates to a vast literature studying informed agents who possess discretion over their communication with outsiders. For example, many models of announcement timing assume managers are dissuaded from systematically delaying bad news because outsiders rationally interpret delays as a negative signal (e.g., Guttman, Ilan, and Skrzypacz (2014)). This article tests that assumption with respect to the scheduling of earnings news and highlights a need for further research into investors' ability to discipline insiders by inferring information embedded in their actions.

III. Empirical Tests

A. Earnings Calendar Data and Sample Selection

The main analyses of this article examine information in firms' scheduling of earnings announcements using daily snapshots of earnings calendar data provided by Wall Street Horizon from 2006 through 2013. Wall Street Horizon began disseminating earnings calendar data in 2006, where each snapshot lists "expected" announcement dates for a broad cross section of firms. The calendar data reflect information available to investors by 4AM EST of each trading day. We use the data to proxy for investors' daily information set regarding expected announcement dates, which is likely conservative because Wall Street Horizon provides these data to clients at much higher frequencies through streaming feeds. Some clients license the calendar data and post them online as a service to their customers.[4]

The earnings calendar provides a rolling view of expected announcement dates by updating the calendar in response to new information. A key feature of the data set is that it indicates whether an expected announcement date stems from a firm explicitly disclosing when it intends to announce earnings (see Appendix A for an example). We define the *scheduling disclosure date* as the first date on which Wall Street Horizons indicates the expected announcement date as "Verified" by the firm.

[4]For example, the "e-research" section of Fidelity's Web site (https://eresearch.fidelity.com/eresearch/conferenceCalls.jhtml) allows investors to track both unconfirmed and scheduled announcement dates from Wall Street Horizon.

We further define the *scheduled announcement date* as the expected date of firms' earnings announcement that Wall Street Horizon obtains from the firm's scheduling disclosure and the *unconfirmed announcement date* as the expected announcement date on the trading day prior to the scheduling disclosure date. Unconfirmed announcement dates are forecasts provided by Wall Street Horizon that typically reflect a firm's past reporting behavior. See Appendix B for a summary of the notation and nomenclature we use throughout the article.

In rare cases, firms revise a previously scheduled announcement date. This practice occurs infrequently, affecting less than 1% of all firm-quarters in our sample. Our main tests only include the first scheduling disclosure date, and accompanying scheduled announcement dates, to avoid look-ahead bias. However, our findings are robust to including any subsequent scheduling disclosure dates as well (results available from the authors).

We emphasize that all scheduling disclosure dates and scheduled announcement dates in this study are based on public information, meaning that all investors had potential access to these data even if they did not subscribe to Wall Street Horizon's data. Although the unconfirmed announcement dates rely on expected dates in the Wall Street Horizon database, we show in Section III.F that unconfirmed announcement dates from Wall Street Horizon and random-walk expected announcement dates are more than 90% correlated and yield the same inferences about investor behavior.

In speaking with representatives of Wall Street Horizon, they mentioned that most scheduling disclosures are gleaned from press releases (e.g., the one in Appendix A) and firms' Web pages and that they are rarely derived from the U.S. Securities and Exchange Commission (SEC) filings (e.g., 8-Ks). Scheduled announcement dates are also available from related sources such as the Thomson Reuters data set used by Bagnoli et al. (2002). However, to the best of our knowledge, the Wall Street Horizon data are unique in that they allow researchers to observe the actual files disseminated to subscribers and thus approximate when investors became aware of announcement timing (deHaan et al. (2015), Livnat and Zhang (2015)).

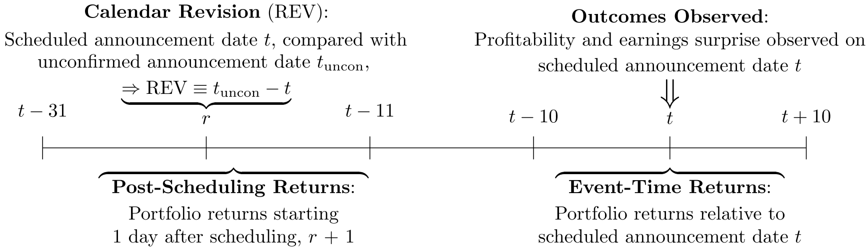
We measure the timing content of scheduling disclosures by computing the corresponding calendar revision, REV, as the difference (in days) between the unconfirmed announcement date, denoted t_{uncon}, and the scheduled announcement date, denoted t.[5] We use the term *calendar revisions* to refer to changes in the Wall Street Horizon earnings calendar induced by firms' scheduling disclosures rather than a firm revising a previous scheduling disclosure. Higher values of REV indicate that the scheduled announcement date is earlier than the unconfirmed announcement date, whereas lower values of REV indicate it is later. To capture scheduling disclosures with economically meaningful content, we focus on disclosures that alter a firm's expected announcement date by at least 2 days.

We merge the calendar-revision sample with return data from the Center for Research in Security Prices (CRSP), financial statement information from Compustat, and analyst-based earnings surprise data from the Institutional Brokers' Estimate System (IBES). Appendix B details how each of our sample

[5]Throughout the article, "days" refers to trading days rather than calendar days.

requirements narrows the universe of firm-quarters to our final sample, which consists of 18,959 unique firm-quarters spanning 2006–2013.

Because firms can issue scheduling disclosures at any time prior to announcing earnings, we use the following timeline to detail the sample requirements and structure of our main tests. The timeline helps emphasize that the empirical tests are constructed to avoid look-ahead bias. We construct a sample of observations where the scheduling disclosure date, r, occurs in the month (21 days) ending 2 weeks prior to the scheduled announcement date t.



The requirement that the scheduling disclosure date occurs no earlier than $t-31$ helps identify scheduling disclosures occurring after a firm's fiscal period and thus those that are potentially informed by managers' knowledge of the firm's performance. Similarly, the requirement that the revision occurs no later than $t-11$ helps mitigate the risk that investors learn about earnings through other sources such as preannouncement media coverage and, as depicted in the timeline, facilitates examining event-time returns without exposing the results to look-ahead bias. Our results do not appear sensitive to this sample requirement.

We categorize each scheduling disclosure based on the corresponding revision to the earnings calendar. For each observation, we implement a simple summary metric, referred to as R_SCORE, that is highest (lowest) for firms whose scheduled announcement date is more than a week earlier (later) than the firm's unconfirmed announcement date. Specifically, for each value of REV, we define R_SCORE as follows:

$$(1) \qquad \text{R\_SCORE} = \begin{cases} 0 \text{ ("Delay")} & \text{for REV} < -5 \\ 0.25 & \text{for REV} \in [-3, -5] \\ 0.5 & \text{for REV} \in [-2, +2] \\ 0.75 & \text{for REV} \in [+3, +5] \\ 1 \text{ ("Advance")} & \text{for REV} > +5, \end{cases}$$

where the cutoff points are selected to provide a simple classification rule that creates symmetry in the average magnitude of REV across R_SCORE portfolios (see Table 1 for details). Using static cutoff points also ensures that our tests can be implemented without referencing the full sample of scheduling disclosures within a given period. A potential concern is that the classification rule is ad hoc and can lead to unequal sample partitions. To mitigate this concern, additional analyses in Section III.D show that the article's inferences are not specific to this classification rule and hold when using the cross-sectional distribution of REV. In the

TABLE 1
Descriptive Statistics

Panel A of Table 1 presents annual descriptive statistics for the main variables used throughout the article. N equals the number of firm-quarters, and FIRMS indicates the number of unique firms. HORIZON equals the number of days between the scheduling disclosure date and the scheduled announcement date. REV is defined as the number of trading days between the scheduled announcement date and the unconfirmed announcement date. |REV| equals the absolute value of REV. DEV equals the number of trading days between the scheduled announcement date and the actual announcement date, where positive (negative) values indicate that the firm reported earlier (later) than expected. |DEV| equals the absolute value of DEV. The "All" column indicates the average of the annual means. Panel B contains sample averages across R_SCORE portfolios. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. MCAP equals firms' market capitalization ($millions). MOMEN is the cumulative market-adjusted return over the prior 12 months ending on $r-11$. RET($r-1, r+1$) is the 3-day market-adjusted return surrounding the scheduling disclosure. Reported t-statistics are based on the difference in high- and low-R_SCORE portfolios over the time series of calendar quarters. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.

Panel A. Summary Statistics by Year

Year	N	FIRMS	HORIZON	REV	|REV|	DEV	|DEV|
2006	1,926	1,357	15.069	−2.965	5.372	−0.075	0.268
2007	2,536	1,652	16.123	−1.647	4.744	−0.057	0.244
2008	3,031	1,843	16.747	−1.638	4.551	−0.019	0.250
2009	2,402	1,524	16.622	−1.993	4.635	0.001	0.229
2010	2,146	1,418	16.224	−1.137	4.754	0.016	0.140
2011	2,076	1,378	16.205	−1.665	4.564	−0.012	0.196
2012	2,395	1,495	16.250	−1.857	4.466	−0.028	0.179
2013	2,447	1,528	16.145	−1.884	4.620	0.046	0.089
All	2,370	1,524	16.173	−1.848	4.713	−0.016	0.200

Panel B. Descriptive Statistics by R_SCORE Portfolio

R_SCORE	REV	N	HORIZON	MCAP	MOMEN	DEV	RET($r-1, r+1$)
0 (Delay)	−8.849	84.6	16.495	3,579	−8.525	0.036	−0.230
0.25	−4.158	248.8	16.434	5,272	−2.871	0.017	−0.180
0.5	−0.019	134.1	15.894	5,275	0.579	0.019	−0.052
0.75	4.118	83.8	15.442	4,106	1.404	−0.088	−0.081
1 (Advance)	8.836	41.2	15.487	3,025	6.311	−0.213	−0.047
Advance − Delay	17.685	−43.5	−1.009	−554	14.835	−0.250	0.183
t-statistic		(−9.16)	(−4.17)	(−1.40)	(8.62)	(−4.33)	(1.52)

following analysis, our main tests focus on differences between high-R_SCORE firms (hereafter referred to as "advancers") and low-R_SCORE firms (hereafter referred to as "delayers").

B. Descriptive Statistics

Table 1 contains descriptive statistics of the main sample used throughout the article. Panel A presents annual descriptive statistics, where the first two columns indicate the number of unique firm-quarters and firms, respectively. The sample consists of approximately 2,300 firms-quarters per year and an average of 1,524 unique firms. HORIZON equals the number of trading days between the scheduling disclosure date r and scheduled announcement date t. Panel A shows that the average scheduling disclosure date in our sample occurs approximately 16 trading days prior to the scheduled announcement date.

The REV column in Panel A of Table 1 shows that the average scheduling disclosure shifts the announcement date back 1–2 days, suggesting firms are more likely to delay than advance when scheduling their earnings announcements. The |REV| column indicates that the average scheduled announcement date is 4.5 days different from the unconfirmed announcement date.

The final two columns in Panel A of Table 1 contain descriptive statistics on firms' deviations from their scheduled announcement dates. Specifically, DEV equals the number of days between a firm's actual and scheduled announcement dates:

$$\text{DEV} \quad = \quad t - t_{\text{act}},$$

where t_{act} is the actual announcement date computed from IBES and Compustat using the method from DellaVigna and Pollet (2009), and t is the scheduled announcement date. Positive (negative) values of DEV indicate that a firm reported earlier (later) than the scheduled announcement date. The averages of DEV and |DEV| confirm that scheduled announcement dates are, on average, highly accurate. Specifically, the average DEV is insignificantly different from 0, and the average |DEV| indicates that actual announcement dates are only 0.20 days different from scheduled announcement dates on average.

Panel B of Table 1 contains descriptive statistics across R_SCORE portfolios. The REV column shows that revisions are nearly symmetric across R_SCORE portfolios, where the average delayer (advancer) moves back (forward) their scheduled announcement date by 8.8 days relative to their unconfirmed announcement date. The N column indicates the average number of firm-quarters within each portfolio and shows that there are approximately twice as many low-R_SCORE firms than high-R_SCORE firms, which is consistent with the result in Panel A that firms are more likely to delay than advance their announcements.

Regarding the sample count, it is important to emphasize that in each quarter there are approximately 125 observations where a firm's scheduled announcement date is more than 1 week different from the firm's unconfirmed announcement date, more than 450 observations where the revision is at least 3 trading days different, and nearly 600 observations where the revision is at least 2 trading days different. These sample counts suggest that calendar revisions are fairly pervasive phenomena rather than isolated examples.

The pricing tests that follow show consistent evidence of return predictability when using extreme R_SCORE portfolios (Table 3), the raw value of REV (Table 4), and all revisions of at least 3 days (Table 9). Additionally, removing some of the sample restrictions discussed previously that are in place for the pricing tests is likely to significantly expand the sample available to researchers studying earnings calendars and firms' scheduling disclosures. Finally, Section III.G shows that our scheduling-disclosure-based approach to studying announcement timeliness results in larger sample sizes, and thus more statistical power, than previously studied approaches to predicting firms' earnings news and returns as a function of timeliness.

The next three columns in Panel B of Table 1 contain average firm characteristics for each R_SCORE portfolio. The HORIZON column shows that delayers revise the earnings calendar approximately 1 day closer to their scheduled announcement date compared with advancers. MCAP equals firms' market capitalization reported in millions of dollars, and MOMEN equals a firm's cumulative market-adjusted return over the 12 months ending on $r-11$. The market capitalization statistics indicate that the average firm in our sample is a mid-cap firm, although firm size does not vary significantly with R_SCORE. By contrast, the MOMEN results show that delayers significantly underperform advancers over the year prior to the scheduling disclosure, and vice versa for advancers, which is consistent with evidence in Ball and Brown (1968) that annual returns lead firms' earnings news.

The DEV column in Panel B of Table 1 shows that delayers are more likely to deviate from their scheduled announcement date by announcing earnings early, and vice versa for advancers, indicating that firms' tendency to advance versus delay via scheduling is actually *negatively* correlated with their tendency to report earlier versus later than the scheduled announcement date. These results show that firms use the two dimensions of earnings announcement timing as substitutes rather than compliments, a pattern we examine further in Section III.G.

The final column in Panel B of Table 1 examines the market's response to firms' scheduling disclosures as a function of the resulting calendar revision. Specifically, RET($r-1, r+1$) measures firms' market-adjusted return in the 3-day window surrounding the scheduling disclosure date. Panel B shows that there is no significant difference in returns across advancers and delayers at the time of the scheduling disclosure, indicating that investors do not respond to scheduled timing as being informative of firm value.[6]

C. Predicting Earnings News

This section directly examines the informativeness of scheduling disclosures by gauging their predictive power for firms' subsequently reported earnings news. Panel A of Table 2 contains average earnings metrics across R_SCORE portfolios based on i) ROA; ii) changes in ROA, denoted as ΔROA; and iii) reported earnings relative to consensus analyst forecasts and scaled by lagged total assets, denoted as SURP. In calculating SURP, the consensus is measured immediately prior to the announcement to ensure that analysts had the opportunity to revise their forecasts in response to the scheduling disclosure. Additionally, ROA < 0, ΔROA < 0, and SURP < 0 are indicator variables that equal 1 when the corresponding variable is negative.

Panel A of Table 2 captures the first main result of the article. Specifically, advancers subsequently announce greater ROA, changes in ROA, and earnings surprises compared with delayers. These differences are both statistically and economically significant. For example, earnings declines and negative analyst-based surprises are concentrated among delayers, where average ROA is positive for advancers and negative for delayers. Additionally, average earnings innovations and earnings surprises increase monotonically across R_SCORE portfolios.

Panel B of Table 2 presents regression results when controlling for firms' natural log of market capitalization (SIZE), log book-to-market ratio (LBM), return momentum (MOMEN), and historical return volatility (VLTY). R_SCORE has strong predictive power for all three earnings news proxies (t-statistics from 3.62 to 5.58) that is not subsumed by the controls. Together, these results establish that firms reveal information about their subsequently reported performance when disclosing their scheduled announcement dates.

[6]These results contrast with the findings of Duarte-Silva, Fu, Noe, and Ramesh (2013) that prices significantly decline at the time of press releases that explicitly mention "delaying," "postponing," or "deferring" an earnings announcement, suggesting that the type and wording of the announcement may make delays more salient to investors.

TABLE 2

Profitability and Earnings Surprises

Panel A of Table 2 contains average earnings metrics, shown as percentages, across R_SCORE portfolios. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. ROA is the firm's return on assets, defined as net income scaled by beginning-of-quarter total assets, and ROA < 0 equals 1 for firms with negative ROA. ΔROA equals same-quarter annual change in ROA, and ΔROA < 0 equals 1 for firms with annual decreases in ROA. SURP equals the actual earnings per share (EPS) reported in the Institutional Brokers' Estimate System (IBES) minus the last consensus forecast available immediately prior to the announcement and scaled by beginning-of-quarter assets, and SURP < 0 equals 1 for firms with negative SURP. Reported t-statistics are based on the difference in high- and low-R_SCORE portfolios over the time series of calendar quarters. Panel B contains regression results of earnings metrics on R_SCORE and additional firm controls. LBM and SIZE are the natural log of 1 plus the book-to-market ratio and the natural log of market capitalization, respectively. MOMEN is the cumulative market-adjusted return, and VLTY is the standard deviation of returns over the prior 12 months ending on $r-11$. The reported t-statistics are based on standard errors clustered by firm and quarter. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Industry fixed effects are based on 2-digit Standard Industrial Classification (SIC) codes. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.

Panel A. Earnings Metrics by R_SCORE Portfolio

R_SCORE	ROA	ROA < 0	ΔROA	ΔROA < 0	SURP	SURP < 0
0 (Delay)	−0.316	0.418	−0.824	0.600	−0.028	0.374
0.25	0.507	0.338	−0.254	0.549	0.055	0.319
0.5	0.636	0.312	−0.059	0.501	0.058	0.310
0.75	0.394	0.353	0.285	0.479	0.116	0.287
1 (Advance)	0.525	0.377	0.854	0.423	0.124	0.283
Advance − Delay	0.841	−0.041	1.678	−0.177	0.152	−0.091
t-statistic	(4.80)	(−2.79)	(6.08)	(−9.70)	(4.95)	(−6.58)

Panel B. Regression Results of Earnings Metrics

	ROA		ΔROA		SURP	
Variable	1	2	3	4	5	6
R_SCORE	0.481***	0.439***	1.326***	1.162***	0.128***	0.118***
	(3.79)	(3.62)	(5.58)	(5.07)	(5.59)	(5.10)
SIZE	0.628***	0.420***	0.065	0.112***	0.016	0.024***
	(12.46)	(10.00)	(1.04)	(2.97)	(1.61)	(2.82)
LBM	−0.588**	−0.226	−0.997***	−0.649***	−0.304***	−0.205***
	(−2.72)	(−1.04)	(−6.31)	(−3.20)	(−8.35)	(−5.73)
MOMEN	—	0.013***	—	0.016***	—	0.001***
	—	(6.51)	—	(10.58)	—	(4.34)
VLTY	—	−0.581***	—	0.197*	—	−0.001
	—	(−8.85)	—	(1.78)	—	(−0.05)
R^2	0.074	0.110	0.015	0.040	0.015	0.016
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes	No	Yes

D. Predicting Future Returns

Given the evidence that firms' scheduling disclosures predict their subsequently reported earnings news, our next set of tests examines whether investors unravel these signals and impound scheduling information into prices in a timely fashion. Panel B of Table 1 shows that returns around scheduling disclosure dates are not sensitive to the calendar revision they disclose, as measured by R_SCORE, indicating that investors likely update prices at a later date.

To measure when the earnings signal embedded in scheduling disclosures is reflected in prices, Table 3 contains average equal- and value-weighted returns to each R_SCORE portfolio following the scheduling disclosure date r, using five return metrics measured over the subsequent month (from $r+1$ to $r+21$). Specifically, the first two columns contain raw and market-adjusted returns denoted as RR$(r+1, r+21)$ and RET$(r+1, r+21)$, respectively. SAR$(r+1, r+21)$ refers to size-adjusted returns, which equals the firm's raw return minus

TABLE 3
Equal- and Value-Weighted Future Returns

Table 3 contains average equal- and value-weighted returns, shown as percentages, for each R_SCORE portfolio. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. The reported returns are calculated over the month following the scheduling disclosure from $r+1$ to $r+21$. The first two columns contain raw and market-adjusted returns, denoted as RR($r+1$, $r+21$) and RET($r+1$, $r+21$), respectively. SAR($r+1$, $r+21$) refers to size-adjusted returns, defined as the firm's raw return minus the average return of firms in the same size decile. CAR($r+1$, $r+21$) refers to firm-size-, book-to-market-, and momentum-characteristic-adjusted returns following Daniel et al. (1997). FAR($r+1$, $r+21$) refers to factor-adjusted returns, defined as the firm's raw return minus the return calculated by estimating a firm's daily sensitivity to the market (MKTRF), small minus big (SMB), high minus low (HML), and up-minus-down momentum (UMD) factors over the year prior to the earnings announcement and applying those sensitivities to the contemporaneous factors, following Fama and French (1993). Reported t-statistics (in parentheses) are based on the difference in high- and low-R_SCORE portfolios over the time series of calendar quarters. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.

R_SCORE	RR	RET	SAR	CAR	FAR
Panel A. Equal-Weighted Returns in Month Following Revision ($r+1, r+21$)					
0 (Delay)	−0.773	−1.304	−0.743	−1.256	−1.165
0.25	0.173	−0.677	−0.267	−0.648	−0.300
0.5	0.750	−0.094	0.335	0.090	0.319
0.75	1.365	0.189	0.656	0.402	0.607
1 (Advance)	2.263	1.384	1.896	1.913	1.627
Advance − Delay	3.036	2.688	2.639	3.168	2.792
	(4.59)	(4.15)	(3.95)	(4.23)	(5.17)
Panel B. Value-Weighted Returns in Month Following Revision ($r+1, r+21$)					
0 (Delay)	0.584	−0.496	−0.247	−0.428	0.098
0.25	0.618	−0.639	−0.185	−0.430	0.086
0.5	0.695	−0.657	−0.260	−0.176	0.246
0.75	1.148	−0.490	0.065	0.207	0.219
1 (Advance)	2.745	1.261	1.716	1.360	1.624
Advance − Delay	2.162	1.757	1.962	1.788	1.526
	(2.13)	(1.95)	(2.07)	(1.73)	(2.01)

the contemporaneous size-matched portfolio return, and CAR($r+1, r+21$) is defined analogously for characteristically adjusted returns, following Daniel, Grinblatt, Titman, and Wermers (1997). Finally, FAR($r+1, r+21$) refers to 4-factor-adjusted returns, following Carhart (1997).

Panel A of Table 3 captures the second main result of the article: a robust positive relation between calendar revisions and firms' future returns. For each return metric, the average return spread across advancers and delayers exceeds 260 bps (2.6%) in the month following scheduling disclosure dates, with corresponding t-statistics between 3.95 and 5.17.

Table 3 also shows that the predictable spread in future returns is also fairly symmetric across advancers and delayers, mitigating concerns that the strategy returns are limited to the short side of the portfolio. Advancers, on average, outperform the market by approximately 138 bps, and delayers underperform by 130 bps, which aligns with the nature of firms' subsequently reported earnings news. This evidence of a robust post-revision return spread across advancers and delayers contrasts sharply with the insignificant price reaction around scheduling disclosure dates shown in Table 1, suggesting that investors do not unravel the implications of calendar revisions for earnings news in a timely fashion.

To address the possibility that the return predictability we document is limited to small firms where transaction costs are highest, Panel B of Table 3 presents value-weighted future returns across R_SCORE portfolios. Value-weighting lowers the portfolio's performance, but the resulting return spreads remain large, ranging from 153 to 216 bps in the month of scheduling disclosures, with corresponding t-statistics of 2.01 and 2.13. Because we find no evidence that the results significantly vary across return metrics in Table 3, we focus on market-adjusted returns in subsequent tests.

To mitigate concerns that the predictability is driven by a firm's exposure to risk, Table 4 contains return regressions when controlling for standard risk proxies. The dependent variables are RET$(r+1, r+21)$, the return in the month following the scheduling disclosure, and RET$(t-1, t+1)$, the return in the 3-day window surrounding firms' scheduled announcement dates. In both sets of regressions, the first columns show that R_SCORE incrementally predicts returns, where the coefficient magnitudes align with the return spreads shown in earlier tables. Similarly, columns 2 and 4 show that the raw magnitude of the calendar revision, REV, also predicts returns (t-statistics = 7.76 and 5.00, respectively), indicating that our evidence of return predictability is not dependent on the cutoff points used in calculating R_SCORE.

Columns 3 and 6 of Table 4 disaggregate R_SCORE into four indicator variables: ADVANCER, MINOR_ADVANCER, MINOR_DELAYER, and DELAYER, constructed from the R_SCORE cutoff points, where observations

TABLE 4

Cross-Sectional Return Regressions

Table 4 contains results from regressing future returns on R_SCORE and additional controls. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. RET$(r+1, t+21)$ is the cumulative market-adjusted return over the month following the scheduling disclosure date r. RET$(t-1, t+1)$ denotes the 3-day market-adjusted return surrounding the scheduled announcement date t. REV is defined as the number of trading days between the scheduled announcement date and the unconfirmed announcement date. ADVANCER is a binary variable for REV > 5, MINOR_ADVANCER is a binary variable for $3 \leq$ REV ≤ 5, MINOR_DELAYER is a binary variable for $-5 \leq$ REV ≤ -3, and DELAYER is a binary variable for REV < −5. LBM and SIZE are the natural log of 1 plus the book-to-market ratio and the natural log of market capitalization, respectively. MOMEN is the cumulative market-adjusted return, and VLTY is the standard deviation of returns over the prior 12 months ending on $r-11$. Year and industry fixed effects are included throughout. The reported t-statistics (in parentheses) are based on standard errors clustered by firm and quarter. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Industry fixed effects are based on 2-digit Standard Industrial Classification (SIC) codes. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.

	RET$(r+1, r+21)$			RET$(t-1, t+1)$		
Variable	1	2	3	4	5	6
R_SCORE	1.514***	—	—	2.333***	—	—
	(6.72)	—	—	(4.86)	—	—
REV	—	0.086***	—	—	0.128***	—
	—	(7.76)	—	—	(5.00)	—
ADVANCER	—	—	1.002***	—	—	1.666***
	—	—	(3.16)	—	—	(2.79)
MINOR_ADVANCER	—	—	0.578**	—	—	0.417
	—	—	(2.61)	—	—	(1.47)
MINOR_DELAYER	—	—	−0.138	—	—	−0.494
	—	—	(−0.80)	—	—	(−1.70)
DELAYER	—	—	−0.651***	—	—	−1.034**
	—	—	(−3.36)	—	—	(−2.39)
SIZE	−0.042	−0.047	−0.044	0.015	0.009	0.017
	(−0.62)	(−0.68)	(−0.64)	(0.10)	(0.06)	(0.11)
LBM	−0.197	−0.194	−0.194	−0.121	−0.117	−0.122
	(−1.00)	(−0.99)	(−0.99)	(−0.16)	(−0.15)	(−0.16)
MOMEN	0.004*	0.004*	0.004*	0.001	0.001	0.001
	(1.91)	(1.90)	(1.92)	(0.10)	(0.09)	(0.09)
VLTY	−0.276**	−0.278**	−0.278**	−0.066	−0.069	−0.072
	(−2.24)	(−2.26)	(−2.27)	(−0.13)	(−0.14)	(−0.15)
R^2	0.367	0.393	0.378	0.227	0.240	0.239

with REV from −2 to +2 serve as the control sample. All of the coefficients have the predicted sign. Moreover, the simultaneous significance of ADVANCER and DELAYER underscores the symmetric predictive power of the scheduling-based methodology in this article, which predicts both positive and negative news weeks ahead of the announcement and thus contrasts with prior studies that conduct pricing tests using short positions in response to missed announcement dates.

E. Event-Time Returns

Our next analyses examine the spread in event-time returns within the month (21 trading days) surrounding firms' scheduled announcement dates.[7] Table 5 contains firms' returns in event time, where RET$(t+X, t+Y)$ denotes the cumulative market-adjusted return from day X to Y relative to the scheduled announcement date t.

TABLE 5

Returns in Event Time Relative to Earnings Announcements

Table 5 contains market-adjusted returns around earnings announcements across R_SCORE portfolios. All returns are shown as percentages. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. RET$(t+X, t+Y)$ equals the cumulative market-adjusted return from day X to Y relative to the scheduled earnings announcement date t. Reported t-statistics (in parentheses) are based on the difference in high- and low-R_SCORE portfolios over the time series of calendar quarters. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.

	RET Window				
R_SCORE	RET$(t-10, t+10)$	$(t-10, t-2)$	$(t-1, t+1)$	$(t+2, t+10)$	$(t-10, t+1)$
0 (Delay)	−0.911	0.078	−0.707	−0.294	−0.675
0.25	−0.323	−0.175	−0.083	−0.081	−0.288
0.5	−0.016	−0.105	0.149	−0.046	0.021
0.75	0.412	0.044	0.627	−0.253	0.656
1 (Advance)	1.623	0.616	0.870	0.198	1.403
Advance – Delay	2.534	0.538	1.578	0.493	2.077
	(4.36)	(1.77)	(4.85)	(2.13)	(4.17)

The RET$(t-10, t+10)$ column of Table 5 shows that advancers outperform delayers by 253 bps in the month centered on firms' scheduled announcement date (i.e., from $t-10$ to $t+10$), consistent with the magnitude of the return spread documented in Table 3. The RET$(t-10, t-2)$ column of Table 5 shows that advancers only weakly outperform delayers by 54 bps (t-statistic = 1.77) prior to earnings announcements.

In contrast, the RET$(t-1, t+1)$ column of Table 5 shows that event-time returns are heavily concentrated in the 3-day window surrounding scheduled announcement dates, where over 60% (=158/253 bps) of monthly event-time returns are earned. This evidence suggests that prices adjust to the information content of scheduling disclosures at the time earnings are announced rather than around the scheduling disclosure date.

The RET$(t+2, t+10)$ column of Table 5 also shows that advancers outperform delayers by approximately 50 bps following earnings announcements, which is consistent with prior evidence of post–earnings announcement drift (PEAD).

[7]The use of actual announcement dates yields qualitatively identical results, which is not surprising given the evidence in Table 1 and given that firms generally announce earnings on the scheduled announcement date.

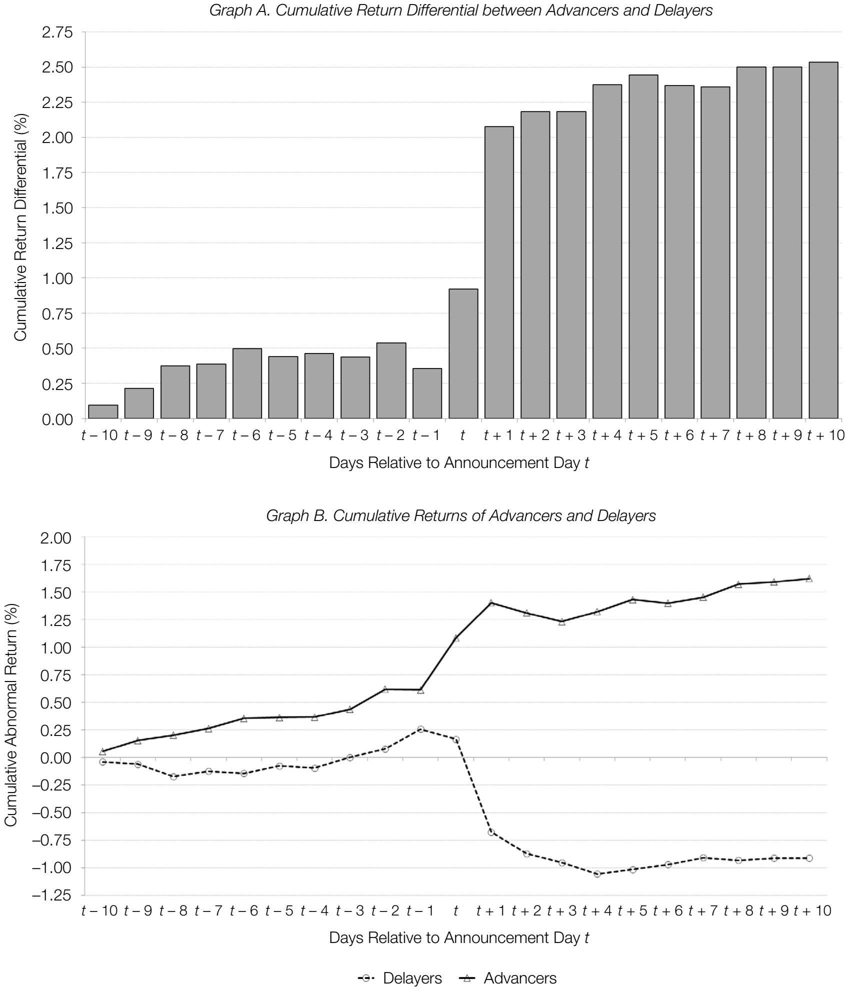
However, Table 5 also shows that over 80% (=208/253 bps) of monthly event-time returns are earned up through the announcement window, indicating that the results are mostly distinct from PEAD.

Figure 1 provides striking evidence of when strategy returns are earned relative to the announcements. Graph A shows that the cumulative spread in returns

FIGURE 1

Cumulative Returns around Earnings Announcements

Graph A of Figure 1 contains the average spread in cumulative returns across high- and low-R_SCORE portfolios in event time in the month surrounding scheduled earnings announcement dates, *t*. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. Firms in the highest-R_SCORE portfolio are deemed "advancers," and firms in the lowest-R_SCORE portfolio are deemed "delayers." In Graph A, the value on day *d* equals the average cumulative return spread between advancers and delayers from day *t* − 10 to day *d*. Graph B contains the average cumulative market-adjusted returns to advancers and delayers. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.



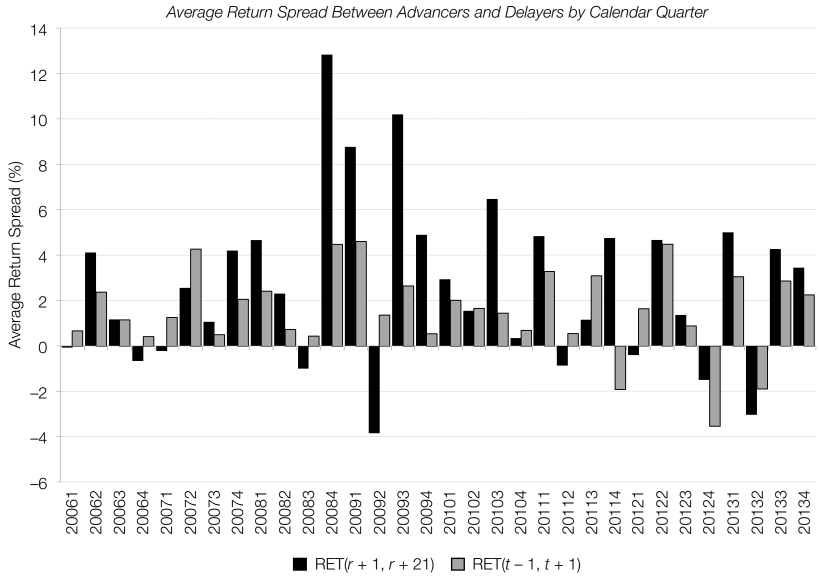
reaches 50 bps 2 days prior to the scheduled announcement (i.e., $t-2$) but nearly doubles on t, then jumps over fourfold by $t+1$ to over 200 bps. In related tests, Graph B separately plots the cumulative return of advancers and delayers in event time relative to firms' scheduled announcement dates. The figure shows that the two lines tend to move in parallel leading up to the announcement but sharply decouple at the time earnings are announced. Together, these results indicate that strategy returns primarily stem from predictable expectation errors that are corrected during the announcement.[8]

Figure 2 shows the average spread in returns across advancers versus delayers for each calendar quarter, where RET($r+1, r+21$) is shown with black bars and RET($t-1, t+1$) is shown with gray bars. The results show that the average return spread is positively skewed and generally positive over time, yielding positive average monthly (announcement-window) returns in 23 (29) of the 32 calendar quarters in our sample window. This evidence helps mitigate concerns that the return-based results are isolated within a specific period.

FIGURE 2

Quarterly Strategy Returns

Figure 2 contains the average spread in returns across high- and low-R_SCORE firms for each calendar quarter. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. Firms in the highest-R_SCORE portfolio are deemed "advancers," and firms in the lowest-R_SCORE portfolio are deemed "delayers." RET($r+1, r+21$), shown with black bars, equals the market-adjusted return spread between advances and delayers over the month following r. RET($t-1, t+1$), shown with gray bars, equals the 3-day return surrounding the expected earnings announcement date t. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.



[8]The average price increase for both advancers and delayers in Figure 1 is consistent with the evidence in Johnson and So (2018) of abnormally positive preannouncement returns as a result of asymmetric trading costs.

F. Use of Random-Walk Expected Announcement Dates

Although the scheduled announcement dates in this study are primarily sourced from public information, one potential concern is that unconfirmed announcement dates are based on proprietary forecasting techniques specific to Wall Street Horizon. To mitigate this concern, Table 6 reexamines our analyses when defining calendar revisions as the difference between the scheduled announcement date and the random-walk expected announcement date, defined as the date a firm reported same-quarter earnings in the prior year.

TABLE 6
Benchmarking to Random-Walk Expected Announcement Dates

Panel A of Table 6 reports average differences and correlations between reporting lags computed using unconfirmed announcement dates from Wall Street Horizon and random-walk expected announcement dates, defined as the firm's announcement date from the same quarter in the prior year. Correlations are computed between reporting lags, defined as the number of days between the fiscal quarter-end and the expected announcement date. Panel B contains reported earnings metrics and returns across five RW_SCORE portfolios. RW_SCORE is a measure of how a scheduling disclosure changes announcement timing relative to the random-walk expected announcement date. ROA is the firm's return on assets, defined as net income scaled by beginning-of-quarter total assets. ΔROA equals same-quarter annual change in ROA. SURP equals the actual earnings per share (EPS) number reported in the Institutional Brokers' Estimate System (IBES) minus the last consensus forecast available immediately prior to the announcement, scaled by beginning-of-quarter assets. RET($r+1$, $r+21$) equals the market-adjusted return over the month following r. RET($t-1$, $t+1$) equals the 3-day return surrounding the scheduled announcement date t. Reported t-statistics (in parentheses) are based on the difference in high- and low-RW_SCORE portfolios over the time series of calendar quarters. The Panel B sample consists of 15,439 firm-quarters spanning 2006–2013 with random-walk (RW) expected announcement dates from the prior year and for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.

Panel A. Unconfirmed versus Random-Walk Announcement Dates

	Signed Difference	Absolute Difference
Mean	−1.036	1.562
	(−9.84)	(16.76)
	Pearson	Spearman
ρ (Unconfirmed, RW)	0.924	0.956

Panel B. Revisions Benchmarked to Random-Walk Dates

RW_SCORE	ROA	ΔROA	SURP	RET($r+1$, $r+21$)	RET($t-1$, $t+1$)
0 (Delay)	−0.410	−0.887	−0.089	−1.169	−0.638
0.25	0.525	−0.244	0.048	−0.635	−0.131
0.5	0.674	−0.132	0.044	−0.489	−0.043
0.75	0.398	0.189	0.102	0.305	0.476
1 (Advance)	0.177	0.418	0.094	1.039	0.791
High–Low	0.587	1.305	0.183	2.208	1.429
	(2.63)	(6.61)	(4.42)	(3.79)	(3.27)

Panel A of Table 6 reports average differences and correlations between unconfirmed and random-walk expected announcement dates. The average signed difference between the two dates is approximately 1 trading day, and the absolute difference is approximately 1.5 trading days. Similarly, the Pearson and Spearman correlations between the unconfirmed and random-walk expected reporting lags are 92% and 96%, respectively, where reporting lags are the number of days between the fiscal quarter-end and the expected announcement date. These findings demonstrate that most of the variation in unconfirmed announcement dates comes from the date a firm announced earnings in the prior year, although Wall Street Horizon reports using a more sophisticated algorithm that also factors in day-of-week and week-of-month patterns in a firm's past reporting behavior.

Panel B of Table 6 contains earnings metrics and future returns across five RW_SCORE portfolios (the RW is short for "random-walk"), where RW_SCORE is computed from the difference between scheduled announcement dates and random-walk expected announcement dates using the cutoff points we use in equation (1) to calculate R_SCORE.

Table 6 shows that earnings calendar revisions implied by scheduling disclosures continue to significantly predict both earnings news and returns when benchmarking to random-walk expected announcement dates. These results mitigate concerns that the results hinge on the use of the unconfirmed announcement date from Wall Street Horizon.

G. Comparing Measures of Announcement Timeliness

Researchers can characterize earnings announcement timeliness in terms of firms being early versus late relative to expected announcement dates (i.e., the approach in prior research) or in terms of whether firms schedule announcement dates that advance or delay relative to unconfirmed announcement dates (i.e., the approach in this study). Although the early/late and advance/delay classifications are conceptually related and are both correlated with earnings news, Table 7 contains results from a series of tests showing that they are actually *negatively* correlated, that they offer distinct predictive power, and that the advance/delay approach in this article yields several benefits over the early/late approach used in prior research.

Panel A of Table 7 contains average REV and observation counts across R_SCORE portfolios, where each portfolio is further partitioned based on whether a firm's actual announcement date is early, on time, or late relative to the scheduled announcement date. To the extent that the early/late and advance/delay classifications capture the same phenomenon, sample observations would be concentrated among delayers being late (i.e., the upper-right cell) and/or among advancers being early (i.e., the bottom-left cell). However, Panel A shows that among both advancers and delayers, approximately 90% of the observations correspond to firms being on time relative to the scheduled announcement date.

The final row in Panel A of Table 7 shows average Spearman and Pearson correlations between the extent of a firm's calendar revision, REV, and the extent to which a firm reports early versus late, DEV, both formally defined previously in Sections III.A and III.B. The correlations are significantly negative, ranging from -4% to -6%. Although the two dimensions are negatively related, the small magnitude of these correlations suggests that they also likely capture separate aspects of earnings announcement timing.

Panels B and C of Table 7 address the following thought experiment: If researchers assumed *perfect foresight* of whether firms report early versus late relative to scheduled announcement dates, would scheduling disclosures still offer incremental predictive power for earnings news and returns? Columns 1 and 4 of Panel B show that DEV has a significant positive relation with ΔROA and SURP, which replicates the result of Bagnoli et al. (2002) that reporting late is correlated with negative earnings news. Panel B also shows that R_SCORE predicts earnings news incremental to DEV when both measures are included in the regression simultaneously. Moreover, the R_SCORE coefficients appear relatively constant in terms of size and significance across regressions that include versus exclude DEV, which is consistent with the small statistical correlations between REV and DEV reported in Panel A.

Panel C of Table 7 provides similar evidence for predicting returns. Columns 1 and 4 show that although DEV is significantly related to longer-window returns around the announcement, it is insignificantly related to returns around the scheduled announcement date, which is consistent with evidence in Penman (1984) that prices drift down after a firm fails to report on time. Moreover, the remaining

TABLE 7

Comparing Measures of Announcement Timing

Panel A contains average values of REV and average observation counts across scheduling disclosures sorted by R_SCORE and classified based on whether firms' actual announcement date is early, on time, or late relative to the scheduled announcement date. REV is defined as the number of trading days between the scheduled announcement date and the unconfirmed announcement date. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. DEV equals the number of trading days between the scheduled announcement date and the actual announcement date. ρ indicates the time-series average of cross-sectional correlations between REV and DEV, with corresponding p-values shown in parentheses. Panels B and C contain results from regressing measures of earnings news and returns on R_SCORE and DEV. ΔROA and SURP are defined in Table 2, and RET($r+X$, $r+Y$) and RET($t+X$, $t+Y$) are defined in Table 4. The control variables SIZE, LBM, MOMEN, and VLTY are defined in Table 2. Year and 2-digit Standard Industrial Classification (SIC) code industry fixed effects are included throughout. The reported t-statistics (in parentheses) are based on standard errors clustered by firm and quarter. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The main sample consists of 18,959 firm-quarters spanning 2006–2013 in which firms revise the expected earnings announcement date at least 2 weeks prior to the expected announcement date. The "All Verified Sample" in Panel D removes the restriction on REV, resulting in 49,575 observations.

Panel A. Comparing Advance/Delay versus Early/Late

	Early	On Time	Late
0 (Delay)	−9.313 3.5	−8.787 77.2	−9.463 5.2
0.25	−4.154 5.4	−4.161 235.6	−4.128 8.4
0.5	0.613 3.2	−0.017 127.3	−0.582 4.4
0.75	4.138 3.0	4.117 79.2	4.203 2.6
1 (Advance)	10.138 1.9	8.805 39.0	9.630 1.4
	Pearson	Spearman	
ρ (REV, DEV) p-value	−0.060 0.00	−0.042 0.00	

Panel B. Earnings Metrics Regressed on R_SCORE and DEV

	ΔROA			SURP		
Variable	1	2	3	4	5	6
R_SCORE	— —	1.166*** (5.72)	1.200*** (5.81)	— —	0.118*** (5.19)	0.124*** (5.40)
REV	0.130*** (2.80)	— —	0.141*** (3.10)	0.033*** (4.07)	— —	0.034*** (4.23)
SIZE	0.120*** (2.84)	0.123*** (2.86)	0.120*** (2.84)	0.024*** (2.86)	0.025*** (2.95)	0.024*** (2.88)
LBM	−0.677*** (−3.27)	−0.648*** (−3.14)	−0.640*** (−3.15)	−0.200*** (−5.46)	−0.197*** (−5.41)	−0.193*** (−5.23)
MOMEN	0.017*** (12.05)	0.017*** (11.77)	0.017*** (11.86)	0.001*** (4.75)	0.001*** (4.59)	0.001*** (4.66)
VLTY	0.225** (2.26)	0.213** (2.17)	0.215** (2.19)	0.004 (0.28)	0.002 (0.18)	0.003 (0.20)
R^2 (%)	3.644	3.941	4.101	1.705	1.643	1.832

(continued on next page)

TABLE 7 (continued)
Comparing Measures of Announcement Timing

Panel C. Returns Regressed on R_SCORE and DEV

	RET($t-1$, $t+1$)			RET($r+1$, $r+21$)		
Variable	1	2	3	4	5	6
R_SCORE	—	1.514***	1.521***	—	2.333***	2.424***
	—	(6.72)	(6.73)	—	(4.86)	(5.12)
REV	0.023	—	0.037	0.434***	—	0.456***
	(0.55)	—	(0.84)	(3.41)	—	(3.73)
SIZE	−0.044	−0.042	−0.043	0.007	0.015	0.008
	(−0.63)	(−0.62)	(−0.62)	(0.04)	(0.10)	(0.05)
LBM	−0.242	−0.197	−0.195	−0.172	−0.121	−0.097
	(−1.23)	(−1.00)	(−0.99)	(−0.22)	(−0.16)	(−0.12)
MOMEN	0.005**	0.004*	0.004*	0.001	0.001	0.000
	(2.12)	(1.91)	(1.91)	(0.20)	(0.10)	(0.05)
VLTY	−0.266**	−0.276**	−0.275**	−0.043	−0.066	−0.058
	(−2.15)	(−2.24)	(−2.23)	(−0.09)	(−0.13)	(−0.12)
R^2 (%)	0.166	0.367	0.370	0.174	0.227	0.407

Panel D. Early/Late Portfolios Assuming Perfect Foresight

	Main Sample		All Verified Sample	
	N	RET($t-10$, $t+10$)	N	RET($t-10$, $t+10$)
Late	15.4	−1.825	29.8	−1.850
On time	558.2	−0.086	1,479.1	0.115
Early	20.5	0.182	43.6	0.391
Early–Late	5.6	1.950	15.1	2.373
	(3.19)	(1.85)	(5.30)	(4.02)

columns show that the predictive power of R_SCORE is largely orthogonal to controlling for DEV, despite these tests assuming that actual announcement dates are observable at the same time as scheduling disclosures.

Finally, Panel D of Table 7 contains average sample counts and returns in the month surrounding firms' scheduled announcement dates, corresponding to two distinct samples. The first two columns correspond to the main sample used throughout the article. The N column shows that there are only roughly 15 firms *per quarter* (2.6% of the total) that actually announce late relative to the scheduled announcement date and 21 firms (3.5% of the total) that report early. The vast majority of firms announce earnings on the scheduled announcement date (i.e., "On Time"), indicating that the early/late classification is applicable to significantly fewer firms within the article's main sample. Furthermore, the spread in average returns across early and late portfolios is 195 bps (t-statistic $=1.85$), smaller than the spread corresponding to advancers versus delayers.

The latter two columns in Panel D of Table 7 contain analogous results for a sample of 49,575 observations that expands the main sample by including cases where the calendar revision is less than 2 trading days. These tests show that the early-versus-late classification continues to yield fewer observations and roughly similar predictive power for returns compared with advances versus delays even when implementing a version of the early/late strategy that assumes perfect foresight of whether firms announce earnings on time.

Together, the panels of Table 7 shows that scheduling disclosures are informationally rich signals that researchers can use to supplement approaches from prior studies and, at the same time, offer several advantages over existing approaches in predicting firms' earnings news and returns.

H. Contextual Analysis

The preceding analysis establishes a robust link between R_SCORE and future returns. A natural extension of these tests is to examine whether the return results are predictably concentrated among subsets of firms in which calendar revisions are more likely to be relevant for prices. We examine this question in Table 8, which contains results from regressing RET($r+1$, $r+21$) on R_SCORE interacted with four conditioning variables.[9]

TABLE 8

Interaction Effects

Table 8 contains results from regressing RET($r+1$, $r+21$) on R_SCORE and additional controls. RET($r+1$, $r+21$) equals the cumulative market-adjusted return in the month (21 trading days) following the scheduling disclosure date r. R_SCORE is a measure of how a scheduling disclosure changes earnings announcement timing, defined in Section III.A. The variable **1**(SMALL_FIRM) is an indicator variable that equals 1 if the firm is in the lowest tercile of market capitalization, **1**(LOW_COVERAGE) is an indicator variable that equals 1 if the firm is in the lowest tercile of analyst coverage, and **1**(HIGH_DISTRESS) is an indicator variable that equals 1 if the firm is in the lowest tercile of the Zmijewski (1984) Z-score for financial distress, all measured within a given calendar quarter. The variable **1**(BUY_REC) is an indicator variable that equals 1 if the firm has an outstanding "BUY" recommendation in the Institutional Brokers' Estimate System (IBES) consensus database. LBM is the natural log of 1 plus the book-to-market ratio. MOMEN is the cumulative market-adjusted return, and VLTY is the standard deviation of returns over the prior 12 months ending on $r-11$. Year and industry fixed effects are included throughout. Industry fixed effects are based on 2-digit Standard Industrial Classification (SIC) codes. The reported t-statistics (in parentheses) are based on standard errors clustered by firm and quarter. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.

	1	2	3	4	5	6
R_SCORE	2.398***	1.308**	1.750***	2.283***	1.918***	0.580
	(4.93)	(2.75)	(2.96)	(4.92)	(4.44)	(1.17)
R_SCORE × **1**(SMALL_FIRM)	—	2.961***	—	—	—	2.292***
	—	(3.61)	—	—	—	(3.00)
1(SMALL_FIRM)	—	−1.282***	—	—	—	−1.054*
	—	(−2.93)	—	—	—	(−2.00)
R_SCORE × **1**(LOW_COVERAGE)	—	—	1.983**	—	—	1.468*
	—	—	(2.35)	—	—	(1.88)
1(LOW_COVERAGE)	—	—	−0.698	—	—	−0.489**
	—	—	(−1.47)	—	—	(−2.17)
R_SCORE × **1**(BUY_REC)	—	—	—	3.712*	—	2.426**
	—	—	—	(1.76)	—	(2.11)
1(BUY_REC)	—	—	—	−0.659	—	−0.109
	—	—	—	(−0.57)	—	(−0.16)
R_SCORE × **1**(HIGH_DISTRESS)	—	—	—	—	3.239***	2.818**
	—	—	—	—	(2.90)	(2.32)
1(HIGH_DISTRESS)	—	—	—	—	−1.824***	−1.646***
	—	—	—	—	(−3.96)	(−3.92)
LBM	−0.089	−0.037	−0.112	−0.107	−0.074	−0.064
	(−0.13)	(−0.05)	(−0.15)	(−0.15)	(−0.11)	(−0.13)
MOMEN	0.000	0.000	0.000	0.000	−0.000	−0.001
	(0.04)	(0.02)	(0.02)	(0.01)	(−0.01)	(−0.09)
VLTY	−0.090	−0.072	−0.094	−0.095	−0.057	−0.042
	(−0.21)	(−0.16)	(−0.22)	(−0.22)	(−0.13)	(−0.08)
R^2	0.235	0.318	0.271	0.261	0.302	0.407

[9] In untabulated results, we find that the predictive power of calendar revisions for firms' earnings news returns is relatively constant across their fiscal quarters, indicating that our results are not driven by fourth-quarter announcements alone.

The first two conditioning variables in Table 8 capture the extent of a firm's information environment and trading frictions. Specifically, **1**(SMALL_FIRM) is an indicator variable that equals 1 if the firm is in the lowest tercile of market capitalization, and **1**(LOW_COVERAGE) is defined analogously for analyst coverage, where terciles are measured each calendar quarter. We expect that the predictive power of R_SCORE for returns is concentrated among smaller firms where investors are less likely to learn about the earnings information embedded in scheduling disclosures through other sources such as media coverage.

Abarbanell and Lehavy (2003) and So (2013) provide evidence that analysts' investment recommendations signal a firm's incentives to meet or beat analysts' forecasts, where higher recommendations indicate a greater sensitivity of a firm's share price to earnings news. Thus, we define **1**(BUY_RECOMMENDATION) as an indicator variable that equals 1 if the firm has a consensus "BUY" recommendation in IBES and predict that it has a positive interaction effect with R_SCORE in predicting future returns because prices should react more strongly to subsequently announced earnings news for this subset of firms.

Finally, Gilson (1989) shows that managers' career concerns increase when a firm approaches distress, and Kothari, Shu, and Wysocki (2009) argue that managers of distressed firms have a heightened incentive to suppress bad news. We define **1**(HIGH_DISTRESS) as an indicator variable that equals 1 if a firm is in the lowest tercile of the Zmijewski (1984) Z-score financial distress measure. We predict it has a positive interaction effect with R_SCORE based on the idea that managers are more likely to use discretion over the timing of earnings news when it has a greater impact on their human capital and/or personal wealth.

Consistent with these predictions, the interaction terms in Table 8 show that return prediction increases among firms with greater sensitivities to earnings news, small firms with low analyst coverage, and firms whose management faces greater career concerns. These results show that the predictive power of revision scores for future returns is correlated with firm characteristics through contextual analysis.

I. Calendar-Time Strategies

The evidence that scheduling disclosures predict returns concentrated during firms' announcements suggests that there are trading strategies that can be used to exploit this pattern. Whereas the preceding tests study returns in event time, Table 9 studies returns to calendar-time strategies. Specifically, Panel A reports alphas and factor loadings from strategies based on simultaneous long and short positions in the week of firms' scheduled announcement dates.

The strategies we test in Table 9 are long firms with REV > 3 and short firms with REV < -3. The four sets of tests vary in terms of the required minimum long and short positions within a given week for the strategy to be implemented. For example, the first two columns correspond to the returns from a strategy that requires at least one long and one short position; otherwise, the strategy is not implemented. N indicates the number of weeks in which the strategy was implemented out of 409 possible weeks.

Table 9 shows that the 4-factor alpha from a weekly long–short strategy varies from 138 bps (t-statistic $= 5.44$), which corresponds to a minimum of 5

TABLE 9

Alphas and Factor Loadings for Weekly Revision Strategy

Table 9 contains the alphas and factor loadings of various weekly revision strategies. The strategies involve simultaneous weekly long and short positions in the week of firms' expected earnings announcements. In Panel A, the strategy is long firms with REV > 3 and short firms with REV < −3, where REV is defined as the number of trading days between the scheduled announcement date and the unconfirmed announcement date. The strategies vary in terms of the required minimum long and short positions, "Minimum Positions," for the strategy to be implemented within a given calendar week. For example, the first two columns correspond to the returns from a strategy that requires at least one long and one short position; otherwise, the strategy is not implemented. *N* indicates the number of weeks in which the strategy was implemented out of 409 possible weeks in the sample window. The time series of weekly returns is regressed on the following four contemporaneous factors: the market minus the risk-free rate (MKTRF), small minus big (SMB), high minus low (HML), and up-minus-down momentum (UMD). The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date. Panel B presents analogous results that rank all firms expected to announce earnings in a given week into terciles based on REV and that incorporate observations where REV is less than 2 in absolute value, which are omitted from the Panel A results. The strategy takes a long (short) position in firms within the highest (lowest) REV tercile. Time-series *t*-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Weekly Alphas for REV < −3 versus REV > 3 Strategy

	Required Number of Positions to Implement Strategy							
	>1		>5		>10		>15	
	(*N* = 339 weeks)		(*N* = 171 weeks)		(*N* = 119 weeks)		(*N* = 94 weeks)	
Intercept	1.079***	1.072***	1.375***	1.376***	1.115***	1.135***	0.589***	0.624***
	(2.56)	(2.55)	(5.45)	(5.44)	(4.83)	(4.91)	(2.76)	(2.95)
MKTRF	0.036	−0.045	0.035	0.041	−0.017	0.013	−0.065	−0.021
	(0.20)	(−0.24)	(0.30)	(0.33)	(−0.15)	(0.11)	(−0.65)	(−0.21)
SMB	−0.866	−0.800	−0.239	−0.246	0.013	−0.019	−0.166	−0.238
	(−2.30)	(−2.11)	(−1.01)	(−1.02)	(0.06)	(−0.08)	(−0.80)	(−1.14)
HML	−0.231	−0.539	−0.151	−0.128	−0.311	−0.207	−0.101	0.056
	(−0.67)	(−1.35)	(−0.78)	(−0.55)	(−1.68)	(−1.01)	(−0.59)	(0.30)
UMD	—	−0.313	—	0.021	—	0.121	—	0.188*
	—	(−1.53)	—	(0.18)	—	(1.14)	—	(1.84)

Panel B. Weekly Alphas for Cross-Sectional REV Strategy

	Required Number of Positions to Implement Strategy							
	>1		>5		>10		>15	
	(*N* = 397 weeks)		(*N* = 295 weeks)		(*N* = 198 weeks)		(*N* = 165 weeks)	
Intercept	0.625**	0.626**	0.744***	0.739***	0.814***	0.814***	0.809***	0.816***
	(2.03)	(2.03)	(3.32)	(3.28)	(5.07)	(5.05)	(5.20)	(5.24)
MKTRF	0.099	0.088	0.145	0.139	−0.109	−0.104	−0.034	−0.013
	(0.75)	(0.64)	(1.49)	(1.39)	(−1.49)	(−1.38)	(−0.45)	(−0.17)
SMB	−0.406	−0.398	−0.098	−0.092	0.257	0.253	0.146	0.120
	(−1.46)	(−1.42)	(−0.50)	(−0.47)	(1.72)	(1.67)	(0.98)	(0.79)
HML	−0.147	−0.195	−0.264	−0.290	0.085	0.104	−0.064	0.025
	(−0.58)	(−0.67)	(−1.45)	(−1.39)	(0.69)	(0.69)	(−0.54)	(0.18)
UMD	—	−0.051	—	−0.026	—	0.018	—	0.084
	—	(−0.34)	—	(−0.26)	—	(0.23)	—	(1.14)

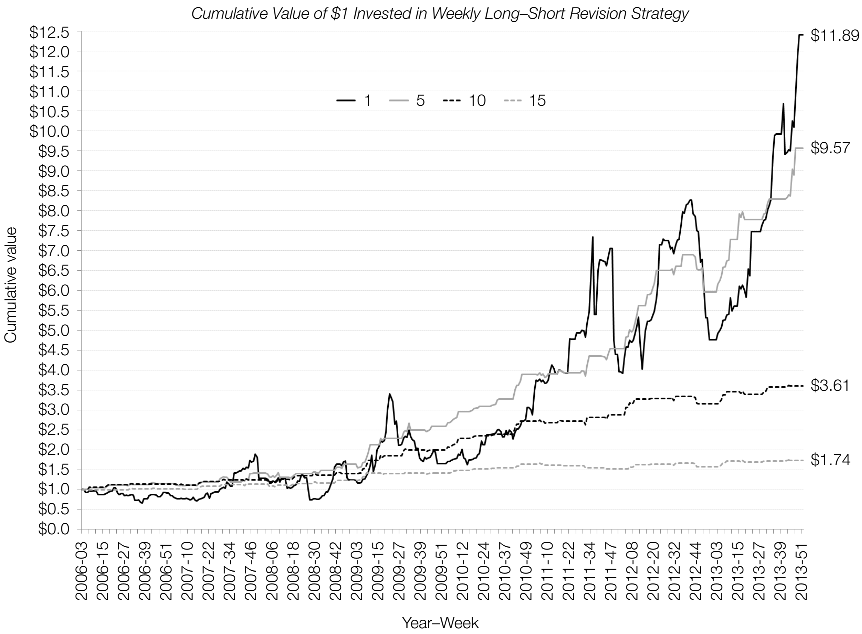
long and short positions, to 62 bps (t-statistic = 2.95), which corresponds to a minimum of 15 long and short positions. These results indicate that the returns to revision strategies are largely orthogonal to traditional asset-pricing factors, including the momentum factor, despite the results in Table 1 showing that revisions are correlated with momentum. This evidence is consistent with firms' earnings news, rather than their exposure to risk factors, being the primary determinant of returns around earnings announcements.

Related evidence in Figure 3 presents the cumulative value of $1 invested across the four long–short revision strategies shown in Panel A of Table 9 starting from the beginning of 2006 through 2013. In weeks where there the number of sample observations does not meet the stated minimum requirement, the strategy

FIGURE 3

Cumulative Returns to Weekly Revision Strategy

Figure 3 contains the cumulative value of $1 invested at the beginning of the sample for four long–short revision strategies. The strategies involve simultaneous weekly long and short positions in firms with scheduled announcements. The strategy is long firms with REV > 3 and short firms with REV < −3, where REV is defined as the number of trading days between the scheduled announcement date and the unconfirmed announcement date. The strategies vary in terms of the required minimum long and short positions for the strategy to be implemented within a given calendar week. For example, the dotted line corresponds to the returns from a strategy that requires at least five long and five short positions; otherwise, the strategy is not implemented and is assumed to earn 0 returns. The sample consists of 18,959 firm-quarters spanning 2006–2013 for which the scheduling disclosure date is at least 2 weeks prior to the scheduled announcement date.



is not implemented and is assumed to earn 0 returns. As a result, the mean and variance of the returns predictably vary with the required portfolio size. For the requirement of at least five long and short positions, the cumulative value of $1 invested in 2006 reaches $9.57 by the end of the sample period. By contrast, the equivalent value when using at least 10 long and short positions is $3.61, which is consistent with the evidence in Table 9 that the number of weeks that a given strategy is implemented declines when increasing the minimum position requirement.

Panel B of Table 9 presents analogous strategy returns when expanding the underlying sample to include observations where REV is less than 2 in absolute value, which are omitted from the Panel A tests. In the Panel B tests, all firms expected to announce earnings in a given week are cross-sectionally ranked into tercile portfolios based on REV.

When expanding the sample, the strategy continues to yield statistically significant but slightly smaller 4-factor alphas ranging from 63 to 81 bps per week (t-statistics = 2.03 and 5.05, respectively). However, Panel B of Table 9 also shows that using terciles of REV and incorporating firms with small or no calendar revisions significantly increases the number of weeks when the strategy can be applied. Together, the findings in Table 9 and Figure 3 highlight significant returns to calendar-time strategies that exploit the information content of scheduling disclosures.

IV. Additional Analyses: Understanding the Source of Predictability

A. Option Market Tests

There are at least two potential explanations for the evidence in Section III that equity prices fail to react to scheduling disclosures and instead subsequently drift in the direction of firms' earnings news. The first is that investors observe the scheduling disclosures but are not aware that they contain information about the nature of firms' earnings news. The second is that investors are unable to observe scheduling disclosures because of the costs of data procurement and processing, such as software development costs, and/or cognitive constraints, such as limited attention (as suggested by Cohen and Lou (2012), DellaVigna and Pollet (2009), and Hirshleifer et al. (2009)).

To distinguish between these explanations, we utilize a unique feature of our research setting that scheduling disclosures convey two simultaneous signals. The first is a "content signal" that foreshadows the nature of firms' earnings news. The second is a "volatility-timing signal" that conveys the timing of firms' earnings news. Because advancing and delaying can shift the timing of announcements relative to option expiration dates, both content and volatility-timing signals are relevant for option prices but through separable channels. This separability feature allows us to test the market's response to each signal while nullifying the other (i.e., holding the other signal constant).

Our earnings calendar setting provides a more powerful platform for studying investor irrationality than most other event settings, such as earnings announcements and analysts' forecast revisions, for at least three reasons. First, earnings announcements convey several different aspects of firms' performance, including, but not limited to, its past earnings, expectations of future earnings, and operational and strategic risks, making it more difficult to interpret market reactions. Second, the information researchers use to study market reactions can differ from the information available to investors at the time of the event, which can create misleading depictions of market inefficiency (Rosenberg and Houglet (1974), Kothari et al. (1995), and Ljungqvist et al. (2009)). Third, the content, clarity, and novelty of information conveyed at earnings announcements and analyst forecast revisions can vary across firms, whereas the scheduling disclosures we study are more likely to represent a unidimensional news event with clear and measurable content.

To the extent that our evidence of return predictability is driven by investors observing scheduling disclosures, understanding that they affect whether options expire before the earnings announcement but failing to internalize the directional earnings news they contain, we would expect to see abnormal price movements in option markets around scheduling disclosure dates. However, if the return predictability is driven by investors not observing the scheduling disclosures or by them not knowing the unconfirmed announcement date expected prior to the scheduling disclosure date, we would expect no contemporaneous option market reaction. To explore these potential explanations, we separately study the content and volatility-timing signals embedded in scheduling decisions along with option market prices from OptionMetrics.

Our option market tests are based on a sample of 10,313 scheduling disclosures for which we have option-pricing data. For each observation, we compute the returns of an at-the-money call option and an at-the-money put option around the scheduling disclosure date (i.e., $r-1, r+1$) and in the days between the scheduling and the option expiration date, which we denote as $r+T$. We focus on the expiration date closest to the scheduled announcement date t to facilitate identifying instances in which the scheduling disclosure postpones the announcement past, or advances it prior to, the option expiration date.

One challenge in studying option returns, unlike stock returns, is that there is no "market" to use as an abnormal performance benchmark. Additionally, the expected return of an option varies as a function of its moneyness, time to maturity, implied volatility, and proximity to earnings announcements. For these reasons, we use a characteristic-based approach for measuring abnormal performance. Specifically, for each outcome variable y and scheduling disclosure i, we subtract average values from scheduling disclosures j in a matched sample:

$$y_i^{\text{abnormal}} = y_i - \frac{1}{N} \sum_{j \in \text{match}_i} y_j, \tag{2}$$

where N is the number of matched observations. By using other at-the-money options from our sample as the benchmark, we eliminate variation driven by moneyness and any pattern in option returns affecting all firms surrounding their earnings schedulings and announcements. Appendix C details our approach to constructing matched samples.

Our option market tests are divided across two tables. Our first tests, presented in Table 10, isolate the option market reaction to the content signal embedded in scheduling by sorting observations according to R_SCORE. A key feature of these tests is that we examine the returns of directional option strategies relative to a matched sample with the same announcement timing relative to the option expiration date. This matching procedure nullifies the volatility-timing signal by ensuring that all options are similarly affected by whether the scheduled announcement date occurs before or after the options expire.

Our second set of tests, presented in Table 11, measures the option market reaction to volatility-timing signals by focusing on observations in which the scheduling disclosure changes the earnings announcement timing relative to option expiration. We effectively nullify the content signal embedded in scheduling decisions by measuring abnormal option market outcomes relative to a matched sample with the same value of REV.

Table 10 presents average abnormal returns to directional option strategies surrounding scheduling disclosure dates as a function of R_SCORE. Panel A shows that, like equity markets, option markets do not react in a timely manner

TABLE 10
Content Information and Option-Based Directional Strategies

Table 10 presents directional strategy returns surrounding scheduling disclosure dates r, across values of R_SCORE, as defined in Table 1. CALL and PUT are the returns of an at-the-money call option and an at-the-money put option, in percent. Each outcome variable presented is the abnormal value relative to the average in a matched sample detailed in Appendix C. Panel A presents outcome variables in the 3-day window around the scheduling disclosure date ($r-1$, $r+1$), and Panel B presents outcome variables between the scheduling disclosure date and the option expiration date ($r+1$, $r+T$). The sample includes 10,313 scheduling disclosures for firms with options data from 2005 to 2013. t-statistics are reported in parentheses.

R_SCORE	CALL	PUT	CALL − PUT
Panel A. Market Reaction ($r-1, r+1$)			
0 (Delay)	0.379	1.278	−0.898
0.25	−3.300	1.985	−5.285
0.5	−0.286	−0.185	−0.101
0.75	1.238	−1.601	2.839
1 (Advance)	−3.733	−1.777	−1.957
Advance − Delay	−4.113	−3.055	−1.058
	(−0.864)	(−0.529)	(−0.112)
Panel B. Subsequent Returns ($r+1, r+T$)			
0 (Delay)	−6.837	15.891	−22.729
0.25	−2.521	4.956	−7.477
0.5	−7.240	4.667	−11.907
0.75	11.751	−13.166	24.917
1 (Advance)	10.233	−7.102	17.336
Advance − Delay	17.071	−22.994	40.064
	(1.458)	(−2.030)	(2.067)

TABLE 11
Volatility-Timing Information and Option-Based Volatility Strategies

Table 11 presents volatility strategy returns surrounding scheduling disclosure dates, r, as a function of whether the implied calendar revision affects the timing of earnings news relative to option expiration dates. We estimate mean outcome variables for revisions that advance the announcement into the life of the option $t < r+T < t_{uncon}$ ("Advanced into"), revisions that postpone the announcement out of the life of the option $t_{uncon} < r+T < t$ ("Postponed out of"), and the difference between the two ("Difference"). ΔIV is the change in the implied volatility of at-the-money options. STRAD, DH_STRAD, DH_CALL, and DH_PUT are the returns of a straddle, a delta-hedged straddle, a delta-hedged call, and a delta-hedged put, respectively, all at-the-money and in percent. UVAR is the unexpected variance, defined as the difference between realized return variance in ($r+1$, $r+T$) and the expected variance implied by at-the-money option prices, both in annualized percent. Each outcome variable presented is the abnormal value relative to the average in a matched sample detailed in Appendix C. Panel A presents outcome variables in the 3-day window around the scheduling disclosure date ($r-1$, $r+1$), and Panel B presents outcome variables between the scheduling disclosure date and the option expiration date ($r+1$, $r+T$). The sample includes 10,313 scheduling disclosures for firms with options data from 2005 to 2013. t-statistics are reported in parentheses.

Panel A. Market Reaction ($r-1, r+1$)

	ΔIV	STRAD	DH_STRAD	DH_CALL	DH_PUT
Advanced into	0.786	1.586	2.126	5.538	5.538
	(1.919)	(1.415)	(2.096)	(1.960)	(2.828)
Postponed out of	−0.483	−2.764	−4.303	−5.261	−9.088
	(−1.694)	(−4.135)	(−5.460)	(−3.252)	(−4.498)
Difference	1.269	4.350	6.429	10.800	14.626
	(3.357)	(3.216)	(4.781)	(3.009)	(5.575)

Panel B. Subsequent Returns ($r+t, r+T$)

	UVAR	STRAD	DH_STRAD	DH_CALL	DH_PUT
Advanced into	−0.524	1.855	−2.980	−2.736	2.326
	(−0.166)	(0.502)	(−0.768)	(−0.334)	(0.500)
Postponed out of	3.067	−3.289	−1.256	−4.289	−1.477
	(0.744)	(−1.082)	(−0.443)	(−0.702)	(−0.302)
Difference	−3.591	5.144	−1.723	1.553	3.803
	(−0.809)	(1.173)	(−0.389)	(0.165)	(0.631)

to the content signal embedded in earnings scheduling disclosures. Specifically, we find that both call- and put-option returns are slightly negatively related to R_SCORE, with neither pattern being statistically significant.

Also echoing our equity market results, Table 10 shows a predictable drift in option prices after the scheduling disclosure date. Specifically, we find positive subsequent call-option returns and negative subsequent put-option returns for high-R_SCORE firm-quarters. The opposite pattern holds for low-R_SCORE firm-quarters. The significance is more marginal than in our main tests because requiring option data reduces the sample size by approximately half and because option returns are much more volatile. However, the difference in option returns across extreme values of R_SCORE remains economically large, at approximately 20% per month, reflecting the additional leverage embedded in options.

Table 11 shows option market reactions and subsequent returns for observations in which firms' scheduling changes the timing of their announcements relative to expiration dates while controlling for the content signal using our matching methodology. We consider two subsamples, the "Advanced into" subsample for which

$$t \quad < \quad r+T \quad < \quad t_{\text{uncon}}, \tag{3}$$

meaning we expect additional volatility prior to option expiration now that the announcement is moved forward, and the "Postponed out of" subsample for which

$$t_{\text{uncon}} \quad < \quad r+T \quad < \quad t, \tag{4}$$

meaning we expect less volatility prior to option expiration. Because each outcome variable is measured relative to a control sample with similar REV, the results in Panel B are attributable to variations in the timing of the option expiration date relative to scheduled announcement dates.

To assess the option market reaction to volatility-timing information, we examine the behavior of option-based volatility measures and volatility strategy returns. Our primary outcome variables are the returns of straddles, denoted STRAD; delta-hedged straddles, denoted DH_STRAD; delta-hedged call options, denoted DH_CALL; and delta-hedged put options, denoted DH_PUT.[10] Following Bakshi and Kapadia (2003), we compute delta-hedged returns using the option delta provided by OptionMetrics (Δ) according to:

$$\text{DH}r_{\text{option},t} \quad = \quad r_{\text{option},t} - \frac{p_{\text{stock},t-1}}{p_{\text{option},t-1}} \Delta_{\text{option},t-1} r_{\text{stock},t}, \tag{5}$$

where $r_{\text{asset},t}$ represents the asset's return on day t, and $p_{\text{asset},t}$ represents its price on day t.

We also examine option market reactions to revisions using changes in at-the-money implied volatility (ΔIV) and subsequent returns using unexpected return variance (UVAR), defined as the difference between option-implied return

[10] Although exactly at-the-money straddles have 0 delta, the range of strike prices often does not include the precise current stock price, meaning straddles often have nonzero delta (see Coval and Shumway (2001)).

variance as of day r and realized daily return variance from $r+1$ through $r+T$, both annualized.

Panel A of Table 11 shows that there is an immediate reaction in option markets to scheduling disclosures that affect the announcement's timing relative to the option expiration date, which notably differs from the results in Table 10. Implied volatility increases and all four volatility strategies earn positive abnormal returns around the scheduling disclosure date when the scheduling advances the announcement into the option's duration, and the opposite pattern occurs when the scheduling postpones the announcement out of the option's duration. Moreover, in addition to being immediate, the option market reaction appears to be efficient; we find no subsequent predictability in unexpected variance or volatility strategy returns in the post-scheduling period.

B. Discussion

The evidence in Section IV.A highlights a stark contrast between the option market reaction to the volatility-timing and content signals in scheduling disclosures. One potential alternative explanation for these findings is that investors are fully aware of the content signal but unable to trade on it because transaction costs are too high in option markets. However, the volatility strategies require forming portfolios with multiple assets, including at least one option position, making them more expensive to implement than the directional strategies. This means that transactions costs alone would likely make option markets *more*, not less, efficient with respect to the content signal compared with the volatility-timing signal.

Another potential alternative is that trading on the content signal requires additional data or poses greater computational complexity relative to the volatility-timing signal. However, both signals require the same underlying data (i.e., scheduled and unconfirmed announcement dates), meaning investors could not observe the volatility-timing signal without also observing the information necessary to infer the content signal.

Combined, the evidence in Tables 10 and 11 indicate that option markets react strongly and efficiently to the volatility-timing signal in earnings schedule disclosures while not significantly reacting to the content signal embedded within the same scheduling disclosures. Based on this evidence, we conclude that our results are not due to investor inattention or data-acquisition costs. Instead, they appear to be likely driven by investors observing scheduling disclosures but failing to internalize their predictive value for firms' earnings news.

More broadly, a likely explanation for the evidence of predictable returns is that investors fail to unravel information in scheduling disclosures because the link to firms' cash flows is subtle. As the example in Appendix A shows, it is not immediately obvious that these seemingly "boilerplate" disclosures signal the nature of firms' earnings news, only *when* the news is to be announced. Thus, identifying the content information embedded in these disclosures requires viewing them through a skeptical lens that considers the fact that managers may strategically time news.

V. Conclusion

In recent decades, a trend has emerged in which firms issue scheduling disclosures, often weeks in advance, indicating when they intend to announce earnings. These disclosures provide an advanced signal of firms' announcement timing and thus may be linked to firms' earnings news for many of the same exogenous and endogenous reasons documented in prior research studying realized announcement timing. Using a novel data set of firms' scheduling disclosures, we provide evidence that they foreshadow firms' earnings news, that investors appear to observe these disclosures weeks ahead of the announcements, but that equity markets fail to react until the announcements.

Taken together, our findings validate a simple approach for extracting information embedded in the dynamics of earnings calendars and, thus, are consistent with the idea that researchers can contribute to making market prices more efficient by identifying new, cost-effective approaches for summarizing value-relevant signals (McLean and Pontiff (2016)).

Appendix A. Example of Earnings Scheduling Disclosure

Appendix A uses a disclosure by Oracle Corporation (ORCL) in Mar. 2010 as an example of an earnings scheduling disclosure. On Mar. 3, 2010, Oracle issued a press release with the following information:

In the prior year, Oracle announced its 2009 third-quarter earnings on Mar. 18, 2009 (the third Wednesday of the month), and prior to the Mar. 3 press release, the Wall Street Horizon earnings calendar forecasted Oracle's 2010 third-quarter expected earnings announcement date as Mar. 17, 2010 (also the third Wednesday of the month).

In response to Oracle's press release, Wall Street Horizon revised the expected announcement date to Mar. 25, 2010. The calendar data appear as follows:

Date	Ticker	FYear	FQtr	EXDT	etype
3/1/2010	ORCL	2010	3	3/17/2010	T
3/2/2010	ORCL	2010	3	3/17/2010	T
3/3/2010	ORCL	2010	3	3/17/2010	T
3/4/2010	ORCL	2010	3	3/25/2010	V
3/5/2010	ORCL	2010	3	3/25/2010	V
3/8/2010	ORCL	2010	3	3/25/2010	V

Note that the press release is issued on Mar. 3, 2010, but is recorded 1 day later in the Mar. 4, 2010, earnings calendar data, which Wall Street Horizon disseminated by 4AM EST on Mar. 4. Accompanying this date change, the "etype" column of the calendar data changes from "T," indicating it was unconfirmed, to "V," indicating it was based on information directly conveyed by the firm regarding when the firm intended to announce earnings.

In this example, the scheduled announcement date t is Mar. 25, 2010, and the unconfirmed announcement date t_{uncon} is Mar. 17, 2010. As a result, our measure of the calendar revision, REV, equals −6 because there were 6 trading days between the scheduled and unconfirmed announcement dates. Because the value of REV is greater than 5 trading days, Oracle's scheduling disclosure is assigned an R_SCORE of 0, and Oracle would be treated as a "delayer."

Appendix B. Details on Sample, Dates, and Variables

Appendix B contains information on the construction of samples, as well as the notation and naming conventions for the key dates and variables used throughout the article.

Table B1 details how we are arrive at our final sample. We start with firms' quarterly earnings announcements at the intersection of CRSP, Compustat, and Wall Street Horizon (WSH), with a stock price above $1. This initial sample consists of 139,452 firm-quarters spanning 6,874 unique firms. We then limit the sample to cases where the firm schedules its earnings announcement date within the 21 trading days ahead of its scheduled announcement date. We then limit the sample to cases where the scheduled announcement date deviates from the unconfirmed announcement date by at least 2 days. The final sample for our main analyses consists of 18,959 firm-quarters corresponding to 4,009 unique firms. Similarly, the sample with traded call and put options consists of 10,313 firm-quarters corresponding to 3,147 unique firms.

TABLE B1
Sample Construction

Sample Requirements	No. of Obs.	Firms
Intersection of CRSP, Compustat, WSH, Price $\geq$ $1	139,452	6,874
+ Scheduling disclosure date in $t-31$ to $t-11$	49,490	4,930
+ Calendar revision | REV | $\geq$ 2 trading days	18,959	4,099
Main sample	18,959	4,099
+ Traded call and put options	10,313	3,147
Option-based sample	10,313	3,147

Appendix Table B2 details the notation and naming conventions for key dates and variables used throughout the article.

TABLE B2
Notation and Naming Conventions

Notation	Naming Convention	Description
t_{act}	Actual announcement date	Date on which earnings are actually announced
r	Scheduling disclosure date	Date on which the public scheduling occurs
t	Scheduled announcement date	Date on which earnings are scheduled on r
t_{uncon}	Unconfirmed announcement date	Date on which earnings were expected prior to r
t_{rw}	Random-walk expected announcement date	Same-quarter announcement date from prior year
$r+T$	Option expiration date	Expiration date closest to t
REV	Calendar revision	$t_{\text{uncon}}-t$
R_SCORE	Revision score	REV discretized into five values between 0 and 1
DEV	Deviation from scheduled announcement date	$t-t_{\text{act}}$

Appendix C. Matching Procedure for Options Analysis

In Table 10 our goal is to study how option returns vary as a function of R_SCORE while holding other relevant factors fixed. In Appendix C, therefore, we compute a control sample of other revisions with the same scheduled announcement timing relative to the option expiration date, the same time to expiration, and similar implied volatility. Specifically, for each observation i we compute a matched sample of $N=10$ other observations j with the following properties:

(A1) The same scheduled announcement timing relative to the option's expiration date both before and after the scheduling disclosure, meaning:

$$\text{(A-1)} \qquad \begin{cases} t_j \leq r_j + T_j & \text{if } t_i \leq r_i + T_i \\ t_j > r_j + T_j & \text{if } t_i > r_i + T_i \\ t_{\text{uncon},j} \leq r_j + T_j & \text{if } t_{\text{uncon},i} \leq r_i + T_i \\ t_{\text{uncon},j} > r_j + T_j & \text{if } t_{\text{uncon},i} > r_i + T_i \end{cases}$$

(A2) Among those satisfying (A1), choose the N with the closest T_j to T_i.

(A3) If more than N satisfying (A1) have $T_j = T_i$, choose the N with the closest IV_j to IV_i among those with $T_j = T_i$.

In Table 11, our goal is to study option returns in cases where the revision postpones the earnings announcement out of an option's life (the "Postponed out of" sample) or the calendar revision advances the announcement into an option's life (the "Advanced into" sample) while holding other relevant factors fixed. We therefore compute a control sample for these observations with the same revision $\text{REV} = t_{\text{uncon}} - t$, the same time to expiration, and similar implied volatility but without the same change in timing relative to the option expiration date. Specifically, for each observation i in the "Advanced into" sample, we compute a matched sample of $N = 10$ other observations with the following properties:

(B1) The announcement timing was prior to the option's expiration date both before and after the revision, meaning $t_j \leq r_j + T_j$ and $t_{\text{uncon},j} \leq r_j + T_j$.

(B2) Among those satisfying (B1), choose the N with the closest REV_j to REV_i.

(B3) If more than N satisfying (B1) have $\text{REV}_j = \text{REV}_i$, choose the N with the closest T_j to T_i among those with $\text{REV}_j = \text{REV}_i$.

(B4) If more than N satisfying (B2) have $T_j = T_i$, choose the N with the closest IV_j to IV_i among those with $T_j = T_i$ and $\text{REV}_j = \text{REV}_i$.

We compute the matched sample for each observation in the "Postponed out of" sample using a similar procedure on the sample of revisions for which the announcement was always after the option expiration, meaning $t_j > r_j + T_j$ and $t_{\text{uncon},j} > r_j + T_j$.

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