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Event Day 0? After-Hours Earnings Announcements

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ABSTRACT

In recent years, the proportion of after-hours earnings announcements has increased to more than 40%. For after-hours announcements, earnings-related volume and price changes are not observed on the Compustat or I/B/E/S earnings announcement date, but one trading day later. This study demonstrates the importance of accounting for after-hours announcements for event studies around earnings announcements.

1. Introduction

More than 40% of the earnings announcements of Russell 3000 firms in the period 2000 to 2004 were made after the close of trading. Earnings-related volume and price changes for after-hours announcements are not observed on the Compustat or I/B/E/S earnings announcement date, but one trading day later. This study demonstrates the importance of accounting for after-hours earnings announcements in identifying the correct event day 0.

We obtain earnings announcement dates and times from the *Wall Street Journal Online* (WSJ.com) for a large sample of earnings announcements of stocks in the Russell 3000 Index for the period 2000 to 2004. We show

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that daily price changes, volume, and volatility around earnings announcements are significantly biased if event dates are not adjusted for after-hours earnings announcements. We also show that earnings response coefficients and measures of postannouncement abnormal return are significantly biased if the event window specification does not account for after-hours announcements.

In many research settings it is impractical or impossible to obtain a sufficiently large sample of earnings announcements with the exact announcement time. We provide two clear prescriptions with respect to event window specification where event dates cannot be adjusted for after-hours earnings announcements. First, earnings announcement windows should include Compustat (or I/B/E/S) event day +1 to ensure that price changes and volume in reaction to after-hours announcements are included. Second, measures of post–earnings announcement abnormal return should *not* include the return on Compustat day +1, because after-hours announcements then create a spurious positive relation between post–earnings announcement abnormal return and earnings surprise.[1]

We show that the relevance of our recommendations and findings goes beyond our main sample. First, for all earnings announcements during the period 2000 to 2004, for stocks that are *not* in the Russell 3000 Index, we analyze price changes and abnormal volume around earnings announcements. Consistent with the Russell 3000 sample, we find that the largest price changes and abnormal volume in reaction to earnings announcements are observed on Compustat day +1 (one trading day *after* the earnings announcement date). We also present evidence for the period 2005 to 2007, and again find that the largest price changes and abnormal volume in reaction to earnings announcements are observed on Compustat day +1. We attribute the seemingly slow market reaction to earnings news in the period 2000 to 2007 to the prevalence of after-hours earnings announcements.

Second, for a random sample of 300 stocks, we use Factiva and find that in the period 1995 to 1999, the five years preceding our sample period, more than 30% of earnings announcements take place after the close of trading.

Finally, we replicate a study where the post–earnings announcement abnormal return includes the return on Compustat day +1. We show that results are significantly different when accounting for after-hours announcements in the choice of event window.

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[1] We search all articles published in the *Journal of Accounting Research*, the *Journal of Accounting and Economics*, and the *Accounting Review* for the period 2000 to 2006, using the key words "earnings," "announcement," and "window." We identify 41 studies that use returns or volume measured over a short window around the Compustat or I/B/E/S earnings announcement date. Out of these 41 studies, 15 (37%) report results based on earnings announcement returns or volume measures that do not include Compustat or I/B/E/S day +1 in the event window. We also identify 13 studies that use a measure of postannouncement abnormal return and find that five of these studies (38%) use a postannouncement return measure that includes the return on Compustat or I/B/E/S day +1.

Patell and Wolfson [1982] are the first to study the timing of earnings announcements. For a sample of 561 earnings announcements in the late 1970s, these authors find that 15% of the announcements occur after the close of trading, and that these announcements are more likely to contain negative earnings surprises. Bagnoli, Clement, and Watts [2004] update Patell and Wolfson's [1982] study and find only weak evidence that managers announce worse earnings news after trading. For our sample of Russell 3000 firms, we find no evidence that after-hours announcements are more likely to contain negative news. We also show that, after controlling for firm heterogeneity, volume and price reactions to earnings announcements do not depend on announcement time. Cohen et al. [2007] study the earnings announcement premium, and analyze the impact of using actual announcement dates instead of expected announcement dates.

In the next section, we discuss sample selection, data sources, and methodology. In section 3, we present our main results. Section 4 investigates whether our findings and recommendations are relevant beyond our sample. Section 5 presents a summary and conclusion.

2. *Sample Selection, Data Sources, and Methodology*

2.1 SAMPLE SELECTION AND DATA SOURCES

The earnings calendar on WSJ.com reports the dates and times of quarterly earnings announcements for major firms listed on U.S. stock exchanges.[2] If earnings are announced before the opening of trading, the time entry is the actual time or "BMO"; for after-hours announcements, the time entry is the actual time or "AMC"; and for announcements during the trading day, the hour and minute of the announcement are reported. We collect announcement data from WSJ.com for all firms in the 2004 Russell 3000 Index. We choose the Russell 3000 Index to keep data collection manageable and still have a sample that represents more than 98% of the U.S. stock market in terms of market capitalization.

The earnings calendar on WSJ.com begins in the first quarter of 1999, but includes earnings announcement information for only 22 stocks in the Russell 3000 Index. We start our sample period in the first quarter of 2000, when WSJ.com report earnings announcement dates and times for 2,115 Russell 3000 stocks. Our sample period ends at the fourth quarter of 2004, after which earnings announcement dates are not available in Compustat at the time of our data collection. For the fourth quarter of 2004, WSJ.com reports earnings information for 2,884 firms in the Russell 3000 Index.

We begin with a sample of 50,110 earnings announcements from WSJ.com. We delete 9,390 earnings announcements because WSJ.com has

[2] WSJ.com is powered by Thomson Corporation. The information on WSJ.com is also available on Earnings.com. Alternative sources of earnings announcement dates and times include Briefing.com and Factiva.

no time entry for these announcements, leaving 40,720 observations.[3,4] Next, we exclude multiple observations for the same quarterly earnings announcement, retaining the first observation. This leaves 39,064 earnings announcements.

The purpose of this study is to analyze the impact of event day misspecification due to after-hours announcements when Compustat earnings announcement dates are used.[5] We therefore match our sample of WSJ.com announcements to Compustat earnings announcements, requiring that the WSJ announcement date be the same as the announcement date in Compustat. This requirement reduces our sample to 38,031 observations.[6]

We find that 17,855 of the announcements in our sample (46.9%) take place after the close of trading (45.3% for I/B/E/S).[7] Interestingly, the percentage of after-hours announcements in our sample increases from 42% in 2000 to 49% in 2004. This increase over this short sample period is consistent with a longer term trend. Patell and Wolfson [1982] document the timing of corporate disclosures for a sample of 96 Chicago Board Options Exchange firms in 1976, 1977, and 1979. They find that 15% of their sample of 561 earnings announcements occurs after the close of trading. Hughes and Ricks [1987] use a sample of 677 earnings announcements for the period 1979 to 1981, and report that 11% of these earnings announcements occur after hours. Their sample is restricted to stocks for which analyst forecasts are available in the mid-January issue of *Earnings Forecaster* in the week before the earnings announcement. For a sample of 100 New York Stock Exchange (NYSE)-listed stocks from 20 different industries for the period 1980 to 1985, Brown, Clinch, and Foster [1992] find that 11% of the earnings releases are made after trading hours. Finally, in section 4, we report evidence from Factiva on the proportion of after-hours announcements in the period 1995 to 2004 for a random sample of 300 stocks. These results also indicate a steady increase in the proportion of after-hours announcements from 17% in 1995 to 48% in 2004.

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[3] In appendix A, we show that the sample characteristics of firms for which WSJ.com reports the time for all earnings announcements are not significantly different from the sample characteristics of firms for which WSJ.com does not report the announcement time for one or more earnings announcements.

[4] From Factiva, we collect information for 250 earnings announcements that match earnings announcements on WSJ.com with missing time entry. For these observations, we find that 28% are after hours, 49% are before the opening, and 22% are during trading hours. In appendix A, we provide evidence that corroborates this estimate.

[5] We usually refer to Compustat as the source of earnings announcement dates. For 92% of our sample, the announcement date according to I/B/E/S and Compustat is the same. We repeat all our tests using I/B/E/S earnings announcement dates and reach the same conclusions.

[6] Appendix B presents a frequency table documenting the length of the difference in earnings announcement dates between Compustat and WSJ.com for the 1,033 announcements where the announcement dates differ.

[7] When we include the 9,390 earnings announcements without an announcement time, and use the estimated percentage of AMC announcements for these announcements (28%, see footnote 4), the percentage of AMC announcements for our sample drops to 42%.

The exact timing of earnings announcements is critical in our study. We therefore compare earnings announcement times in WSJ.com with two alternative data sources. First, we obtain earnings announcement dates and times from Briefing.com for all firms in the Russell 1000 Index (Briefing.com reports information similar to that of WSJ.com.) We find a total of 10,043 matching earnings announcements between the two data sets. Of these observations, only 110 observations (1.1%) have different announcement times. We also match our sample with a sample of earnings announcements we obtain from Factiva.[8] There are 1,622 matching observations from 179 different firms. Of these matching observations, 1.9% have different announcement times. We conclude that the information in the earnings calendar of the *Wall Street Journal Online* is reliable.

Daily stock returns are obtained from the Center for Research in Securities Prices (CRSP). Earnings announcement dates are from Compustat and I/B/E/S. Accounting data are from the Compustat annual industrial files of income statements and balance sheets, and earnings surprises are calculated using data from I/B/E/S that are not split-adjusted (see Payne and Thomas [2003]).

2.2 METHODOLOGY

To study how misalignment of event day 0 due to after-hours announcements affects event studies, we create two sets of observations. For the first set, referred to as the WSJ sample, the event date is adjusted for after-hours announcements. Thus, for the "WSJ sample," event day 0 is the announcement date if the announcement takes place before the close of trading, and one trading day later if the announcement takes place after the close. For the second set, referred to as the Compustat sample, the event date is not adjusted for after-hours announcements, and event day 0 is the earnings announcement date. Note that even though we refer to the "Compustat sample" and the "WSJ sample," both sets of observations relate to the same 38,031 earnings announcements, and differ only in terms of the classification rule used to determine event day 0.

We focus on three common types of event studies around earnings announcements and analyze: (1) patterns in returns, volume, and volatility around earnings announcements; (2) earnings response coefficients; and (3) post–earnings announcement drift.

2.2.1. Returns, Volume, and Volatility. For both the WSJ and the Compustat samples, we compare average daily size-adjusted returns for days around event day 0, on portfolios of stocks based on the earnings surprise. Earnings surprise is defined as actual earnings per share, minus the most recent analyst forecast before the earnings announcement, scaled by the stock price 10 days before the announcement. For each quarter we form new earnings surprise quintile portfolios.

[8] This sample is used in section 4 to estimate the proportion of after-hours announcements in the period 1995 to 2004. Sample selection criteria are discussed in section 4.

The size-adjusted daily return on a stock is the actual stock return minus the equally weighted average return for all firms in the same CRSP size decile on the same CRSP exchange index (i.e., NYSE/American Stock Exchange (AMEX) or NASDAQ). The size-adjusted return for a portfolio is obtained by equally weighting the size-adjusted returns for all stocks in that portfolio. We measure daily return volatility as the absolute value of the daily size-adjusted return for a stock. Finally, daily abnormal volume is defined as the difference between a stock's actual turnover on trading day t and that stock's average daily turnover during the preannouncement period from day -40 through day -11, scaled by that stock's average daily turnover during the preannouncement period.

Many firms announce their earnings on the same calendar date. As a result, standard t-tests applied to mean size-adjusted returns could be biased upward due to crosscorrelation of returns (see Bernard [1987]). We therefore present t-statistics, which are not affected by this bias. Specifically, we calculate the mean return of any given portfolio averaged over the 20 quarters in our sample period. The t-statistic is defined as the mean of these 20 returns divided by the time-series standard error (see Fama and MacBeth [1973]). A similar method is applied to calculate average volatility, average volume, and relevant t-statistics.

2.2.2. Earnings Response Coefficients and Post–Earnings Announcement Drift. Several studies in accounting and finance report variations of the following base-case regressions (e.g., Davis [2002], Garfinkel and Sokobin [2006], and Mendenhall [2004]):

$$CAR(-2,0)_{i,q} = a1 + b1 * Surprise_{i,q} + \varepsilon_{i,q} \tag{1}$$

$$Drift(1,60)_{i,q} = a2 + b2 * Surprise_{i,q} + \varepsilon_{i,q} \tag{2}$$

$$Drift(1,60)_{i,q} = a3 + b3 * CAR(-2,0)_{i,q} + \varepsilon_{i,q}. \tag{3}$$

$CAR(-2,0)_{i,q}$ is the cumulative size-adjusted return over a three-day window from day -2 through day 0 for firm i, quarter q; $Drift(1,60)_{i,q}$ is the cumulative size-adjusted return over a window from day 1 through day 60; and $Surprise_{i,q}$ is the earnings surprise as defined above. To address outliers and potential nonlinearities, we follow prior research and transform the independent variables in model (1) to model (3) into deciles based on their rank within each quarter, and use the decile number in the regressions.

To analyze the impact of after-hours announcements, we compare the results for the WSJ sample and the Compustat sample. For the Compustat sample, $CAR(-2,0)_{i,q}$ does not capture the price reaction to after-hours announcements, and we expect $b1$ (regression (1)) to be understated relative to the WSJ sample. The dependent variable in regression (2), $Drift(1,60)_{i,q}$, erroneously includes the contemporaneous price reaction to after-hours announcements for the Compustat sample, and we expect $b2$ to be overstated. Finally, regression (3) contains measurement errors for both the dependent and independent variable for the Compustat sample, making this regression less meaningful. We hypothesize that $b3$ for the Compustat sample is smaller in magnitude than $b3$ for the WSJ sample.

If a researcher cannot obtain earnings announcement times, we recommend that event windows be shifted forward one day so that the return on Compustat day +1 is included in the three-day CAR around the announcement date, and is *not* included in the post–earnings announcement abnormal return.[9] To evaluate the effectiveness of these recommendations, we compare the performance of models using windows from day −1 through day 1, and day 2 through day 61 relative to the Compustat announcement date, with the performance of model (1) to model (3) for the WSJ sample (i.e., event day 0 is adjusted for after-hours announcements, and the relevant event windows are from day −2 through day 0, and from day 1 through day 60). Finally, to address concerns that the price reaction for earnings announcements just before the close of trading on the adjusted day 0 might be incomplete, we present results using event windows from day −1 though day +1, and day +2 through day +61, for the WSJ sample.

3. Results

In this section, we first present descriptive statistics, concentrating on differences between earnings announcements taking place before the market close (BMC) and after the market close (AMC).[10] Next, we show how misalignment of event day 0 due to after-hours announcements affects three common types of event studies around earnings announcements.

3.1 DESCRIPTIVE STATISTICS

We distinguish three groups of firms: firms that have only AMC announcements during our sample period (AMC firms), firms with only BMC announcements (BMC firms), and firms with both AMC and BMC announcements. In order to classify a firm, we require more than five quarterly earnings announcements for that firm in our sample. Of the 2,885 firms in our sample, 40 firms that have no more than five observations are excluded, leaving 2,845 firms for the analysis in this section.

Table 1 provides descriptive statistics for the three groups of firms. There are 882 BMC firms (31%) and 691 AMC firms (24%), and the remaining 1,272 firms (45%) have both AMC and BMC announcements. The average number of earnings announcements per firm ranges from 13.1, for firms that have both AMC and BMC announcements, to 13.6, for BMC firms. For

[9] Note that returns in CRSP are based on closing prices recorded for the regular trading day, which ends at 4:00 p.m. EST. The increase in after-market trading in recent years therefore does not alleviate the need for event-day adjustment for AMC announcements.

[10] The data from WSJ.com allow us to split earnings announcements into before the opening, during the trading day, and after the close of trading. However, because our focus is on event day misalignment due to after-hours announcements, we split the sample into earnings announcements that take place after the close of trading on day t (AMC announcements) and announcements on day t that take place before the end of the trading day (i.e., from 00:00 a.m. until the opening, or during trading hours). We refer to the latter group as BMC announcements. Exclusion of earnings announcements during the trading day (less than 10% of the sample) from the group of BMC announcements changes none of our conclusions.

TABLE 1
Descriptive Statistics

Panel A: Firm characteristics

	BMC Firms (1)	AMC Firms (2)	H_0: (1) = (2) *p*-Value (3)	BMC and AMC Firms (4)
Number of firms	882	691	–	1,272
Average number of quarters	13.6	13.4		13.1
Size (000s)	7,827,655	3,724,016	<0.001***	4,250,368
Leverage	0.211	0.151	<0.001***	0.197
Book-to-market	0.537	0.501	<0.001***	0.571
NASDAQ	0.350	0.650	<0.001***	0.450

Panel B: Earnings-related volume, volatility, and earnings surprise

	BMC Firms (1)	AMC Firms (2)	H_0: (1) = (2) *p*-Value (3)	BMC and AMC Firms		H_0: (4) − (5) = 0 *p*-Value (6)
				BMC Announcements (4)	AMC Announcements (5)	
Earnings surprise (%)	−0.025	0.006	0.599***	−0.034	0.000	0.642
Abnormal volume	0.625	0.923	<0.001***	0.696	0.692	0.787
Volatility (%)	2.632	4.095	<0.001***	3.271	3.312	0.655

This table presents descriptive statistics for firms in the Russell 3000 Index for the period 2000 through 2004. We split the sample into firms that only have earnings announcements after the close of trading during our sample period (AMC firms), firms with only earnings announcements before the close of trading (BMC firms), and firms with both AMC and BMC announcements. In panel B, we split the earnings announcements of the last group into AMC announcements (51.1%) and BMC announcements (48.9%). For each group, we first average the variables by firm. We then compute the average across the firms in each group. Average number of quarters is the number of quarters with earnings announcements averaged across the firms in each group. Size is the market capitalization at year-end, leverage is the ratio of long-term debt over total assets, book-to-market is the ratio of the book value of equity to the market value of equity, and NASDAQ is a dummy variable equal to 1 if the firm is listed on NASDAQ and 0 otherwise. Earnings surprise is the difference between actual earnings and the most recent analyst forecast, scaled by the stock price 10 days prior to the earnings announcement. Daily abnormal volume and volatility are averaged over a window from day −1 to day +1, where event day 0 is adjusted for after-hours announcements. Daily abnormal volume is defined as the difference between a stock's actual turnover on trading day t and that stock's average daily turnover during the preannouncement period from day −40 through day −11, scaled by that stock's average daily turnover during the preannouncement period. Volatility is the absolute value of the daily size-adjusted return. Earnings surprise and volatility are in percentage terms. The p-value in column (3) is based on a t-test that the means of each variable for AMC and BMC firms are not significantly different. The p-value in column (6) is based on a t-test that the average of the difference in the firm-specific means of each variable for AMC and BMC announcements is not significantly different from zero.

*** indicates significance at the 1% level.

the group of firms with both AMC and BMC announcements, 51.1% of the announcements are after the close.

For each of the three groups, we report average firm size, leverage, book-to-market ratio, and a dummy variable equal to one if a firm is listed on NASDAQ. Size is the market capitalization at year end, leverage is the ratio of long-term debt over total assets, book-to-market is the ratio of book value of equity over market value of equity, and NASDAQ is a dummy variable equal to one if the firm is listed on NASDAQ, and zero otherwise. We first calculate the average value for each firm characteristic across all earnings announcements per firm. Next, we average these firm-specific averages across all firms in each group.

Table 1, panel A shows that AMC firms are smaller and have lower leverage and a lower book-to market ratio than BMC firms. All these differences are significant at the 1% level (column (3)). Furthermore, 65% of AMC firms are listed on NASDAQ, whereas only 35% of BMC firms are listed on NASDAQ. Finally, apart from the book-to-market ratio, the average value of firm characteristics for firms that have both BMC and AMC announcements lies between the averages of BMC and AMC firms (column (4)).

As part of our descriptive analysis, we investigate whether the stock market response to earnings announcements depends on announcement time.[11] We focus on earnings surprises, and daily earnings-related abnormal volume and volatility, averaged over day -1 through day $+1$ relative to event day 0 (adjusted for after-hours announcements). We split our observations into four subsamples: earnings announcements by AMC firms; earnings announcements by BMC firms; and, for firms with both AMC and BMC announcements, we split the sample into AMC and BMC announcements. Next, within each of these groups, we calculate the average earnings surprise, and average abnormal volume and volatility across all earnings announcements for each firm. Finally, these firm-specific means are averaged across all firms in each subsample.

The results presented in table 1, panel B show that there is no significant difference in average earnings surprise between BMC firms and AMC firms (column (3)). Furthermore, comparison of matched (BMC-AMC) pairs shows no evidence that firms with both BMC and AMC announcements prefer either AMC or BMC announcements for negative earnings news (column (6)).

We find that AMC firms typically have stronger market reactions to earnings announcements, as measured by earnings-related abnormal volume and volatility (column (3)). However, for firms that announce both BMC and AMC, we find no significant difference in abnormal volume and volatility

[11] Francis, Pagach, and Stephan [1992] compare price and volume reactions to earnings announced during trading and nontrading hours. Gennotte and Trueman [1996] develop a model that predicts that managers prefer to release bad earnings news after the close of trading. Patell and Wolfson [1982] and Bagnoli, Clement, and Watts [2004] provide empirical evidence on this issue.

TABLE 2

Earnings Surprise and Earnings Announcement Return in Relation to Announcement Time

Panel A: Earnings surprise and *CAR*(−1,1) for earnings surprise portfolios: AMC firms and BMC firms

	AMC Firms		BMC Firms			
Quintile	Earnings Surprise (1)	*CAR*(−1,1) (2)	Earnings Surprise (3)	*CAR*(−1,1) (4)	H_0: (1) = (3) *p*-Value (5)	H_0: (2) = (4) *p*-Value (6)
1	−1.250	−3.456***	−1.122	−1.827***	0.637	0.005***
		(−7.23)		(−6.33)		
2	−0.017	−2.588***	−0.019	−0.506***	0.757	0.001***
		(−8.58)		(−3.72)		
3	0.044	−0.140	0.041	0.471***	0.352	0.046**
		(−0.49)		(4.63)		
4	0.134	1.712***	0.119	1.759***	0.357	0.916
		(4.22)		(10.45)		
5	1.037	3.402***	0.866	2.164***	0.333	0.001***
		(11.16)		(11.39)		

Panel B: Earnings surprise and *CAR*(−1,1) for earnings surprise portfolios: firms with both AMC and BMC announcements

	AMC Announcements		BMC Announcements			
Quintile	Earnings Surprise	*CAR*(−1,1)	Earnings Surprise	*CAR*(−1,1)	H_0: (1) = (3) *p*-Value	H_0: (2) = (4) *p*-Value
1	−1.189	−2.973***	−1.179	−2.466***	0.966	0.282
		(−7.69)		(−9.63)		
2	−0.020	−1.335***	−0.021	−0.724***	0.836	0.247
		(−3.54)		(−4.61)		
3	0.052	−0.187	0.043	0.655***	0.305	0.023**
		(−0.69)		(3.80)		
4	0.133	1.357***	0.130	1.041***	0.708	0.381
		(4.53)		(5.44)		
5	1.026	2.926***	0.854	2.845***	0.341	0.883
		(9.35)		(9.01)		

This table presents the average earnings surprise and average size-adjusted return for five earnings surprise portfolios. The abnormal return (*CAR*) is cumulated over day −1 through day +1 relative to the correct event day 0. Each quarter stocks are grouped into quintiles based on earnings surprise (the difference between actual earnings and the most recent preannouncement forecast scaled by the price 10 days before the announcement). In panel A, we report the results for AMC firms and BMC firms, and panel B gives results for firms with both AMC and BMC announcements. Earnings surprise and returns are in percentage terms and are averaged over 20 quarters (Q1, 2000 to Q4, 2004). The second entry in each cell is the *t*-statistic based on the time-series standard error. The *p*-value in column (5) (column (6)) in panel A is based on a *t*-test of the hypothesis that the earnings surprises (three-day earnings announcement return) for AMC firms and BMC firms are not significantly different. The *p*-value in column (5) (column (6)) in panel B is based on a *t*-test of the hypothesis that the earnings surprise (three-day earnings announcement return) is not significantly different for AMC announcements and BMC announcements for firms that have both AMC and BMC announcements.

** and *** indicate significance at the 5% and 1% levels, respectively.

between each type of announcement (column (6)). This last result shows that, after controlling for firm heterogeneity, there is no evidence that market reaction to earnings announcements depends on announcement time.

In order to further investigate the impact of announcement time on market reaction to earnings announcements, table 2 documents earnings announcement returns for earnings surprise quintiles for the three groups of

firms. Earnings announcement return is defined as the cumulative abnormal return over event day −1 through day +1 relative to adjusted event day 0, averaged over 20 quarters (first quarter 2000 to last quarter 2004). For each earnings surprise quintile, table 2 also reports the earnings surprise averaged over 20 quarters.

Average earnings surprise (*CAR*) for AMC firms is reported in column (1) (column (2)) of table 2, panel A, and the average earnings surprise (*CAR*) for BMC firms is reported in column (3) (column (4)). For all earnings surprise quintiles, table 2, panel A shows there is no significant difference in the level of earnings surprise between AMC and BMC firms (column (5)). However, for quintiles 1, 2, and 5 AMC firms display significantly stronger price reaction in the direction of the earnings surprise (column (6)).

The results in table 2, panel B help to answer the question of whether the difference in price reaction between AMC and BMC firms is the result of differences in firm characteristics or of announcement time. For the sample of firms with both AMC and BMC announcements, panel B reports average earnings surprise (*CAR*) for AMC announcements in column (1) (column (2)), and average earnings surprise (*CAR*) for BMC announcements in column (3) (column (4)). With the exception of price reaction for quintile 3, we cannot reject the hypothesis that average earnings surprise and average share price reaction are the same for BMC and AMC announcements.[12] This result is consistent with table 1, panel B, and suggests that even though market reaction to earnings surprises differs between AMC and BMC firms, market reaction to earnings announcements does not depend on announcement time for the group of firms with both BMC and AMC announcements.

3.2 EVENT STUDIES AROUND EARNINGS ANNOUNCEMENTS

In this section, we analyze the impact of misalignment of event day 0 due to after-hours announcements on the results of three common types of event studies around earnings announcements. Our main focus is on differences in results between the WSJ sample (where event dates are adjusted for after-hours earnings announcements) and the Compustat sample (where event dates are not adjusted for after-hours announcements).

3.2.1. Returns, Volume, and Volatility. Table 3, panel A reports evidence on stock returns for different earnings surprise quintiles. The returns for each portfolio are averaged over 20 quarters (first quarter 2000 to last quarter 2004). We show results for the WSJ and Compustat samples from day −1 through day 1, and report the difference for each event day. For both samples, we also report the average cumulative abnormal return over day +2 through day +60.

[12] In an additional test, we only include earnings announcements when a firm changes from an AMC announcement to a BMC announcement, or from a BMC announcement to an AMC announcement. For this set of observations, for all earnings surprise quintiles, we cannot reject the hypothesis that the average earnings surprise and the average share price reaction are the same for BMC and AMC announcements.

TABLE 3

Return, Volume, and Volatility around Earnings Announcements

Panel A: Size-adjusted returns around earnings announcements for five earnings surprise portfolios

		WSJ				Compustat				Difference			
	Event Day	−1	0	1	2–60	−1	0	1	2–60	−1	0	1	2–60
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Quintile	*AMC%*												
1	46.2	−0.031	−2.414***	−0.169**	0.133	0.007	−0.939***	−1.601***	0.084	−0.038	−1.475***	1.432***	0.049
		(−0.65)	(−11.62)	(−2.77)	(0.14)	(0.11)	(−12.38)	(−9.65)	(0.09)	(−0.61)	(−8.87)	(9.25)	(0.09)
2	43.7	−0.041	−1.160***	0.007	−0.195	−0.026	−0.362***	−0.823***	−0.201	−0.014	−0.799***	0.830***	0.006
		(−0.95)	(−9.63)	(0.13)	(−0.26)	(−0.80)	(−4.95)	(−10.27)	(−0.26)	(−0.39)	(−10.61)	(9.63)	(−0.26)
3	44.9	0.069	0.035	0.163**	−0.534	0.043	0.070	0.079	−0.474	0.026	−0.035	0.084	−0.059
		(1.06)	(0.31)	(2.25)	(−1.12)	(0.63)	(0.83)	(1.28)	(−0.96)	(0.80)	(−0.51)	(0.95)	(−0.96)
4	46.6	0.112	1.061***	0.292***	0.234	0.144*	0.535***	0.770***	0.307	−0.031	0.526***	−0.478***	−0.072
		(1.55)	(11.40)	(3.73)	(0.46)	(2.03)	(7.91)	(8.42)	(0.62)	(−0.70)	(7.32)	(−4.56)	(−0.46)
5	46.8	0.474***	1.926***	0.363***	1.577	0.289***	1.187***	1.241***	1.779	0.185**	0.739***	−0.878***	−0.202
		(4.67)	(13.17)	(5.50)	(1.59)	(4.05)	(13.09)	(13.54)	(1.72)	(2.60)	(5.98)	(−9.71)	(−1.39)

Panel B: Abnormal volume and volatility around earnings announcements

	WSJ			Compustat			Difference		
Event Day	−1	0	1	−1	0	1	−1	0	1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Abnormal volume	0.162***	1.478***	0.599***	0.045	0.760***	1.151***	0.117***	0.717***	−0.552***
	(6.24)	(17.13)	(15.82)	(0.88)	(15.30)	(18.05)	(3.23)	(18.45)	(−16.03)
Volatility (%)	2.351***	4.873***	2.611***	2.276***	3.343***	4.082***	0.075***	1.530***	−1.470***
	(17.27)	(33.20)	(20.86)	(16.93)	(24.81)	(29.85)	(4.91)	(34.28)	(−30.74)

Panel A presents average size-adjusted returns for five earnings surprise portfolios. Each quarter stocks are grouped into quintiles based on earnings surprise (the difference between actual earnings and the most recent preannouncement forecast scaled by the price 10 days before the announcement). Column (1) through column (4) present the results for the WSJ sample. Column (5) through column (8) present the results for the Compustat sample. The difference in returns between the matched WSJ-Compustat pairs is in column (9) through column (12). *AMC%* is the percentage of after-hours earnings announcements in each quintile. Column (4) and column (8) report the cumulative abnormal return from day +2 through day +60. Panel B presents average daily abnormal volume and volatility. Daily abnormal volume is defined as the difference between a stock's actual turnover on trading day t and that stock's average daily turnover during the preannouncement period from day −40 through day −11, scaled by that stock's average daily turnover during the preannouncement period. Daily volatility is the absolute value of the daily size-adjusted return. Returns and volatility are in percentage terms and are averaged over 20 quarters (Q1, 2000 to Q4, 2004). Volume is also averaged over 20 quarters. The second entry in each cell is the t-statistic based on the time-series standard error.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 3, panel A shows no clear pattern between earnings surprise and the percentage of after-hours announcements. The percentage of after-hours announcements ranges from a high of 46.8% for quintile 5 to a low of 43.7% for quintile 2. This result is consistent with table 1, which also shows that after-hours announcements are not associated with bad news.

Table 3, panel A, column (1) through column (3), shows that most of the stock price reaction takes place on WSJ event day 0. For example, for the lowest surprise quintile, the stock price reaction on WSJ event day 0 is 92% of the total price reaction in the three-day period from day −1 through day +1. For quintile 5, this number is 70%.

For the Compustat sample, a different picture emerges. From column (5) through column (7), we see that the strongest stock price reactions occur on Compustat day +1, the day after the earnings announcement. Column (10) and column (11) show that apart from the middle quintile, the returns on Compustat event day 0 and event day +1 are significantly biased, due to the one-day delay with which returns are reported for after-hours announcements.

For each of the quintiles, table 3, panel A, column (4) reports the average cumulative abnormal return over the period from WSJ day +2 through WSJ day +60. The analogous returns for the Compustat sample are reported in column (8). For each of the quintiles, the average abnormal return is not significantly different from zero. However, consistent with earnings momentum, we find that the cumulative abnormal return on zero-cost portfolios that are long on the quintile of stocks with the largest earnings surprises for each quarter and short on the quintile of stocks with the most negative earnings surprises for each quarter, is significantly larger than zero for the WSJ sample and the Compustat sample. The abnormal return on the zero-cost portfolio is 1.44% (*t*-statistic is 3.19) for the WSJ sample, and 1.69% for the Compustat sample (*t*-statistic is 3.36). The difference in these abnormal returns is not significantly different from zero.

Table 3, panel B reports the pattern of average abnormal volume and volatility in the days around earnings announcements. The results for the WSJ sample, where event dates are adjusted for after-hours announcements, show that volume and volatility peak on day 0 (column (2)). The results for the Compustat sample erroneously suggest a delayed market reaction to the new earnings information. Both abnormal volume and volatility peak on Compustat event day +1 (column (6)). For all three event days, the difference in average abnormal volume and volatility between the two samples is significant.[13]

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[13] The increase in the proportion of after-hours earnings announcements through time, and consequently the increase in measurement bias, will impact studies that focus on time series of earnings-related volume and volatility. For example, Kross and Kim [2000] use volume and volatility measured over a window of day −1 and 0 to analyze how the information content of earnings announcements has changed over the last 30 years. Our results suggest their volume and volatility measures are more downward biased in the later part of their sample. Landsman

The significant and substantial differences between the Compustat and WSJ samples in table 3 imply that studies that rely on exact patterns in returns, volume, or volatility in the days around earnings announcements should use event dates that are adjusted for after-hours announcements. While our evidence is limited to earnings announcements in the period 2000 to 2004, after-hours announcements could impact patterns in returns, volume, or volatility in the days around earnings announcements in earlier periods. For example, the increase in the proportion of after-hours earnings announcements might explain the "shift" in volume to the day after the I/B/E/S earnings announcement date reported in Chae [2005]. This author finds that, in the period 1986 to 1990, volume on day 0 is higher than volume on day +1 (relative to the I/B/E/S earnings announcement date). For the period 1996 to 2000, however, volume on day +1 is higher than volume on day 0.

The results in table 3 also imply that studies using a large sample of earnings announcements from Compustat or I/B/E/S to measure earnings-related abnormal returns, volume, or volatility should use event windows that include Compustat day +1 to ensure that volume and price changes in reaction to after-hours earnings announcements are included. This recommendation recognizes that both Compustat day 0 and Compustat day +1 can be the true event day 0.[14]

Finally, the results in table 3 imply that the window to measure the postannouncement abnormal return should start at Compustat day +2, in order to avoid erroneously including price reaction to after-hours earnings announcements. Again, this recommendation recognizes that both Compustat day 0 and Compustat day +1 can be the true event day 0.[15]

3.2.2. Earnings Response Coefficients and Post–Earnings Announcement Drift. To investigate the impact of after-hours announcements on the measurement of earnings response coefficients and post–earnings announcement

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and Maydew [2002], and Francis, Schipper, and Vincent [2002] study the same issue, but use a three-day window around the announcement day, reducing the impact of event day misalignment.

[14] Several recent studies use windows that are inconsistent with this prescription. Chae [2005] uses the absolute return on event day 0 as a measure of the announcement risk; Affleck-Graves, Callahan, and Chipakatti [2002], Blouin, Smith Raedy, and Shackelford [2003], and Garfinkel and Sokobin [2006] use event days −1 and 0 to measure abnormal volume or abnormal volatility. To measure abnormal returns, Bartov, Radhakrishnan, and Krinsky [2000], Brown and Han [2000], Burgstahler, Jiambalvo, and Shevlin [2002], Davis [2002], Jin [2006], and Mendenhall [2002] use days −2 through 0, while Altamuro, Beatty, and Weber [2005], Blouin, Smith Raedy, and Shackelford [2003], Conrad, Cornell, and Landsman [2002], Ecker et al. [2006], and Hotchkiss and Strickland [2003] use day −1 and day 0. Garfinkel and Sokobin [2006] and Hotchkiss and Strickland [2003] report that their results are robust to extending the window to day +1.

[15] Several recent studies use windows that are inconsistent with this prescription. For example, Bartov, Radhakrishnan, and Krinsky [2000], Garfinkel and Sokobin [2006], Mendenhall [2002, 2004], and Shane and Brous [2001] all use post–earnings announcement windows that include Compustat day +1.

drift, we estimate regression model (1) to model (3) separately for each quarter q. The coefficients reported in table 4 are averaged across the 20 quarters in the sample, and t-statistics are based on time-series standard errors. The estimates for $b1$ are reported in table 4, panel A, and the estimates for $b2$ and $b3$ are reported in panel B and panel C, respectively.

TABLE 4

Earnings Response Coefficients and Post–Earnings Announcement Drift

Panel A: Short-term earnings response coefficients ($b1$)

			(1) Surprise	(2) Comparison with (1a)
(1a)	WSJ	$CAR(-2,0)$	0.635***	
			(21.85)	
(1b)	Compustat	$CAR(-2,0)$	0.330***	0.305***
			(29.36)	(9.79)
(1c)	Compustat	$CAR(-1,1)$	0.664***	−0.029
			(23.80)	(−0.73)
(1d)	WSJ	$CAR(-1,1)$	0.676***	−0.041
			(21.30)	(−0.95)

Panel B: Post–earnings announcement drift and I/B/E/S surprise ($b2$)

			Surprise	Comparison with (2a)
(2a)	WSJ	$CAR(1,60)$	0.232***	
			(4.23)	
(2b)	Compustat	$CAR(1,60)$	0.549***	−0.316***
			(8.58)	(−3.75)
(2c)	Compustat	$CAR(2,61)$	0.187***	0.046
			(3.17)	(0.57)
(2d)	WSJ	$CAR(2,61)$	0.176***	0.057
			(2.80)	(0.83)

Panel C: Post–earnings announcement drift and earnings announcement return ($b3$)

			3-Day CAR	Comparison with (3a)
(3a)	WSJ	$CAR(1,60)$	0.417***	
			(5.03)	
(3b)	Compustat	$CAR(1,60)$	0.091	0.326***
			(1.42)	(3.11)
(3c)	Compustat	$CAR(2,61)$	0.397***	0.020
			(5.69)	(0.19)
(3d)	WSJ	$CAR(2,61)$	0.327***	0.090
			(4.41)	(0.90)

This table shows the impact of the choice of event window on three commonly used regression models. The three-day CAR is the cumulative size-adjusted return over day −2 through day 0 in regressions (1a),(1b), (3a), and (3b), and the cumulative size-adjusted return over day −1 through day +1 in regressions (1c), (1d), (3c), and (3d). The post–earnings announcement drift is the cumulative size-adjusted return over day 1 through day 60 in regressions (2a), (2b), (3a), and (3b), and the cumulative size-adjusted return over day 2 through day 61 in regressions (2c), (2d), (3c), and (3d). $Surprise_{i,q}$ is the difference between the actual earnings per share and the most recent preannouncement forecast scaled by the stock price 10 days before the announcement. For each regression, the independent variables are transformed into deciles based on their rank within each quarter. We use the decile number in the regressions. For brevity we do not report the intercepts. We estimate the regressions separately for each quarter q. The coefficients reported are averaged across all quarters in the sample, and t-statistics are based on time-series standard errors. The t-test in column (2) tests the null hypothesis that the mean of the differences in the matched coefficients for the model in the first row of each panel (model a) and the models in row two to four (models b, c, and d) is 0. The t-statistics are in parentheses.

*** indicates significance at the 1% level.

The first row in each panel in table 4 shows the results for the benchmark model (the WSJ sample and windows from day −2 through day 0, and day +1 through day +60). All coefficients have the expected sign.[16] The second row in each panel gives the analogous results for the Compustat sample. The test for the equality of coefficients for the WSJ and Compustat samples using the same event window is shown in the second row of column (2). Consistent with our expectations, we find that relative to the WSJ sample, $b1$ is significantly smaller for the Compustat sample, $b2$ is significantly larger for the Compustat sample, and $b3$ is significantly smaller for the Compustat sample.

The third row in each panel reports the coefficients of the regressions for the Compustat sample using our recommended event windows (i.e., the windows are shifted forward one day relative to models 1–3). The third row in column (2) shows the differences between the coefficients for these regressions and the WSJ sample (the benchmark). For all three models, the differences in the coefficients are small and insignificant. Importantly, table 4, panels B and C (column (2)) show that excluding the return on Compustat day +1 from the postearnings abnormal return has no significant impact on the estimated drift relative to the drift estimated using the benchmark window WSJ(1,60).

Finally, the last row in each panel reports the results of the regression using the WSJ sample where event windows have shifted forward one day compared to the benchmark model (the WSJ sample using windows from day −2 through day 0, and day +1 through day +60). The fourth row in column (2) reports the differences in the coefficients. Consistent with table 3, panel A, there is some evidence of an incomplete price reaction on day 0, as the coefficient in model (1d) is larger than the coefficient in model (1a) (and the coefficient in model (2d) is smaller than the coefficient in regression (2a)). However, for all panels, the differences in the coefficients are small and insignificant.

Based on the results in this section, we conclude that if event days cannot be adjusted for after-hours announcements: (1) measures of earnings surprise based on cumulative abnormal return around earnings announcements should include the return on Compustat day +1 and (2) measures of post–earnings announcement abnormal return should not include the return on Compustat day +1.

3.2.3. Post–Earnings Announcement Window: A Closer Look. Our recommendation to exclude the return on Compustat day +1 from the postearnings abnormal return does avoid spurious correlation for AMC announcements (the point we emphasize). However, exclusion of Compustat day +1 also results in a downward bias of the drift, because postannouncement abnormal return does not include the return on the correct day +1 for BMC

[16] The intercepts of the benchmark models in table 4, panels A to C are −2.81% ($t = -14.9$), −0.62% ($t = -0.89$), and −1.34% ($t = -1.7$), respectively.

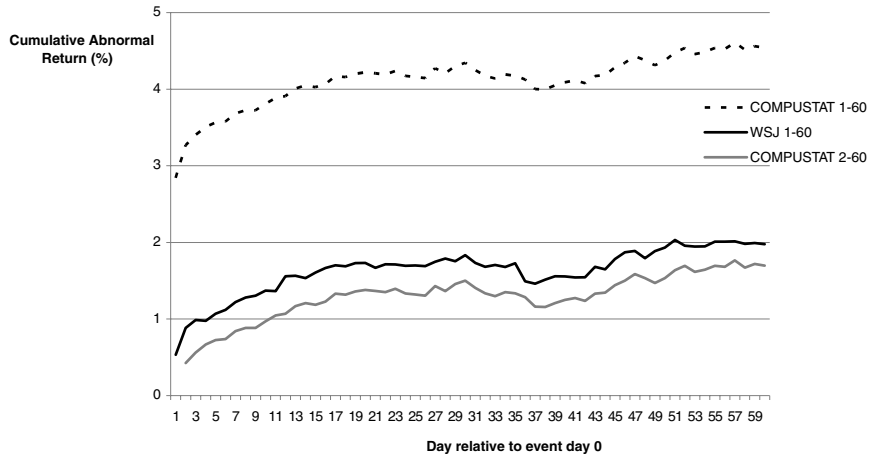

Fig. 1.—Cumulative abnormal return on earnings surprise zero-cost portfolios 2000 to 2004. Figure 1 presents the cumulative abnormal return on zero-cost portfolios that are long on the quintile of stocks with the largest earnings surprises for each quarter and short on the quintile of stocks with the most negative earnings surprises for each quarter. The sample comprises Russell 3000 stocks for the period 2000 through 2004. The abnormal return on a stock is the actual stock return minus the equally weighted average return for all firms in the same CRSP size decile on the same CRSP exchange index (i.e., NYSE/AMEX or NASDAQ). The black line in the figure provides the benchmark and gives the abnormal return on the zero-cost portfolio cumulated from day +1 through day +60, relative to event day 0, where event day 0 is corrected for after-hours earnings announcements. The dotted line represents the cumulative abnormal return on the zero-cost portfolio from event day +1 through day +60, relative to the Compustat earnings announcement date. The grey line gives the cumulative abnormal return based on the window from day +2 through day +60 relative to the Compustat earnings announcement date.

announcements. We argue that the benefits of exclusion of Compustat day +1 outweigh the costs when measuring postearnings abnormal return. First, under the null hypothesis of no post–earnings announcement drift, removing day +1 from the postannouncement window still allows an unbiased test of the null hypothesis. However, knowing that: (1) a substantial proportion of earnings announcements takes place after hours and (2) stock prices are positively related to earnings surprise, inclusion of Compustat day +1 results in a biased test.

Second, following a less conservative approach, a simple rule to minimize the absolute value of measurement bias resulting from the choice to include or exclude Compustat day +1 from the postannouncement window also points to exclusion of Compustat day +1. Figure 1 illustrates the impact of this choice on post–earnings announcement abnormal returns for our sample of Russell 3000 stocks in the period 2000 through 2004. Figure 1 presents the cumulative abnormal return on zero-cost portfolios that are long on the quintile of stocks with the largest earnings surprises each quarter and short on the quintile of stocks with the most negative earnings surprises each quarter. The black line in the figure provides the benchmark, and

gives the abnormal return on the zero-cost portfolio cumulated from day +1 through day +60, relative to the correct event day 0 (WSJ 1–60). The dotted line represents the cumulative abnormal return on the zero-cost portfolio from event day +1 through day +60, relative to the Compustat earnings announcement date (Compustat 1–60). The grey line gives the cumulative abnormal return based on the window from day +2 through day +60 relative to the Compustat earnings announcement date (Compustat 2–60).

We make several observations based on figure 1. First, starting the event window at Compustat day +2 results in a downward bias of the postearnings abnormal return of 0.29% relative to the benchmark. This bias is approximately equal to the percentage of earnings announcements that take place before market close (53%), multiplied by the abnormal return on the zero-cost portfolio on the correct day 1, when the portfolio is restricted to BMC announcements (0.58%).[17] On the other hand, if Compustat day +1 is included in the window, the post–earnings announcement return is overstated by 2.56% (the distance between the dotted line and the black line). This bias is approximately equal to the percentage of earnings announcements that take place after the market close (1 − 0.53), multiplied by the abnormal return on the correct day 0 when the portfolio is restricted to AMC announcements (5.38%).

In general, assuming that the correct day 0 return on the zero-cost portfolio restricted to AMC announcements is eight times the correct day 1 return on the zero-cost portfolio restricted to BMC announcements (for our sample this number is 9), the percentage of AMC announcements needs to be smaller than 11% for the absolute value of the bias resulting from the inclusion of Compustat day +1 to be less than the absolute value of the bias resulting from the exclusion of Compustat day +1 from the postannouncement window.[18] Given the percentage of AMC announcements reported in the literature and this study, minimization of the absolute value of measurement bias points toward exclusion of Compustat day +1.

Finally, our recommendation is consistent with a real-world trading strategy where investors take long and short positions to exploit post–earnings

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[17] As reported in table 3, panel A, the abnormal return on the correct day 0 (+1) for the zero-cost portfolio is 4.34% (0.53%). When the portfolio is restricted to BMC announcements, the abnormal return on day 0 is 3.47% and the abnormal return on day +1 is 0.58%. When the portfolio is restricted to AMC announcements, the abnormal return on day 0 is 5.38% and the abnormal return on day +1 is 0.47%.

[18] Let $AMC\%$ be the percentage of AMC announcements, and let $AR(t)^{AMC}$ be the abnormal return on the zero-cost portfolio on day t when the portfolio is restricted to AMC earnings announcements and $AR(t)^{BMC}$ be the abnormal return on the zero-cost portfolio on day t when the portfolio is restricted to BMC earnings announcements. Assume $AR(0)^{AMC} = 8 * AR(1)^{BMC}$ and that $AR(60)^{AMC} = 0$. The absolute value of the bias from including Compustat day +1 is less than the absolute value of the bias resulting from excluding Compustat day +1 if: the absolute value of $(AMC\% * 8 * AR(1)^{BMC})$ < absolute value of $(1 - AMC\%) * AR(1)^{BMC}$. This condition holds if $AMC\%$ is smaller than 11.11%.

announcement drift after the actual earnings are observed. Inclusion of the return on Compustat day +1, however, implies a trading strategy for AMC announcements where positions are taken based on information that has not yet been released.

4. Relevance for Different Samples

This section first presents evidence on the pattern in daily returns, volume, and volatility in the days surrounding the Compustat announcement date for a sample of earnings announcements in the period 2000 through 2004, for a sample of stocks that are not in the Russell 3000 Index. To test whether our findings are relevant for more recent periods, we also report evidence for a sample of all stocks with data in the CRSP, Compustat, and I/B/E/S databases in the period 2005 through 2007. Next, we present evidence on the percentage of after-hours announcements, based on earnings announcements collected from Factiva, for a random sample of 300 stocks in Compustat over the period 1995 through 2004. Finally, we replicate a study of post–earnings announcement drift that does not account for after-hours announcements in the choice of event window.

4.1 OUT-OF-SAMPLE EVIDENCE

4.1.1. Stocks Not in the Russell 3000 Index in the Period 2000 to 2004. In the period 2000 through 2004, there are 29,805 earnings announcements for stocks with data in the CRSP, Compustat, and I/B/E/S databases that are not in the Russell 3000 Index. For this sample, table 5, panel A reports abnormal returns in the three days surrounding Compustat event day 0 for quintiles of stocks based on the earnings surprise. Table 5, panel B shows the pattern in abnormal volume and volatility in the three days surrounding Compustat event day 0.

The results in table 5 suggest that the biases we report in the previous section are not unique to stocks in the Russell 3000 Index. For stocks that are not in the Russell 3000 Index, a large proportion of the new earnings information is reflected in the price on the day after the earnings announcement (Compustat day +1). Furthermore, volume and volatility are higher on the day after the earnings announcement than on the Compustat earnings announcement date.

4.1.2. All Stocks in the Period 2005 to 2007. In a recent paper, Ball and Shivakumar [2008] provide evidence that is suggestive of a structural break in the information content of earnings announcements around 2004. In this section we test if the evidence documented for our sample, which ends in 2004, is still relevant for more recent years. The results are in table 6, which has the same format as table 5.

The results in table 6 show that the biases we have documented for the period 2000 to 2004 are also relevant for the period from the first quarter in 2005 through the second quarter in 2007. Consistent with the evidence

TABLE 5

Return, Volume, and Volatility around Earnings Announcements for Non–Russell 3000 Stocks

Panel A: Size-adjusted returns around earnings announcements for five earnings surprise portfolios

	Non-Russell 3000 Stocks 2000 to 2004		
Event Day	−1	0	1
	(1)	(2)	(3)
Quintile			
1	0.027	−1.322***	−2.069***
	(0.36)	(−15.33)	(−14.37)
2	−0.002	−0.622***	−1.017***
	(−0.03)	(−7.45)	(−7.50)
3	0.167***	0.039	−0.492**
	(2.86)	(0.35)	(−3.84)
4	0.244***	0.519***	0.260*
	(3.87)	(6.25)	(2.02)
5	0.457***	1.417***	0.507***
	(5.13)	(13.66)	(3.82)

Panel B: Volume and volatility around earnings announcements

	Non-Russell 3000 Stocks 2000 to 2004		
Event Day	−1	0	1
	(1)	(2)	(3)
Abnormal volume	0.694***	2.070***	2.373***
	(5.27)	(9.44)	(8.69)
Volatility (%)	3.110***	4.231***	4.331***
	(19.15)	(29.40)	(28.86)

This table presents returns, volume, and volatility around earnings announcements for a sample of 29,805 earnings announcements in the period 2000 to 2004 for stocks with data in the CRSP, Compustat, and I/B/E/S databases that are not in the Russell 3000 Index. Results are presented for event days −1, 0, and +1 relative to the Compustat earnings announcement date. Panel A presents average size-adjusted returns for five earnings surprise portfolios. Each stock is grouped into quintiles based on the earnings surprise in every quarter (the difference between actual earnings and the most recent forecast scaled by the price 10 days before the announcement). Panel B presents average daily abnormal volume and volatility. Daily abnormal volume is defined as the difference between a stock's actual turnover on trading day t and that stock's average daily turnover during the preannouncement period from day −40 through day −11, scaled by that stock's average daily turnover during the preannouncement period. Daily volatility is the absolute value of the daily size-adjusted return. Returns and volatility are in percentage terms and are averaged over 20 quarters (Q1, 2000 to Q4, 2004). Volume is also averaged over 20 quarters. The second entry in each cell is the t-statistic based on the time-series standard error.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

in table 3 and table 5, we find that a large proportion of the new earnings information is reflected in the price on the day after the earnings announcement (Compustat day +1). Furthermore, the results in table 6, panel B show that volume and volatility are higher on the day after the earnings announcement than on the Compustat earnings announcement date.

4.2 EVIDENCE FROM FACTIVA

To establish the proportion of after-hours earnings announcements in the period preceding our sample period, we use Factiva. From the 3000

TABLE 6

Return, Volume, and Volatility around Earnings Announcements 2005 to 2007

Panel A: Size-adjusted returns around earnings announcements for five earnings surprise portfolios

	All Stocks 2005 to 2007		
Event Day	−1	0	1
	(1)	(2)	(3)
Quintile			
1	−0.079	−1.409***	−2.306***
	(−1.43)	(−8.82)	(−19.38)
2	0.052	−0.844***	−1.395***
	(0.95)	(−10.72)	(−10.45)
3	0.079**	0.061	−0.198
	(2.40)	(0.67)	(−1.12)
4	0.114***	0.875***	0.747***
	(4.37)	(7.43)	(14.70)
5	0.195***	1.286***	1.133***
	(4.38)	(11.13)	(13.26)

Panel B: Volume and volatility around earnings announcements

	All Stocks 2005 to 2007		
Event Day	−1	0	1
Abnormal volume	0.223***	1.594***	1.861***
	(8.64)	(15.89)	(18.89)
Volatility (%)	1.766***	3.011***	3.551***
	(36.82)	(44.33)	(50.33)

This table presents returns, volume, and volatility around earnings announcements for a sample of 33,082 earnings announcements in the period Q1, 2005 through Q2, 2007, for all stocks with data in the CRSP, Compustat, and I/B/E/S databases. Results are presented for event days −1, 0, and +1 relative to the Compustat earnings announcement date. Panel A presents average size-adjusted returns for five earnings surprise portfolios. Each stock is grouped into quintiles based on the earnings surprise in every quarter (the difference between actual earnings and the most recent forecast scaled by the price 10 days before the announcement). Panel B presents average daily abnormal volume and volatility. Daily abnormal volume is defined as the difference between a stock's actual turnover on trading day t and that stock's average daily turnover during the preannouncement period from day −40 through day −11, scaled by that stock's average daily turnover during the preannouncement period. Daily volatility is the absolute value of the daily size-adjusted return. Returns and volatility are in percentage terms and are averaged over 10 quarters. Volume is also averaged over 10 quarters. The second entry in each cell is the t-statistic based on the time-series standard error.

** and *** indicate significance at the 5% and 1% levels, respectively.

largest firms with financial information in Compustat for fiscal year 1999, we randomly select 100 firms from each tercile with the smallest, medium, and largest firms.[19] We then search Factiva to find the earliest earnings announcement for each of these stocks in each quarter for the period 1995 through 2004. Our observation period starts in 1995, because Factiva

[19] We sample from the largest 3,000 stocks to facilitate comparison with the Russell 3000 sample in the previous section, and to obtain a reasonable number of observations from Factiva. Some 58% of the firms in the Factiva sample are also in our WSJ sample.

provides earnings announcement times for only a small number of stocks in the years prior to 1995.[20]

Table 7, panel A shows that the number of observations from Factiva ranges from a low of 477, in 1995, to a high of 694, in 1999. The percentage of observations in Factiva with no time entry is highest in 1995 (14%), and is much lower in subsequent years. The results shown in panel A also demonstrate a steady increase in the percentage of after-hours earnings announcements from 17% in 1995 to almost 48% in 2004.[21] These numbers confirm our earlier finding on the high percentage of after-hours announcements in the period 2000 to 2004. Furthermore, the high percentage of after-hours announcements in the five years prior to 2000 shows that the relevance of our recommendations for event studies transcends our sample period.

Although not our main focus, our Factiva search also allows us to analyze the accuracy of reporting *dates* in Compustat. These results are reported in table 7, panel B. We find that from 2000 onwards, the Compustat earnings announcement date is the same as the actual earnings announcement date for more than 98% of the sample. However, in earlier years the accuracy of the Compustat dates is much lower. For example, in 1995, the announcement date reported in Compustat is one or more trading days later than the actual date for 30% of our sample.[22, 23]

Table 7, panel C combines the information in panel A and panel B, and shows that the percentage of earnings announcements where the Compustat announcement date is equal to the correct event day 0 (based on Factiva and adjusted for AMC announcements) is less than 60% in all of the 10 years of our sample period. While late reporting in Compustat is the main source of event day misalignment for 1995, its importance decreases rapidly. From 1996 onwards, after-hours announcements are the main source of event day misalignment.

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[20] In Factiva, we use eastern U.S. time as the "reported time," and also adjust for daylight savings time. While most earnings announcements are first reported by one of the newswires, such as PR Newswires, Business Wire, or Dow Jones News Service, our search includes all news providers, to ensure that we capture the earliest announcement. The key words we use are the company name and "reports."

[21] We also compute the percentage of after-hours earnings announcements for each size group. There are 2,070 observations for large firms, and the AMC percentage increases from 14% in 1995 to 39% in 2004. There are 1,824 observations for medium-sized firms, and the AMC percentage increases from 18% in 1995 to 49.7% in 2004. There are 1,839 observations for small firms, and the AMC percentage increases from 17% in 1995 to 58% in 2004.

[22] Chari, Jagannathan, and Ofer [1988] point out that Compustat day −1 should be included in the event window because the Compustat announcement date could be from the *Wall Street Journal* (and relate to an announcement during the previous trading day). This recommendation is mainly relevant for the first half of our sample period.

[23] For about 1% of the sample, the Compustat earnings announcement date is one or two trading days earlier than the first announcement in Factiva (see appendix B).

TABLE 7

Earnings Announcement Dates and Times from Factiva

Panel A: Timing of earnings announcements from Factiva

Year	*N*	*NoTime*	*AMC*	*BMO*	*DUR*
1995	477	14.26%	16.56%	33.75%	35.43%
1996	478	1.67%	27.20%	36.19%	34.94%
1997	566	2.30%	33.39%	34.81%	29.51%
1998	646	4.33%	37.00%	36.69%	21.98%
1999	694	4.61%	39.05%	39.77%	16.57%
2000	678	1.62%	45.58%	43.22%	9.59%
2001	638	3.61%	46.71%	42.16%	7.52%
2002	560	3.21%	48.39%	42.14%	6.25%
2003	495	3.40%	46.00%	42.72%	7.88%
2004	501	3.19%	47.90%	42.32%	6.59%

Panel B: Compustat and Factiva earnings announcement dates

Year	*N*	$C = F$	$C = F + 1$	$C \geq F + 2$
1995	477	69.81%	28.30%	1.89%
1996	478	75.31%	23.85%	0.84%
1997	566	79.68%	19.08%	1.24%
1998	646	92.72%	7.12%	0.15%
1999	694	95.82%	3.60%	0.58%
2000	678	98.08%	1.92%	0.00%
2001	638	98.75%	0.63%	0.63%
2002	560	99.11%	0.89%	0.00%
2003	495	98.18%	1.41%	0.40%
2004	501	98.40%	1.20%	0.40%

Panel C: Event day 0 according to Compustat relative to Factiva

Year	*N*	C = Event Day 0	C = Event Day $0 + 1$	$C \geq$ Event Day $0 + 2$	C = Event Day $0 - 1$
1995	409	52.57%	26.89%	1.22%	19.32%
1996	470	54.68%	17.23%	0.43%	27.66%
1997	553	50.99%	14.47%	0.36%	34.18%
1998	618	55.66%	5.66%	0.00%	38.67%
1999	662	56.80%	1.66%	0.60%	40.94%
2000	667	52.77%	0.90%	0.00%	46.33%
2001	615	51.22%	0.16%	0.16%	48.46%
2002	542	50.00%	0.00%	0.00%	50.00%
2003	478	51.45%	0.24%	0.48%	47.83%
2004	485	49.69%	0.41%	0.41%	49.48%

This table presents information on earnings announcement dates and times for a randomly selected sample of 300 stocks. From the 3,000 largest firms with financial information in Compustat for fiscal year 1999, we randomly select 100 firms from the tercile with the smallest, medium, and largest firms. For these firms we collect earnings announcement dates and times from Factiva. Panel A presents the number of earnings announcements from 1995 to 2004 and shows the percentage of announcements with no time entry (*NoTime*), and the percentage of announcements that take place after trading closes (*AMC*), before trading opens (*BMO*), and during trading (*DUR*). In Panel B, F indicates the Factiva earnings announcement date and C indicates the Compustat earnings announcement date. $C = F$ indicates that the earnings announcement dates according to Compustat and Factiva are the same, and $F + 1$ indicates one day after the announcement date in Factiva. Panel C presents evidence on the accuracy of event dates from Compustat, where the correct date is based on Factiva and is adjusted for after-hours announcements. 0 (+1) indicates the announcement date from Compustat is correct (one day later than the correct event day 0). Panel C excludes observations with no time entry.

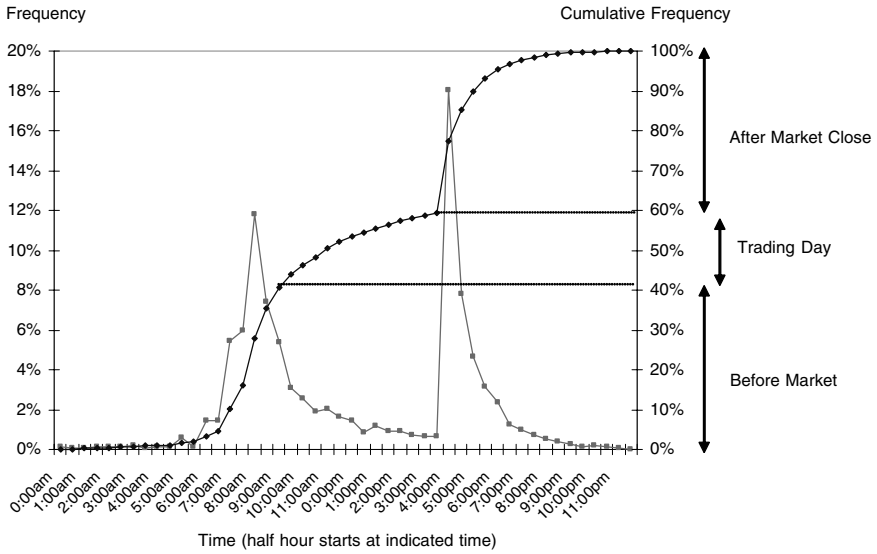

Fig. 2.—Intraday frequency of earnings announcements 1995 to 2004. Figure 2 presents the number of earnings announcements as a percentage of the total number of earnings announcements in the sample for half-hour intraday intervals. The sample is selected from the 3,000 largest firms with financial information in Compustat for fiscal year 1999. We randomly select 100 firms from each tercile with the smallest, medium, and largest firms. For these firms we collect earnings announcement dates and times from Factiva. The sample period is from 1995 through 2004, and there are 5,499 observations in our sample. Figure 2 also plots the cumulative frequency distribution of earnings announcements throughout the day.

Based on information from Factiva, we calculate the number of earnings releases for each half hour of the day.[24] Figure 2 plots the half hourly number of earnings announcements as a percentage of the total number of earnings announcements in the Factiva sample. Figure 2 also plots the cumulative frequency distribution of earnings announcements throughout the day.

Figure 2 shows that there are only a few earnings releases between midnight and 7 a.m. The number of announcements increases after 7 a.m., and peaks in the half hour from 8:00 a.m. to 8:30 a.m. Overall, 41% of the earnings announcements in our sample take place before the opening. The number of earnings announcements is still relatively high in the first half hour after the opening, but drops off during the trading day. Overall, 18% of the earnings announcements in our sample take place during the trading day. The highest number of earnings announcements occurs in the first half hour after the close.[25] In total, 41% of the earnings announcements in our sample take place after the close of the trading day.

[24] We use the Factiva sample rather than the WSJ sample because earnings announcement times for most announcements in WSJ.com are indicated as "BMO" or "AMC." Earnings announcements obtained from Factiva are time stamped to the minute.

[25] There are 59 announcements (1.1%) for which the reported time of the earnings release is 4:00 p.m. These announcements are included in the (after-hours) announcements from 4:00 p.m. until 4:30 p.m.

4.3 REPLICATION OF PRIOR STUDY

Mendenhall [2004] finds that the magnitude of the post–earnings announcement drift is statistically and economically related to arbitrage risk. This author's results support the view of post–earnings announcement drift as an underreaction to earnings information.

Mendenhall [2004] measures post–earnings announcement abnormal return over a window that starts at Compustat day +1. Since this abnormal return measure includes the price reaction to after-hours earnings announcements, we expect the relation between the earnings surprise and the "post"announcement abnormal return to be overstated (see section 2). To investigate this issue, we replicate the research in Mendenhall [2004], and compare the results when the postannouncement abnormal return is measured over a window that starts at Compustat day +1 ($QTRCAR_{i,q,1}$) with the results when the postannouncement abnormal return is measured over a window that starts at Compustat day +2 ($QTRCAR_{i,q,2}$).

We follow the sample selection procedures outlined in Mendenhall [2004] and obtain a sample of 52,418 observations for the period 1991 to 2000. The sample in Mendenhall [2004] comprises 52,575 earnings announcements. Based on Mendenhall [2004], we estimate the following model for every quarter in the sample period

$$\begin{aligned} QTRCAR_{i,q,1} \text{ or } QTRCAR_{i,q,2} = \text{Intercept} &+ \beta_1 SUE_{iq} + \beta_2 SUE_{iq} * ARBRISK_{iq} \\ &+ \beta_3 SUE_{iq} * EXPRISK_{iq} + \beta_4 SUE_{iq} * PRICE_{iq} \\ &+ \beta_5 SUE_{iq} * VOLUME_{iq} + \beta_6 SUE_{iq} * INST_{iq} \\ &+ \beta_7 SUE_{iq} * ANUM_{iq} + \varepsilon_{iq}. \end{aligned} \tag{4}$$

$QTRCAR_{i,q,1}$ is the compound return from Compustat day +1 through the day of the subsequent announcement, minus the compound return of the corresponding CRSP equally weighted size decile of which the stock is a member at the start of the calendar year. $QTRCAR_{i,q,2}$ is defined in the same way, but starts at Compustat day +2.

Following Mendenhall [2004], we define $SUE_{i,q}$ as the difference between the actual quarterly earnings and the mean analyst forecast from I/B/E/S (less than 90 days old) for firm i in quarter q, scaled by the cross-sectional standard deviation of the forecasts. *ARBRISK* is the residual variance from a market model regression of monthly stock returns on the Standard and Poor's (S&P) 500 returns for 48 months ending one month before the announcement. *EXPRISK* is the explained variance from the market model regression. *PRICE* is the closing price on day −20, and *VOLUME* is the average trading volume from day −270 to day −21. *INST* is the fraction of shares held by institutional investors in the calendar quarter prior to the earnings announcement (from 13F filings) and *ANUM* is the number of analysts providing forecasts to I/B/E/S within 90 days prior to the announcement. Based on Mendenhall [2004], we transform the variables on the right-hand side of model (4) to scores from −0.5 to 0.5 based on their

decile rank within each calendar quarter, and we delete all observations whose *QTRCAR* are within the extreme 1% of each end of the distribution. Finally, as discussed in Mendenhall [2004], pooled cross-sectional regression models such as model (4) might have inflated *t*-statistics, due to a lack of independence across observations. We therefore focus on time-series *t*-statistics.

Table 8, panel A, corresponds to table 3 in Mendenhall [2004]. This panel also reports the expected sign for each of the coefficients based on previous research (Mendenhall [2004, table 1]). The first two rows in table 8, panel B report the results of our replication for the two postannouncement abnormal return measures. The third row in panel B reports the difference in estimated coefficients.

From table 8, panel B, we see that the coefficient for *SUE* is 6.4 if $QTRCAR_{i,q,1}$ is used, while the coefficient for *SUE* is only 4.6 if $QTRCAR_{i,q,2}$ is used. Thus, post–earnings announcement drift is overstated by almost 40% if Compustat day +1 is included in the window over which the postannouncement abnormal return is measured (the *t*-statistic for the difference is 10.1). Consistent with Mendenhall [2004], the coefficient for $SUE * ARBRISK$ indicates that post–earnings announcement drift is significantly related to arbitrage risk. However, the coefficient for $SUE * ARBRISK$ is overstated by more than 60% if the return on Compustat day +1 is included in the postannouncement abnormal return measure. Again, the difference in coefficients is highly significant.

As discussed above, the use of a postannouncement window that starts at Compustat day +2 correctly excludes the earnings announcement return for after-hours announcements. However, using a window that starts at Compustat day +2 also implies that, for BMC announcements, the postannouncement abnormal return does not include the return on the correct day +1. To avoid this tradeoff, we also estimate model (4) for the WSJ sample (see section 2) and measure post–earnings announcement abnormal return starting at day +1, where day +1 is adjusted for after-hours announcements. These results are presented in the second row of table 8, panel C. The first row of table 8, panel C presents results for the Compustat sample, where the post–earnings announcement window starts at Compustat day +1, as in Mendenhall [2004].

Table 8, panel C shows that *SUE* and $SUE * ARBRISK$ are significantly positive if Compustat day +1 is erroneously included in the postannouncement window for AMC announcements. However, using the adjusted event day +1 as the starting point of the postannouncement window, there is no evidence of post–earnings announcement drift and no evidence that arbitrage risk affects post–earnings announcement drift.[26] The last row shows that

[26] Using the same sample, we document significant post–earnings announcement drift for the period 2000 through 2004 in table 4, panel B. When we use the most recent earnings forecast to calculate $SUE_{i,q}$ (as in table 4) instead of the mean analyst forecast, the estimated coefficient for *SUE* increases to 2.043 (*t*-statistic is 2.57). If we use this alternative measure of *SUE*, the estimated coefficient for $SUE * ARBRISK$ is still insignificant.

TABLE 8

Arbitrage Risk and Post–Earnings Announcement Drift

	(1) Intercept	(2) *SUE*	(3) *SUE* ∗ *ARBRISK*	(4) *SUE* ∗ *EXPRISK*	(5) *SUE* ∗ *PRICE*	(6) *SUE* ∗ *VOLUME*	(7) *SUE* ∗ *INST*	(8) *SUE* ∗ *ANUM*	
Panel A: Determinants of post–earnings announcement drift 1991 to 2000: Mendenhall [2004, table 3]									
QTRCARi,q,1	−0.832*	6.975***	6.815***	0.349	2.326*	−4.895***	1.442	0.753	$N = 52{,}575$
	(−1.81)	(13.14)	(5.21)	(0.95)	(1.76)	(−3.10)	(0.85)	(0.59)	Adj. $R^2 = 1.56\%$
Expected sign		+	+	+/0	−	−	−	−	
Panel B: Replication of Mendenhall [2004]: 1991 to 2000									
QTRCARi,q,1	−1.309***	6.442***	7.299***	0.586	−1.246	−3.844	−0.925	−3.914	$N = 52{,}418$
	(−2.93)	(7.39)	(3.25)	(0.33)	(−0.38)	(−1.19)	(−0.58)	(−1.89)	Adj. $R^2 = 1.23\%$
QTRCARi,q,2	−1.381***	4.622***	4.368*	0.811	−1.276	−4.660	−0.578	−3.501*	$N = 52{,}418$
	(−3.09)	(5.27)	(2.01)	(0.47)	(−0.39)	(−1.37)	(−0.38)	(−1.69)	Adj. $R^2 = 1.14\%$
Difference	0.072**	1.819***	2.931***	−0.225	0.030	0.816	−0.578	−0.414	
	(2.38)	(10.07)	(5.51)	(−0.46)	(1.07)	(1.19)	(−0.38)	(−1.07)	
Panel C: Extension of Mendenhall [2004] to the Compustat and WSJ samples: 2000 to 2004									
Compustat-	−0.338	4.500***	5.755**	0.551	−0.483	0.403	−2.132	−2.437	$N = 34{,}519$
QTRCARi,q,1	(−0.71)	(3.29)	(2.23)	(0.29)	(−0.11)	(0.12)	(−1.33)	(−1.37)	Adj. $R^2 = 0.55\%$
WSJ-QTRCARi,q,1	−0.390	1.217	2.045	−1.259	−0.636	−0.367	−1.695	−2.707	$N = 34{,}519$
	(−0.80)	(0.94)	(0.78)	(−0.64)	(−0.16)	(−0.13)	(−1.10)	(−1.63)	Adj. $R^2 = 0.21\%$
Difference	0.051	3.282***	3.710***	1.809**	0.152	0.770	−0.438	0.271	
	(0.67)	(8.14)	(3.66)	(2.24)	(0.18)	(1.17)	(−1.10)	(0.41)	

This table presents the results of determinants of post–earnings-announcement drift as in table 3 of Mendenhall [2004]. $QTRCAR_{i,q,1}$ is the compound return from Compustat day +1 relative to the earnings announcement through to the day of the subsequent announcement minus the compound return of the corresponding CRSP size decile. $QTRCAR_{i,q,2}$ is defined similarly, but is measured from Compustat day +2 through to the day of the subsequent announcement. *SUE* is the difference between actual earnings and the mean analyst forecast from I/B/E/S, scaled by the cross-sectional standard deviation of the forecasts. *ARBRISK* is the residual variance from a market model regression of stock monthly return on S&P 500 return for the 48 months ending one month before the announcement. *EXPRISK* is the variance of the return explained by the market model regression. *PRICE* is the closing price on day −20, *VOLUME* is the average trading volume from day −270 to day −21, *INST* is the fraction of shares held by institutional investors, and *ANUM* is the number of analysts providing forecasts in I/B/E/S within 90 days to the announcement. Following Mendenhall [2004], we convert these variables to scores from −0.5 to 0.5 for each quarter. The results are from Fama–MacBeth regressions where the model is estimated each quarter and we average the coefficients across all year-quarters. The reported adjusted R^2 values are also averaged across year-quarters, whereas the number of observations is the total number across all quarterly regressions. The Fama–MacBeth *t*-statistic is computed using the time-series standard error. Panel A presents the results documented in table 3 of Mendenhall [2004]. Panel B presents our replication of Mendenhall [2004]. Panel C presents our replication of Mendenhall [2004] for the WSJ and Compustat samples described in section 2.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

using a post–earnings announcement window that starts at Compustat day +1 results in coefficients for *SUE* and *SUE* ∗ *ARBRISK* that are significantly overstated, compared to coefficients from a model that uses a measure of postannouncement return that accounts for after-hours announcements.

5. *Summary*

Event studies of earnings announcements typically assign the Compustat or I/B/E/S earnings announcement date as event day 0. However, for after-hours earnings announcements, this is incorrect. For these announcements, new earnings information is not reflected in the price until the first trading day after the earnings announcement date. Thus, if event dates are not adjusted, event day 0 is misspecified for after-hours announcements.

In this study, we show that daily returns, volume, and volatility around event day 0 are significantly biased if the event dates are not adjusted for after-hours announcements. We also argue that, if announcement times are not available, abnormal returns, volume, and volatility in reaction to earnings announcements should be measured over windows that include the first trading day after the earnings announcement (Compustat or I/B/E/S event day +1) to ensure that market responses related to after-hours announcements are included. For measures of post–earnings announcement abnormal return, the return on Compustat day +1 should *not* be included, since after-hours announcements then create a spurious positive relation between the post–earnings announcement abnormal return and earnings surprise.

APPENDIX A

Earnings Announcements with No Time Entry on WSJ.Com

In this appendix, we test whether there are significant differences in the characteristics of firms for which WSJ.com reports the time for all their earnings announcements, and firms for which WSJ.com does not report the announcement time for one or more earnings announcements. We also examine daily size-adjusted returns on Compustat days −1, 0, and +1 for the sample of earnings announcements with no time entries.

We first split our sample into BMC firms, AMC firms, and AMC-BMC firms (see section 3). Based on the criterion of whether WSJ.com provides information on the timing of all earnings announcements of a firm, we further subdivide these three groups. Next, we calculate the average value of each firm characteristic across all earnings announcements per firm, and average these firm-specific averages across all firms in each group.[27] Table A1 reports the results.

[27] To calculate abnormal volume and volatility, we delete all earnings announcements for which we do not have an announcement time. The results are robust if we assume that the announcements for the AMC firms are made after the close, and that the announcements of the BMC firms are made before the close.

TABLE A1

Earnings Announcements with No Time Entry on WSJ.com

Panel A: BMC firms

Time for all announcements	(1) Yes	(2) No	(3) *p*-Value: (1) = (2)
Number of firms	172	710	–
Size (000s)	6,405,486	8,172,181	0.43
Leverage	0.192	0.216	0.15
Book-to-market	0.505	0.545	0.06*
NASDAQ	0.385	0.342	0.38
Earnings surprise (%)	−0.098	−0.007	0.12
Abnormal volume (%)	0.641	0.621	0.26
Volatility (%)	2.521	2.658	0.22

Panel B: AMC firms

Time for all announcements	(1) Yes	(2) No	(3) *p*-value: (1) = (2)
Number of firms	244	447	–
Size (000s)	3,228,809	3,994,331	0.20
Leverage	0.150	0.151	0.91
Book-to-market	0.473	0.517	0.15
NASDAQ	0.642	0.655	0.66
Earnings surprise (%)	−0.041	0.033	0.59
Abnormal volume (%)	0.964	0.901	0.22
Volatility (%)	4.224	4.024	0.10*

Panel C: AMC-BMC firms

Time for all announcements	(1) Yes	(2) No	(3) *p*-Value: (1) = (2)
Number of firms	273	999	–
Size (000s)	4,083,830	4,295,879	0.84
Leverage	0.189	0.199	0.48
Book-to-market	0.542	0.579	0.63
NASDAQ	0.458	0.448	0.56
Earnings surprise (%)	0.056	−0.038	0.91
Abnormal volume (%)	0.732	0.684	0.08*
Volatility (%)	3.137	3.332	0.12

This table presents descriptive statistics for firms for which WSJ.com reports the time for all earnings announcements and for firms for which WSJ.com does not report the announcement time for one or more earnings announcements. Similar to table 1, we first split our sample into AMC firms, BMC firms, and AMC-BMC firms. Based on the criterion whether or not WSJ.com provides information on the timing of all earnings announcements of a firm, we further subdivide these three groups. Next, we calculate the average value of each firm characteristic across all earnings announcements per firm, and average these firm-specific averages across all firms in each group. Variable definitions are in table 1. The *p*-value in column (3) is based on a *t*-test that the means of each variable for the two groups of firms are not significantly different.

*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Table A1, panel A shows that 172 firms in the group of BMC firms have a time entry for all earnings announcements in our sample. In total, 710 firms in this group have one or more earnings announcements for which WSJ.com does not report an announcement time. Comparison of the two groups reveals that, with the exception of the book-to-market ratio, firm characteristics of the two samples are not significantly different (column (3)).

TABLE A2

Returns around Earnings Announcements with No Reported Time on WSJ.com

	Compustat		
Event Day	−1	0	1
Quintile			
1	−0.018	−1.253***	−1.018**
	(−0.16)	(−7.57)	(−2.76)
2	−0.002	−0.608***	−0.409**
	(−0.02)	(−4.68)	(−2.20)
3	0.142	0.210	0.069
	(1.56)	(1.50)	(0.57)
4	−0.029	0.551***	0.370**
	(−0.45)	(4.21)	(2.36)
5	0.282*	1.210***	0.806***
	(2.06)	(7.98)	(4.77)

This table presents average size-adjusted returns for five earnings surprise portfolios for earnings announcements for which WSJ.com does not report the announcement time. Each quarter stocks are grouped into quintiles based on earnings surprise (the difference between actual earnings and the most recent preannouncement forecast scaled by the price 10 days before the announcement). Returns are in percentage terms and are averaged over 20 quarters (Q1, 2000 to Q4, 2004). The second entry in each cell is the *t*-statistic based on the time-series standard error.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table A1, panel B reports analogous results for AMC firms. The proportion of firms for which all earnings announcements on WSJ.com have a time entry is higher than that for BMC firms. Comparison of the two groups of firms shows that, with the exception of volatility around the earnings announcement date, there are no significant differences in firm characteristics. The results for AMC-BMC firms are presented in table A1, panel C. Similar to the first two panels, there is no evidence of substantial differences in the firm characteristics between the two groups of firms.

Table A2 reports average daily size-adjusted returns on Compustat days −1, 0, and +1 for the sample of earnings announcements with no time entry. Similar to the analysis in section 3, new earnings surprise quintile portfolios are defined each quarter, and the average return on each portfolio in table A2 is the mean return of any given portfolio, averaged over the 20 quarters in the sample period. The *t*-statistic is defined as the mean of these 20 returns, divided by the time-series standard error.

From table A2, we note that a substantial portion of the earnings announcement return is realized on Compustat day +1. Averaged over quintiles 1, 2, 4, and 5, the size-adjusted return on Compustat day +1 divided by the cumulative abnormal return over day −1 through day +1 equals 40%. It is instructive to compare this with the results for the WSJ sample as well as the Compustat sample in table 3, panel A. For the WSJ sample, the price reaction on day +1 as a percentage of the three-day cumulative abnormal return averaged over quintiles 1, 2, 4, and 5 is 9.7%. For the Compustat sample, the price reaction on day +1 as a percentage of the three-day cumulative abnormal return averaged over quintiles 1, 2, 4, and 5 is 57%. Since 47%

of earnings announcements in the Compustat sample are after hours, these numbers suggest that, for every 1% increase in the proportion of after-hours earnings announcements, there is a 1% increase in the ratio of the abnormal return on day +1 to the three-day cumulative abnormal return around Compustat day 0. Assuming the same starting point of 9.7%, the estimate in footnote 4—that 28% of the announcements for which WSJ.com does not report earnings announcement times occur after the close of trading—seems quite reasonable, as it suggests a ratio of the abnormal return on day +1 to the three-day cumulative abnormal return around Compustat day 0 of 38%, which is close to the actual number in table A2 of 40%.

APPENDIX B

Different Earnings Announcement Dates on WSJ.com and Compustat

This appendix documents the differences in earnings announcement dates for the 1,033 earnings announcements that have differing announcement dates on WSJ.com and Compustat. Table B1 is a frequency table that shows differences in announcement dates between these two sources.

There are 599 announcements where the date on WSJ.com precedes the date from Compustat; the maximum difference is 97 days. There are 434 announcements where the announcement provided by Compustat precedes WSJ.com; the maximum difference is 41 days. For 683 earnings announcements (66%), the difference in earnings announcement dates is one day. Furthermore, 8% of the unmatched announcements (82 announcements) are from non-U.S. companies. For the full sample, this percentage is 3.7%. For 10 earnings announcements, the difference in announcement dates is exactly one month, suggesting typographical errors as the most likely cause of the discrepancy.

TABLE B1
Frequency of Announcement Date Differences

	Difference (in Days)	Frequency
	(−97,−21)	84
	(−20,−6)	84
	−5	17
	−4	29
Compustat is later than WSJ.com	−3	18
	−2	45
	−1	322
	1	361
	2	10
WSJ.com is later than Compustat	3	18
	4	3
	5	3
	(6,20)	27
	(21,41)	12

This table reports the number of earnings announcements with different announcement dates on WSJ.com and Compustat for different groups depending on the length of the difference in days.

For each of the 14 groups in table B1, we search Factiva for the first 10 earnings announcements (based on alphabetical ordering of company names), in order to explain the differences in announcement dates.[28] For the seven groups where Compustat is later than WSJ.com, the announcement date according to Factiva is the same as the WSJ.com announcement date in 67 cases. The announcement date according to Factiva is the same as the Compustat announcement date in three cases. Moreover, for the dates that do not correspond to the Factiva date, we fail to find any announcements that can explain the discrepancy (i.e., 3 announcement dates from WSJ.com and 67 announcement dates from Compustat).

For the seven groups where the Compustat announcement precedes the WSJ.com announcement, the date from Factiva is the same as the WSJ.com announcement date in 41 cases. The announcement date according to Factiva is the same as the Compustat announcement date in 15 cases. Again, for the dates that do not correspond to the Factiva date, we generally fail to find any announcements that can explain the discrepancy. However, we find one case where the (incorrect) announcement date is also the date of an earnings restatement, one case where the date coincides with the issuance of a management earnings forecast, and three cases where the earnings announcement date from WSJ.com is the date of a conference call.

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[28] For these announcements we also compare actual earnings per share according to the three alternative sources. After correction for stock splits, we find that, for these announcements, earnings per share recorded in Compustat, Factiva, and WSJ.com are the same.

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