Macro News and Micro News: Complements or Substitutes?

Hirshleifer, David and Sheng, Jinfei

University of California Irvine, University of California Irvine

28 December 2016

Macro News and Micro News:

Complements or Substitutes?

David Hirshleifer Jinfei Sheng*

June 2021

We study how the arrival of macro-news affects the stock market's ability to incorporate the information in firm-level earnings announcements. Existing theories suggest that macro and firm-level earnings news are attention substitutes; macro-news announcements crowd out firm-level attention, causing less efficient processing of firm-level earnings announcements. We find the opposite: the sensitivity of announcement returns to earnings news is 17% stronger, and post-earnings announcement drift 71% weaker, on macro-news days. This suggests a complementary relationship between macro and micro news that is consistent with either investor attention or information transmission channels.

Keywords: macro news, earnings announcements, market efficiency, investor attention, information transmission, complementary relationship
JEL Classification: E44, G12, G14, G04

* David Hirshleifer: Merage School of Business, University of California, Irvine and NBER. Email: david.h@uci.edu. Jinfei Sheng: Merage School of Business, University of California, Irvine. Email: jinfei.sheng@uci.edu. We thank Markus Baldauf, Jan Bena, Vincent Bogousslavsky, Oliver Boguth, Murray Carlson, Nuno Clara (discussant), Jack Favilukis, Adlai Fisher, Ron Giammarino, Thomas Gilbert, Will Gornall, Alexander Hillert (discussant), Shiyang Huang, Kai Li, Russell Lundholm, Christoph Meinerding (discussant), Carolin Pflueger, Pavel Savor (discussant), Yushui Shi, Eric Swanson, Joshua Thornton, Selim Topaloglu (discussant), Wanyi Wang, Liyan Yang, Alminas Zaldokas (discussant), and seminar and conference participants at the University of British Columbia, University of Sydney, European Finance Association Conference, RCFS/RAPS Conference, Conference on Financial Economics and Accounting (Tulane University), American Finance Association Conference Poster Session, Northern Finance Association Conference, Yale Whitebox Advisor Behavioral Finance Conference, LBS TADC, and Financial Management Association Conference for helpful comments. We thank Michael Drake for sharing the daily Google Search Volume data. We thank Yichun He, Joshua Thornton, Yushui Shi, and Wanyi Wang for excellent research assistance. Jinfei Sheng gratefully acknowledges the financial support from the Canadian Securities Institute Research Foundation. Earlier versions of this paper were circulated under the title "Macro News, Micro News, and Stock Prices."

Macro News and Micro News:

Complements or Substitutes?

June 2021

We study how the arrival of macro-news affects the stock market's ability to incorporate the information in firm-level earnings announcements. Existing theories suggest that macro and firm-level earnings news are attention substitutes; macro-news announcements crowd out firm-level attention, causing less efficient processing of firm-level earnings announcements. We find the opposite: the sensitivity of announcement returns to earnings news is 17% stronger, and post-earnings announcement drift 71% weaker, on macro-news days. This suggests a complementary relationship between macro and micro news that is consistent with either investor attention or information transmission channels.

Keywords: macro news, earnings announcements, market efficiency, investor attention, information transmission, complementary relationship
JEL Classification: G12, G14, G02

1. Introduction

To understand how the market processes multiple signals that are relevant for pricing a security, there are possible informational and attentional interactions. For example, investors often face both economy-wide (macro) and firm-specific (micro) news. To provide insight into interactions between information signals, we study here how the arrival of macro news affects the stock market's ability to incorporate the information in firm-level earnings announcements.

Existing theories suggest that macro news will impede the processing of earnings news. In theories of optimal attention allocation, investors with limited attention face a tradeoff between allocating time or cognitive resources to macro versus firm-level news. For instance, in the model of Peng and Xiong (2006), investors tend to process market- and sector-wide information before processing firm-specific information owing to economies of scale in processing the market- and sector-wide information.

This theory emphasizes the *substitution* between attention to macro versus firm-level news. The arrival of macro news distracts investors, reducing the attentional resources available to process firm-level earnings news. Theoretical models have shown that limited investor attention induces firm-level mispricing, including underreaction to earnings surprises (Hirshleifer and Teoh 2003; Peng and Xiong 2006; Hirshleifer, Lim, and Teoh 2011), consistent with evidence from empirical studies suggesting that investor inattention delays the incorporation of earnings news into stock prices.[1] So if investor attention is limited, macro news that causes investors to shift attention from the firm level to the aggregate level will make the market less efficient in processing

[1]It is well-documented that market prices incorporate the information in earnings surprises sluggishly, post-earnings announcements drift, or PEAD (Ball and Brown 1968; Bernard and Thomas 1989, 1990). Other studies find that prices react more sluggishly when there is greater distraction from other firms' same-day earnings announcements (Hirshleifer, Lim, and Teoh 2009), and when the earnings news is released on a Friday (DellaVigna and Pollet 2009).

firm-level earnings news. Specifically, the market will react more sluggishly, increasing underreaction.

Motivated by the limited attention theory, we examine the sensitivity of stock market reactions to earnings news on days either with or without major macroeconomic announcements. We test for the effects of macro news on both the initial stock price reaction to earning news, and the subsequent post-earnings announcement drift (PEAD). Specifically, we study whether macroeconomic announcements on a given day causes weaker incorporation by the stock market of firm-specific earnings news on that day.

Surprisingly, we find that the effects of macro news are opposite to the theoretical prediction: macro news is associated with greater incorporation of firm-level news into stock prices. We find that the immediate price reaction to a firm's earnings surprise is stronger and the drift is weaker when the macro news is released on the same day. This suggests that earnings information released on macro-news days is incorporated into stock prices faster, leading to more efficient stock valuation. In other words, our findings suggest a *complementary relationship* between macro news and firm-level news. The complementary relationship remains after controlling for existing determinants of market reactions to earnings news, such as the number of earnings news, the day of the week, and the level of market returns. The magnitude of the complementary relationship is economically large. Firms with the largest earnings surprises on macro-news days experience a 17% higher immediate price reaction and a 71% lower post-earnings announcement drift compared to reactions to earnings surprises on other days.

The complementary relationship between macro and micro news can be exploited to form a profitable trading strategy. In general, a trading strategy based upon PEAD buys firms that have positive earnings surprises and sells firms with negative surprises. Consistent with past research

on the PEAD anomaly, in our sample a PEAD trading strategy generates about 1% abnormal returns per month among earnings announcements released on non-macro-news days. However, we further find that the abnormal returns to a PEAD strategy are small and statistically insignificant for earnings released on macro-news days. This finding is consistent with the conclusion that on macro-news days, earnings information is incorporated more rapidly, eliminating the opportunity to profit by trading based on earnings surprises.

Why is the processing of earnings news more efficient on macro-news days? We explore four potential explanations. These explanations are not mutually exclusive. The first possible explanation derives from the fact that investors allocate attention across more than just the two margins of macro and micro news about stocks, and that macro news draws attention away from other activities to analysis of stocks. Investors, in their daily lives, must devote time and effort to activities unrelated to the immediate processing of stock market news. For retail investors, this includes their leisure and work activities. For institutional investors such as fund managers, in addition to leisure activities, this also includes a major portion of their work activities.[2] Investment managers have administrative and human resource tasks, marketing and client-networking tasks, and general investment management tasks such as research about possible trading strategies.

It follows that on a given day an investor can potentially devote more or less attention to *both* macro- and firm-level news, trading off against the other targets of investor attention. The arrival of important macro news, such as a Federal Open Market Committee (FOMC) decision, can trigger a shift in investor attention simultaneously toward studying macroeconomic implications and the implications for the fundamentals of individual firms. If so, at such times the market may incorporate firm-specific news more efficiently as well. Although this third margin for attention

[2]There is evidence that even institutional investors are distracted by competing information (e.g., Corwin and Coughenour 2008; Kempf, Manconi, and Spalt 2017).

allocation is economically intuitive and compelling, it has received much less emphasis in the existing literature.[3]

A possible objection to this argument is that only trivial firm-specific analysis is needed in response to a macro event, so that there is no reason for such an event to trigger extra firm-level attention.[4] However, the incorporation of macro information is complicated by the fact that firms' betas and factor loadings continually evolve over time.[5] So incorporating major macro-news accurately requires examination of firms' evolving fundamentals. Such a reexamination is likely to be complementary with incorporating the information in earnings news.

To test whether macro-news does indeed trigger greater investor attention to firm-specific news, we use a measure of abnormal institutional investor attention (AIA) from Bloomberg (Ben-Rephael, Da, and Israelsen 2017). We find that AIA is higher on macro-news days in general and that AIA to firms with earnings announcements is higher when macro news is released on the same day. Furthermore, attentional tradeoffs seem to be important for institutional investors; we find that the effect of macro-news on AIA is concentrated among firms with high institutional ownership. These results are consistent with the attention explanation that the effect of macro news on market reactions to earnings announcements derives from investor attention.

An alternative possible explanation for our findings is that macro news may contain information that affects rational interpretations of firm-level earnings news. In particular, the

[3]Goldstein and Yang (2015) provide theoretical evidence that the presence of complementarities between two firm-level signals facilitates information acquisition and improves price informativeness.

[4]If firm and macro fundamentals were multivariate normal, then a firm would inherit any fundamental consequences of macro news in proportion to its loading on the relevant fundamental factor. So if, in addition, investors perfectly knew beta and loadings, they would be able to calculate in a straightforward way the implications of macro news for firm fundamentals.

[5]This is in part due to leverage, which shifts loadings in response to fluctuations in firm value and borrowing. It is in part due to fluctuations in the value and moneyness of firms' real options. Furthermore, in conglomerates, different divisions have different loadings, and the value weights on different divisions are continually fluctuating (see e.g., Boguth, Duchin, and Simutin 2020).

presence of macro news might potentially make firm-level news more informative about value, resulting in stronger reactions to earnings announcements. We call this the information transmission effect. Theoretical research suggests that investors rationally react more to the same firm-specific news more when revealed in downturns than in upturns (e.g., Schmalz and Zhuk 2018). This suggests that the macro news may sometimes contain information that makes stock prices more sensitive to earnings announcements.

To explore this possibility, we conduct tests on analyst forecasts. If information from macro news complements firm-specific news in the sense of making firm-specific news more informative, analysts forecast revisions should be more sensitive to firm-level earnings news. Consistent with this argument, we find analysts revise their forecasts more frequently, and provide more accurate forecasts, when earnings announcements are released on macro-news days.

The limited attention explanation for the complementary relationship has the appealing feature that it also explains why post-earnings announcement drift is weaker when there is macro-news: because more earnings information is incorporated quickly into price. It is not obvious whether the information transmission explanation for the complementary relationship of macro news to the immediate price reaction to earnings news also explains the effect on post-earnings announcement drift, but we do not rule out this possibility.

Estimates of the complementarity or substitutive relationship between macro and earnings news could potentially be influenced by firms strategically choosing to announce their earnings on macro-news versus no-macro-news days. Based on past studies, we categorize firms as strategically changing their earnings announcement dates if the announcement date differs from their previous same-quarter date by more than five days. We find that the complementary relationship is concentrated among firms that do not strategically change their earnings

announcement dates. This suggests that strategic timing does not drive the complementary relationship.

Finally, we consider the possibility that the complementary relationship between macro and micro news is driven by a firm's liquidity premium. Previous studies find that the earnings announcement premium is associated with liquidity risk (Sadka 2006; Frazzini and Lamont 2007). It is possible that firms with a positive earnings surprise have greater liquidity on macro-news days. Using two measures of liquidity, we find that liquidity is higher on macro-news days in general. However, firms with high earnings surprises do not have more liquidity on days with macro news compared to firms with low earnings surprises. These findings suggest that it is unlikely that liquidity explains the complementary relationship.

This paper bears upon several strands of literature, including theories of rational inattention (e.g., Sims 2003) discussed earlier.[6] The literature on the determinants of investors' reactions to earnings announcements finds evidence of lower investor attention to firm-level earnings announcements when earnings are announced on Fridays (DellaVigna and Pollet 2009), when there is a greater number of distracting same-day earnings announcements from other firms (Hirshleifer, Lim, and Teoh 2009), and when the market return is low (Gulen and Hwang 2012). Our paper differs in documenting how macro news affects price reactions to firm-level earnings announcements, and in particular documents how macro news can *attract* attention rather than distract.

This paper extends the literature on how macro news affects stock markets in two ways (e.g., Boyd, Hu, and Jagannathan 2005; Gilbert 2011; Gilbert et al. 2017).[7] First, we provide a more

[6]This paper is also related to the literature on the determinants and asset pricing implications of investor attention (e.g., Da, Engelberg, and Gao 2011; Ben-Rephael, Da, and Israelsen 2017; Liu, Peng, and Tang 2019).

[7]More generally, this paper also relates to the literature on media coverage and stock market anomalies (Chan 2003; Hillert, Jacobs, and Muller 2014; Engelberg, McLean, and Pontiff 2018).

direct test of the effect of macro news on market efficiency. Our results suggest that the stock market is more efficient on macro-news days in the sense that earnings information is incorporated into stock price faster.

There are past studies that provide indirect evidence that the presence of macro-news is related to efficient processing of firm-level information. For instance, Savor and Wilson (2014) find that CAPM fits stock returns better on macro-news days, suggesting that the stock market is more efficient on macro-news days. Their approach to testing how macro-news affects market efficiency therefore relies on the validity of the asset pricing model (Fama 1970). Our approach does not make strong assumptions about the underlying asset pricing model.

Second, this paper speaks to the debate on the underlying mechanisms through which macro news affects asset prices. While some studies offer risk-based explanations for their findings (Savor and Wilson 2013, 2014), others suggest that imperfect rationality is important (Lucca and Moench 2015; Cieslak, Morse, and Vissing-Jogensen 2019; Fisher, Martineau, and Sheng 2021). Our findings suggest that investor attention allocation and information transmission both may play a role in explaining how macro news affects the market for individual stocks.

2. Data

2.1 Macroeconomic announcements

We first select a set of important macro announcements from a list of 40 macro announcements by Bloomberg Econoday. This data has macro announcements since 1997. We define a day to be a macro-news day (hereafter, Macroday) if one of the following four announcements happens on this day: the Federal Open Market Committee (FOMC) decision, Nonfarm Payroll, ISM PMI, and Personal Consumption. These days make up 23% of all trading days. The rationale for selecting

these four announcements is given below.

Following Savor and Wilson's (2013) method, we test whether the market excess return (market return minus riskfree rate) is significantly higher on announcement days for each type of macroeconomic announcement. The announcements that have statistically and economically significant impacts on the market excess return include FOMC, Nonfarm Payroll, ISM PMI, and Personal Consumption. The results are provided in the Internet Appendix. The importance of the FOMC announcement is well documented (see, e.g., Lucca and Moench 2015). Gilbert et al. (2017) find that macroeconomic announcements, including Nonfarm payroll, ISM PMI, and Personal consumption, are important for financial markets.

2.2 Earnings news

We obtain quarterly earnings release data from Compustat and I/B/E/S as micro news from 1997 to 2014. Following Hirshleifer, Lim, and Teoh (2009), we measure earnings surprise (ES) using Equation (1). It is the difference between actual earnings ($Actual$) for the quarter recorded by I/B/E/S and the median forecast ($Forecast$) included in the I/B/E/S detail file during the 30 days before the quarterly earnings announcements scaled by the stock price ($Price$) at the end of the corresponding quarter.

$$ES = \frac{Actual - Forecast}{Price} \tag{1}$$

Stock price response to earnings news is measured by cumulative abnormal return (CAR) for each stock, which is the raw buy-and-hold return adjusted using estimated beta from the market model. For each earnings announcement date τ of quarter t, we define the cumulative abnormal return over time period $(\tau + h,\ \tau + H)$ $CAR[h, H]$ as follows

$$CAR[h,H] = \left[\prod_{j=\tau+h}^{\tau+H}\left(1+R_{j,k}\right)-1\right] - \hat{\beta}_{t,k}\left[\prod_{j=\tau+h}^{\tau+H}\left(1+R_{j,m}\right)-1\right] \quad (2)$$

where $R_{j,k}$ is the stock return of company k on day j, $R_{j,m}$ is the market return on day j, and $\hat{\beta}_{t,k}$ is obtained from the market model regression $R_{j,k} = \alpha_{t,k} + \beta_{t,k}R_{j,m} + \epsilon$ for days j from $\tau - 300$ to $\tau - 46$.

For the immediate stock price reaction, we use CAR over a 2-trading-day window [0, 1]. For drift, we use CAR over a 60-trading-day window [2, 61]. In Section 3.1, we show that the results are robust to alternative choices of windows. We exclude the penny stocks, observations in which actual or forecast earnings are greater than stock price, and those with a missing earnings surprise. The final sample includes 158,399 observations.

2.3 Summary statistics

Table 1 Panel A reports summary statistics based on the full sample. It shows that, on average, there are 118 earnings announcements per day. The mean immediate reaction to an earnings announcement ($CAR[0,1]$) is 0.1 %, and the mean of the drift ($CAR[2,61]$) is 1%. Panel B shows the same statistics, conditional on being on a Macroday, compared to all other days. On average, Macrodays have a significantly fewer number of earnings announcements and higher market return. Firms that release their earnings announcements on macro-new days have significantly higher immediate reaction to earnings news ($CAR[0,1]$), and lower drift ($CAR[2,61]$).

3. Macro news and the processing of firm-level earnings news

We next describe tests of whether there is a complementary or substitute relationship between macro news and market sensitivity to micro news. Then, in Subsection 3.2 we test the relationship

using a portfolio trading strategy.

3.1 Main results

We test whether reactions to earnings announcements on days with macro news are different from reactions on other days. Following existing literature, we rank firms' earnings surprises and assign them into 11 quantiles for each year. Firms with negative surprises are equally assigned to quantiles 1 to 5, and firms with positive surprises are equally assigned to quantiles 7 to 11. Firms with zero surprises are labeled as quantile 6. In general, the earnings announcement literature uses earnings surprise quantiles rather than the raw value of earnings surprise because raw earnings surprises do not result in a well-specified linear regression (Bernard and Thomas 1989). In Section 6, we show that the results are robust to alternative choices of earnings surprise partitions, such as decile sorting.

We first focus on the top and bottom groups, quantiles 1 and 11, because this makes it easy to interpret the magnitude of the effect. To test for the effect of macro news on the processing of earnings news, we run the following regression

$$CAR = a_0 + a_1 ESTOP + a_2 Macroday + a_3 (ESTOP \times Macroday) + \sum_{i=1}^{n} [b_i X_i + c_i (ESTOP \times X_i)] + e \qquad (3)$$

where CAR is either $CAR\,[0,1]$ for immediate reaction, or $CAR\,[2,61]$ for drift. *ESTOP* equals to 1 if the earnings surprise quantile is 11 and 0 if the earnings surprise quantile is 1. $Macroday$ is a dummy variable equaling 1 if that day is an announcement day for any FOMC, Nonfarm payroll, ISM PMI, or Personal consumption news. X_i contains various control variables. Previous research shows that stock response to earnings news varies with firm size, analyst

coverage, day of the week, the number of the same-day earnings announcements, and the aggregate stock market return (e.g., Bernard and Thomas 1989; DellaVigna and Pollet 2009; Hirshleifer, Lim, and Teoh 2009; Gulen and Hwang 2012). Thus, we include size deciles, analyst coverage, share turnover, day of week/month/year dummies, the number of earnings announcements per day, and market returns as control variables.

We consider two hypotheses. The first, motivated by past theoretical models, holds that attention to macro news draws attention away from processing the earnings announcements of individual firms. We call this *Substitution Hypothesis.* Alternatively, motivated by the discussion in the introduction, that macro news may increase the sensitivity of price reactions to firms' earnings announcements. We call this *Complementarity Hypothesis.*

The key coefficient for testing between *Substitution Hypothesis* and *Complementarity Hypothesis* is a_3. Under *Complementarity Hypothesis,* the market's immediate reaction to earnings announcements is stronger, and the drift is weaker when macro news is released on the same day. Thus, $a_3 > 0$ for $CAR\,[0,1]$ and $a_3 < 0$ for $CAR\,[2,61]$. In contrast, under *Substitution Hypothesis*, we expect that $a_3 < 0$ for $CAR\,[0,1]$ and $a_3 > 0$ for $CAR\,[2,61]$.

Table 2 Panel A reports the results of this test. Column (1) presents the result from a parsimonious specification without including any control variables. The coefficient on the interaction term ($ESTOP \times Macroday$) is positive (1.277) and significant at the 1% level, suggesting that the price reaction to a large earnings surprise is stronger on macro-news days than on other days. The economic magnitude is also significant. Compared to the coefficient on the stock reaction to a top earnings surprise ($ESTOP$) on other days (8.352), the reaction on Macroday is greater by 15% (1.277/8.352). When control variables are included, the economic magnitude increases by 17% (1.373/8.127) in this comparison. The size of this effect is comparable to the 15%

reduction for Friday announcements documented in DellaVigna and Pollet (2009), and the 13% reduction for high-news-day earnings announcements documented in Hirshleifer, Lim, and Teoh (2009).

For post-earnings announcement drift, the coefficient on the interaction term is negative (3.682 with controls) and significant at the 5% level, suggesting that post-earning announcement drift is smaller for top surprise earnings announcements released on macro-news days compared to other days' earnings news. Column (4) shows that our estimates indicate 71% (3.458/4.846) smaller drift for earnings announcements released on macro-news days. Again, the economic magnitude is substantial, and is comparable to prior studies.[8] Overall, these results support the *Complementarity Hypothesis*.

To further understand how macro announcements affect drift, we compare the drift differences over various horizons in Figure 1. Here the drift difference is defined as the difference between average cumulative abnormal returns of the top group and of the bottom group. The drift difference between Macroday and non-Macroday announcements becomes evident on the 10th trading day after the earnings announcement, and continues to increase during the next 60 trading days. Specifically, the drift on Macroday announcements increases quickly during the first 10 trading days after announcements and decreases slightly until the 50th trading day. In contrast, the drift on non-Macroday announcements displays a completely different pattern. It increases quickly during the first 10 trading days and continues to increase until the 60th trading day. These patterns suggest that earnings news released on macro-news days is almost fully incorporated in prices within 10 trading days following the announcement, whereas earnings news released on non-Macroday

[8]Hirshleifer, Lim, and Teoh (2009) report that the post-earnings announcement drift is 75% greater for high-news-day earnings announcements compared to low-news day announcements. DellaVigna and Pollet (2009) find that the drift is 69% greater for Friday earnings announcements compared to other weekday earnings announcements.

requires much more time to be incorporated into stock prices.

In the analysis above, we restricted our attention to extreme earnings surprise quantiles in which effects should be strongest. While this approach is simple and easy to interpret, it does not take advantage of the entire sample. We next examine how macro news affects investors' reactions to earnings announcements across all earnings surprises quantiles. To empirically test this effect, we estimate the following regression

$$CAR = d_0 + d_1 ES + d_2 Macroday + d_3 (ES \times Macroday) + \sum_{i=1}^{n} [f_i X_i + g_i (ES \times X_i)] + \varepsilon \quad (4)$$

where ES is the earnings surprise quantile, which equals 1 to 11, and other variables are defined as in Equation (3). Again, the coefficient on the interaction term (in this case, d_3) is the key parameter of interest.

Table 2 Panel B reports the regression results. Consistent with Panel A, the coefficient on the interaction term ($ES \times Macroday$) is positive and significant for $CAR[0,1]$, suggesting that immediate stock response to earnings news is stronger on Macrodays than on other days. As for the economic magnitude, compared to the coefficient on the stock reaction to earnings surprise on other days (0.842), the sensitivity to earnings news is greater by 11% (0.092/0.842) on Macrodays (Column (2)). For the drift, the coefficient on the interaction term is negative and significant at the 1% level, which indicates that the drift is smaller for earnings news released on Macrodays than for earnings news on other days. Column (4) indicates a 52% (0.201/0.388) smaller drift for earnings announcements released on Macrodays.

The controls in these tests derive from previously-studied effects. First, consistent with

DellaVigna and Pollet (2009), we find that the immediate price reaction to earnings announcements is much smaller if the news is released on Friday. Second, we verify that earnings announcements released on days with a high number of earnings news releases experience much weaker immediate reaction and much stronger drift, consistent with Hirshleifer, Lim, and Teoh (2009). Third, we verify that earnings released on days with high market returns have much stronger immediate reactions, which is consistent with Gulen and Hwang (2012).

The complementary relationship between macro news and earnings announcements is present after controlling for these effects; macro news is distinct from these determinants of short- or long-horizon price reactions to earnings. Macro-news can be announced on any day of the week, so our results are not just driven by the Friday inattention effect. Macro news is also a different type of information from the occurrence of a large number of firm-level earnings announcements. Like market return, macro news is a market-wide variable. However, macro news is pre-scheduled and is associated with information release, while the market return is unpredictable ex-ante. We provide several additional robustness tests controlling for these effects in Section 5.

Most studies use $CAR[0,1]$ to measure immediate price reaction to earnings announcements, but different studies use different measures to capture drift. Most use $CAR[2,61]$ as the measure of drift as in Bernard and Thomas (1989), but some studies use longer horizons such as $CAR[2,75]$ (e.g., DellaVigna and Pollet 2009). To verify robustness of the findings in Table 2, we conduct tests based upon Equation (4) using different drift windows. Table 3 Panel A presents the result and demonstrates that the conclusion is robust.

To assess the effects of macro news on the processing of earnings news, we also look at the longevity of the drift. In our sample, there is no indication of drift beyond 240 trading days. Thus, we use the 240-day drift as the benchmark. Following Bernard and Thomas (1989), we then look

at the drift over different time horizons as a fraction of 240-day drift. The longevity of the drift is measured as the number of days until approximately 100% of the 240-day drift occurs.

Table 3 Panel B shows that the longevity of the drift is shorter for earnings announcements released on macro news days than for earnings announcements released on other days. For example, approximately 100% of the drift occurs within 210 days if earnings announcements are on macro-news days, while only 89% occurs within 210 days if earnings announcements are on days without macro news. For earnings released on non-macro-news days, the drift may last up to 240 trading days. To test whether difference in longevity of the drifts is significant, we examine the effect of macro news on the 210-day drift, which is crucial in measuring the longevity. Panel A Column (6) of Table 3 shows that the effect is statistically significant and substantial. This finding provides further support for the complementary relationship between macro and micro news. Macro news not only makes the drift of earning announcements smaller, but also shorter in terms of duration.

3.2 Portfolio trading strategy

An alternative way to test the effect of macro news on investors' reaction to earnings announcements is to design a trading strategy to exploit the fact that drift is greater for non-Macroday announcements than for Macroday announcements. This provides insight about whether sophisticated professionals understand the effects of macro-news on firm-level market efficiency. If they understand these effects well, then a trading strategy should have limited profitability for investors who trade at large scale. In other words, its profitability should either be low or concentrated in illiquid firms. Large trading profits to a liquid strategy would suggest that even sophisticated professionals are generally unaware of the effects we document.

A standard post-earnings announcement drift hedge portfolio goes long stocks with good earnings news and short stocks with bad earnings news. Owing to market underreaction to earnings

news, stocks with good earnings news will enjoy high returns within the following quarter. Similarly, stocks with bad earnings news will experience subsequent low returns within the following quarter.

The new drift trading strategy based on macro news is as follows. In month t, it purchases firms that, in month $t-1$ made announcements on a non-macro-day in the top quantile and sells short firms that made an announcement on a non-macro-day in the bottom quantile. Therefore, the return for the non-macro-day drift portfolio is $R_{NM}^{D} = R_{NM}^{11} - R_{NM}^{1}$. We construct the macro-day drift portfolio for month t following a similar procedure except that we only include firms that made an earnings announcement on a macro-news day in previous month. The return for this portfolio is $R_{M}^{D} = R_{M}^{11} - R_{M}^{1}$. The long-short portfolio of buying the non-macro-day drift portfolio and selling the macro-day portfolio has return, $R_{NM-M}^{D} = R_{NM}^{D} - R_{M}^{D}$. The intuition here is that conducting the traditional drift trading strategy on a macro-news day is not profitable or has negative profit. Thus, shorting the macro-day drift portfolio and longing the non-macro day drift portfolio will be profitable if macro-news indeed impacts investors' reactions to earnings announcements.

Table 4 presents the results of this trading strategy. Column 1 shows that a non-macro-day drift portfolio earns a return of 0.970% per month, while the return on the macro-day portfolio is much smaller and statistically insignificant (Column 2). The long-short portfolio earns 0.891% per month (Column 3). Standard risk factors, such as Fama-French three-factor are controlled in the regression (Fama and French 1993). A similar conclusion is reached using an equally-weighted method for portfolio construction (Columns 4-6). Overall, these results are also consistent with a complementary relationship between macro and micro news.

4. Explanations

So far, we have documented a complementary relationship between macro news and earnings announcements which is not explained by existing theoretical literature. We next explore four potential explanations. These explanations are not mutually exclusive.

4.1 Investor attention

The first potential explanation is investor attention. As discussed in the introduction, a leading explanation for PEAD is that investors do not pay full attention to the information in earnings news. Thus, one possible explanation for increased reactions to earnings announcements when macro news is released is that investors pay more attention to earnings news on macro-news days. Macro news events such as FOMC announcements are attention-grabbing, which can encourage investors to focus on immediate valuation in stock markets rather than other activities. As a result, the fraction of investors who update their beliefs based upon earnings news increases.

To test the attention explanation, we use two direct measures of attention. One measure is abnormal institutional investor attention (AIA), which captures the news-searching and news-reading activity for specific stocks on Bloomberg terminals. Bloomberg assigns a raw score based on the number of ticker searches and the number of clicks on related articles for each firm. The AIA is a relative index compared to the previous month's average of the raw score and has a value from 0 to 4. The majority of the Bloomberg terminal users are institutional investors, so AIA is predominantly a measure of attention of institutions (see Ben-Rephael, Da, and Israelsen 2017 for more details). The other measure is Google Search Volume Index (SVI), which captures the ticker-searching activity for each firm. Prior studies show that SVI is more informative about the attention of retail investors (Da, Engelberg, and Gao 2011; Drake et al. 2012).

We first examine whether investors pay more attention to stocks with earnings announcements on macro-news days than on days without macro-news. In Table 5 Column (1), the coefficient on $Macroday$ is positive and significant at the 1% level, indicating that institutional investor attention to all firms is higher on macro-news days than on other days. We define $Eday$ as a dummy for whether there is an earnings announcement for each firm. The coefficient on $Eday$ is positive and significant, suggesting that attention to firms is higher when firms have earnings announcements.

Turning to the primary variable of interest, the coefficient on the interaction term ($Macroday \times Eday$) is positive and significant at the 1% level (Column 2). The economic magnitude is also large. The attention to earnings announcements is about 10% higher if major macro announcements are released on the same day. This indicates that institutional investors pay more attention to firms when earnings announcements are released on macro-news days compared to when earnings announcements are released on non-macro-news days. Interestingly, we find no evidence that retail investor attention to the stock market is higher on macro-news days (Column 3) and attention to firms with earnings announcements is even lower on macro-news days (Column 4). This is consistent with the study of Liu, Peng and Tang (2019), who also find that retail investor attention gets crowded out by macro news. Overall, our findings strongly suggest that the complementary relationship between macro-news and earnings announcements is related to institutional investors' attention.

As discussed in the introduction, it is not obvious on basic conceptual grounds whether attention substitution should be increasing or decreasing in investor sophistication. Since institutional investors are very important for the pricing of individual stocks, we further test whether the complementary relationship is concentrated among firms with high institutional

ownership.

In general, it is plausible that investors pay more attention to stocks that they hold than stocks that they do not hold. This suggests two possibilities. On the one hand, if retail investors are more subject to attention limits, the effects could be stronger when retail holdings of a stock are high (i.e., institutional holdings of a stock are low). On the other hand, institutional investors tend to trade more actively than retail investors, and therefore are likely to be more important for price setting. This suggest that it is the attention of institutional investors that matters most, so that effects will be stronger in firms with high institutional holdings.

To test whether this is the case, we partition the sample of firms into low, medium, and high institutional ownership groups, and re-estimate regression Equation (4) separately for these three subsamples. Table 10 Panel C shows that the complementary relationship is only significant for firms with high institutional ownership. The economic magnitude is greater than that in Table 2. This finding again suggests the importance of institutional investors. This result does not have to hold for merely mechanically reasons. Although AIA is a good measure for institutional attention, it only captures the activities by institutional investors who use Bloomberg terminals. Institutional ownership is based on holdings of all institutional investors. Therefore, this finding provides further support for the AIA result.

4.2 Information transmission

Another possible source of the complementary relationship between macro and micro news derives from complementarity of information content. The content of macro news may make firm-level news incrementally more informative about firm value, resulting in stronger price reactions to earnings announcements.

We test this information transmission explanation by examining financial analyst forecasts of

earnings. If there is important information from macro news for interpreting firm-level news, analysts should learn from it and revise their forecasts accordingly. We test two implications of this information transmission explanation for analyst forecast revisions.

The first implication is that analysts revise their forecasts more frequently for earnings announcements that occur on macro-news days. We count the number of analyst revisions 1 to 10 days before earnings announcements. Table 6 Column (1) presents the result. The coefficient on $Macroday$ is positive, suggesting that analysts revise their forecasts more frequently for earnings announcements released on macro-news days. This is consistent with the information transmission channel.

The second implication is that analysts issue more accurate forecasts for earnings announcements released on macro-news days since they are able to learn from macro news. We define the forecast quality as the negative value of forecast errors.[9] Our premise is that small forecast errors are indicative of high forecast quality is. Table 6 Column (2) presents the result. The coefficient on $Macroday$ is positive, suggesting that analyst forecasts for earnings announcements released on macro-news days are more accurate than other ones. This result is consistent with the information transmission channel.

4.3 Strategic timing of earnings announcements

Estimates of the complementarity or substitutive relationship between macro and earnings news could potentially be influenced by firms strategically choosing to announce their earnings on macro-news versus no-macro-news days. In the model of DellaVigna and Pollet (2009), a firm manager has an incentive to strategically release earnings news on Fridays to maximize short-term

[9]Following the literature, analyst forecast error is defined as the absolute value of the difference between predicted earnings by analysts and actual earnings, scaled by stock prices.

value. Similarly, the manager may also strategically release earnings news on macro news days. This raises the question of whether the complementary relationship is driven by strategic timing of earnings announcements.

We identify firms that shift their earnings announcement dates by comparing their current earnings announcement dates to the previous year's earnings announcement dates. Specifically, we categorize firms as having advanced or delayed their earnings dates if they differ from their previous same-quarter date by more than five days based on past studies (e.g., Hartzmark and Shue 2018). We find that roughly 80% of firms do not substantially change their earnings announcement dates, 15% advance them by more than five days, and 5% delay them by more than five days.

Previous studies have hypothesized and provided evidence that firms tend to advance good news and defer bad news (e.g., DeHaan, Shevlin, and Thornock 2015; Johnson and So 2018). Taking this idea further, firms with positive earnings news may strategically advance their earnings announcement date to a macro-news day because it is a salient day to investors and the market has stronger reactions to their announcements. Firms with negative earnings news may strategically delay their earnings announcement dates while avoiding a macro-news day. If this is the case, the average of earnings surprises of firms that advance earnings announcement dates to macro-news days would be more positive than that of firms that shift dates to other days. Similarly, the average of earnings surprises of firms that delay earnings announcement dates to macro-news days would be more negative than that of firms that shift dates to other days.

However, Table 7 Panel A shows that these effects are not present in the data. The difference in earnings surprises (0.013) for two groups of firms that advance their earnings announcements to macro-news days and other days is not statistically significant (t = 0.349). Similarly, the difference in earnings surprise is not significant when firms delay their earnings announcements.

Thus, these results suggest that firms do not strategically time their earnings announcements in conjunction with macro announcements.

Also, we examine whether firms are more likely to strategically change their earnings announcements to a macro-news day when their earning surprise is positive versus negative. If firms strategically release earnings news on macro news days, firms with positive earnings surprises are more likely to do so because the market has stronger reactions to their announcements. Table 7 Panel B presents the results. Firms with positive (negative) earnings surprises are less (more) likely to change their earnings announcement dates to a macro-news day, which opposes the strategic timing account.

To examine whether the complementary relationship is driven by firms strategically changing their earnings announcement dates, we test whether the complementary relationship is present even firms that do not strategically change their earnings announcement dates. The results are described in Table 7 Panel C. Column (1) shows that firms that did not greatly change their announcement dates have a large positive coefficient of 0.095 on the immediate reaction that is statistically and economically significant. Firms that changed their earnings announcements forward or backward have insignificant coefficients for the effects of macro news on reaction to earnings news. Columns (2) reaches similar conclusion for the drift.[10] Overall, these results suggest that strategic timing does not drive the complementary relationship.

4.4 Trading frictions

We also examine the possibility that the complementary relationship between macro and micro news may be driven by a firm's liquidity premium. Even with rational investors, it is possible that

[10] As a robustness check, we show similar results when analyzing firms that changed their earnings announcements more than three days in Table IA. 4 of the Internet Appendix.

the effect is driven by shifts in firms' liquidity premia if firms with positive earnings surprises are more liquid or have lower trading costs on Macrodays. Past literature shows that the earnings announcement premium is associated with liquidity risk (Sadka 2006; Frazzini and Lamont 2007).

Table 8 tests for such an explanation. We use two measures of liquidity: bid-ask spread and turnover. For a firm, greater bid-ask spread means it is less liquid, while higher turnover means it is more liquid. If the liquidity story holds, we would expect that the coefficient on the interaction term $ES \times Macroday$ is significant and positive. However, Table 8 shows that the coefficients are not significant. Thus, liquidity is unlikely to account for the complementary relationship.

Overall, we examine four potential explanations for the complementary relationship between macro news and earnings announcements. Our results suggest that a combination of attention and information transmission channels may explain this complementary relationship.

5. Additional results and robustness tests

We first discuss additional results to provide further insights about the sources of effects. Then, in Section 5.2, we discuss robustness checks.

5.1 Additional results

We next provide three additional results. First, we examine situations where earnings announcements are released a few days before or after macro news. For earnings announcements released after macro news, the information transmission explanation is potentially consistent with investors processing subsequent earnings news differently, because they can learn information from earlier macro news that is relevant for the interpretation of the earnings news. The attention explanation is potentially consistent with greater investor attention to subsequent earnings

announcements being triggered by preceding macro news. Thus, both explanations are potentially consistent with stronger reactions to earnings. Table 9 Panel A shows that there is some effect of macro news on immediate reactions to earnings news when earnings are released one day after macro news. As discussed above, this is potentially consistent with either the attention channel or the information transmission channel (or both).

For earnings announcements released before macro announcements, under the attention explanation, the *prospect* of scheduled arrival of macro-news may trigger firm-level attention. Consistent with this idea, other research shows that investor attention to the stock market (as measured by news media coverage) rises several days before macro announcements (Fisher, Martineau, and Sheng 2021). This would increase the sensitivity of the market reaction to earnings news. The information transmission explanation does not predict that the prospect of macro news will result in stronger market reaction to preceding earnings news. Table 9 Panel B shows that there is significant and positive effect of macro news on immediate reactions to earnings news when earnings are released one or two days before macro news. Again, this result is potentially consistent with either the attention channel or the information transmission channel (or both).

In the second test, we examine whether the complementary relationship varies with firms' size and analyst coverage. When macro-news triggers investor attention to the stock market, they are more likely to look at large firms such as Apple and Microsoft, since such firms attract greater attention in general.[11] There is evidence from past literature that in general large firms receive more attention from investors. For example, Bhushan (1989) find large firms have higher analyst following. Also, large firms tend to be more tied to the macro economy rather than having

[11]Another theoretical possibility is that investors pay attention to large firms almost all the time, and small firms only part of the time. In this scenario, a triggering event would mainly increase attention among small firms. We regard this story as much less plausible, most investors do not pay attention to any given firm---even a large one---every day.

idiosyncratic performance. This suggests that macro news will be more valuable to understand their earnings announcements, which is consistent with information channel.

To test this idea, we examine the effect of macro news on the sensitivity of prices to firm-level earnings news separately for small, medium, and large firms. Table 10 Panel A shows that the effect is more pronounced for large firms. Again the stronger effect can either due to the higher attention they get from investors or greater information value from macro news for these firms. Similarly, Table 10 Panel B shows that the effect is concentrated among firms with high analyst coverage.

A further plausible implication of the information transmission explanation is that macro news is more relevant for the processing of earnings news for industries that are more sensitive to macro news. Likewise, for the attention explanation, macro news may be a stronger trigger for attention in industries that are more sensitive to macro news.

To perform this test, we use Fama French 10 industries. To estimate the sensitivity of the industry to macro news, we regress the value-weighted industry portfolio returns on *Macroday*. Industry sensitivity is measured by the coefficient on *Macroday*. We then compare whether industries that are more sensitive to macro news have with the largest effect of macro-news on the sensitivity of returns to earnings news. Table 11 presents the results. Columns (1) and (2) show that the effect of macro news on the processing of earnings news, is most pronounced in two big industries: i) Wholesale, Retail, and Some Services; ii) Other (including finance, business services, etc). Consistent with this result, Column (3) shows that these two industries are also the industries that are very sensitive to macro news.[12]

[12]Given that the analysis is based on a sample of 10 industries, the evidence is suggestive. We also considered an analysis with a larger number of industries but doing so greater reduces the sample size for estimation. There are fewer observations within an industry when using a larger number of industries. In the sample of 30 industries, some industries have less than 1,000 observations, as compared to 158,399 observations in our main analysis.

Finally, both the attention explanation and the information transmission explanation imply that the more important the macro news, the larger an effect it has on investors' reactions to earnings news. This is because more important macro news is likely to be more relevant for the interpretation of firm-level news, which potentially increases both rational responses to such news and attention to such news.

We measure the importance of the macro news by the absolute value of aggregate stock market return ($Market\_Ret\_Abs$) on macro-news days, as both big bad and big good news may contain more information. To test this idea, we augment the regression Equation (4) by adding a triple interaction term $ES \times Macroday \times Market\_Ret\_Abs$ and $Market\_Ret\_Abs$. Table 12 presents the result. The coefficient on the triple interaction term is positive and statistically significant for $CAR[0,1]$, and negative and statistically significant for $CAR[2,61]$. This result indicates that the complementary relationship between macro and earnings news is more pronounced when the macro news is more important.

5.2 Robustness tests

A possible concern is that the apparent complementary relationship actually reflects differences between firms that choose to announce on macro-news days and firms that announce on non-macro-news days. In the extreme, these two sets of firms might not overlap, so that the complementary relationship between macro news and earnings announcements is just the difference between this set of firms and other firms.

To address this concern, we calculate the fraction of firms that always issue their earnings announcements on macro-news days. Specifically, we create an Abnormal Announcement

Preference Ratio (AAPR) for each firm, which is the number of earnings announcements on macro-news day divided by the total number of its announcements. Among firms that release earnings news on macro-news days at least once, less than 3% (114) of firms release more than 50% of their earnings news on macro-news days. This accounts for only 13% even if we count firms that issue more than 33% of their earnings announcements on macro-news days. This evidence suggests that the complementary relationship between macro news and earnings announcements is unlikely driven by a set of firms that repeatedly announce earnings on macro-news days.

Nevertheless, we test for this possibility by re-estimating Equation (4) with a sample that excludes these firms. Table 13 Panel A reports the results of this test. It shows that the complementary relationship between macro news and earnings announcements on reactions to earnings news remains statistically and economically similar as in Table 2. Thus, our results cannot be driven by a small set of firms that have strong preference of announcement dates.

Hirshleifer, Lim, and Teoh (2009) find that investors' immediate reactions to earnings announcements are much weaker, and drift is much stronger when a large number of earnings are issued by other firms on the same day. Given that macro-news days have slightly fewer earnings announcements (Table 1 Panel B), a possible concern is that the complementary relationship between macro news and earnings announcements is driven by days with a low number of earnings news. We address this concern by removing days with a low number of earnings news (bottom quantile) and present the results in Table 13 Panel B. It shows that the complementary relationship between macro and micro news is the same as in Table 2 at both statistical and economic levels. Thus, the complementary relationship between macro and micro news is a distinct contributor that is not explained by the number of earnings news.

Hirshleifer, Lim, and Teoh (2009) find the distraction effect is mainly driven by unrelated earnings news, which is defined earnings news from other industries. For the same-industry announcement, there is no distraction effect. This finding is similar in spirit to the finding of this paper that aggregate/macro announcement can draw attention to a firm rather than serves as a distraction.

Gulen and Hwang (2012) show that investors' immediate reactions to corporate events, including earnings announcements, are much stronger and delayed reactions are much weaker when earnings are released on days with high market returns and the earnings surprises are positive. To the extent that both macro-news and market returns are aggregate variables, one may be concerned about the new implications from macro-news compared to market returns. The fact that market returns and macro-news are correlated (Savor and Wilson 2013) and that market returns affect investors' reactions to earnings news does not mean that macro news is not a distinct phenomenon for studying investor behaviors. Macro-news is different from market returns for at least two reasons. First, macro-news affects stock market returns, but not the opposite. Also, many factors move stock market returns. Thus, the impact of market returns on investor behavior can come from factors other than macro news. Second, macro news is associated with information release and its impact on reactions to earnings news provides a unique setting to study the interaction between two types of information. This is crucial in understanding the channels through which macro-news affects investors' behavior.

To address the concern that macro-news and market returns are the same driving force for the changes in investors' reactions to earnings news, we re-estimate Equation (4) by excluding days with high market returns (top quantile). Table 13 Panel C reports the results of this test. The complementary relationship between macro and micro news is barely affected by removing these

observations, suggesting that market return swings cannot explain this effect.

Finally, we test whether the results are robust to alternative measures of investor reactions and earnings surprise groups. First, instead of using the market model, we use the Fama-French Three-Factor model when calculating $CAR[0,1]$ and $CAR[2,61]$ and re-estimate Equation (4). Table 13 Panel D presents the results. The coefficient on the interaction term is positive and significant for $CAR[0,1]$ (Column 1), and negative and significant for $CAR[2,61]$ (Column 2). Thus, the results are similar to the main findings in Table 2. The economic magnitudes of the coefficients are also similar. Moreover, we use 10 groups of earnings surprise and re-estimate Equation (4) and the results remain qualitatively and quantitatively similar (Table 13 Panel E). Overall, the complementary relationship between macro and micro news is robust to the choice of model in calculating the reaction measures.

6. Conclusion

We investigate how the arrival of macro news affects the sensitivity of stock prices to firm-level earnings news. Models of limited attention in the stock market have predicted since investors need to allocate cognitive resources between different activities, there will be substitution between attention to different signals. There is evidence of such distraction triggered by news arrival about individual stocks. Surprisingly, we find that the effects are opposite to the theoretical prediction: macro news increases the sensitivity of stock prices to firm-level news. So the relationship between macro and micro news is complementary.

A possible explanation for this complementary relationship between macro news and earnings announcements is the attention channel, wherein investors pay more attention to firm-level news on macro-news days. An alternative explanation is provided by the information transmission

channel, wherein earnings announcements become more informative when there is also macro-news. We provide further evidence consistent with both explanations.

These results suggest that it will be fruitful to broaden the modeling of limited attention in the stock market to consider an additional margin for attention allocation—the margin between attending to the stock market at all versus other activities. In particular, our findings suggest that macro news stimulates overall attention to the stock market, including firm-specific news.

This evidence also speaks to the dynamics of market efficiency for individual stocks (Savor and Wilson 2014; Rosch, Subrahmanyam, and van Dijk 2017; Engelberg, McLean, and Pontiff 2018; Birru 2018). The finding of improved price efficiency on macro-news days differs from these papers in suggesting that shifts in attention allocation may be an important source of such market efficiency dynamics.

The idea that swings in investor attention are often in the same direction at macro-news level and the firm level, instead of being only between them, may operate much more broadly in financial markets than the application to earnings news that we have focused upon. Several stylized facts or anecdotal observations are potentially consistent with this idea. Investors trade individual stocks more heavily when the aggregate market has performed well (US: Statman, Thorley and Vorkink 2006); 46 countries: Griffin, Nardari and Stulz 2007). During sector or aggregate market bubble periods, it seems that investors become especially excited about individual stocks, as exemplified by the rise of day trading, investment clubs, and stock market chat rooms during the internet boom at the turn of the millennium. So the complementarity between aggregate and firm-level attention may be a far-reaching phenomenon.

References

Ball, Ray, and Philip Brown, 1968, An empirical evaluation of accounting numbers, *Journal of Accounting Research* 6, 159–178.

Bernard, Victor L., and Jacob K. Thomas, 1989, Post-earnings-announcement drift: Delayed price response or risk premium? *Journal of Accounting Research* 27, 1–36.

Bernard, Victor L., and Jacob K. Thomas, 1990, Evidence that stock prices do not fully reflect the implications of current earnings for future earnings, *Journal of Accounting and Economics* 13, 305-340.

Ben-Rephael, Azi, Zhi Da, and Ryan D. Israelsen, 2017, It depends on where you search: A comparison of institutional and retail attention, *Review of Financial Studies* 30, 3009-3047.

Bhushan, Ravi, 1989, Firm characteristics and analyst following. *Journal of Accounting and Economics* 11.2-3, 255-274.

Birru, Justin, 2018, Day of the week and the cross-section of returns, *Journal of Financial Economics*130, 182-214.

Boguth, Oliver and Duchin, Ran and Simutin, Mikhail, 2020, Dissecting Conglomerates, *Journal of Finance*, forthcoming.

Boyd, John H., Jian Hu, Ravi Jagannathan, 2005, The stock market's reaction to unemployment news: Why bad news is usually good for stocks, *Journal of Finance* 60, 649-672.

Chan, Wesley S., 2003, Stock price reaction to news and no-news: drift and reversal after headlines, *Journal of Financial Economics* 70, 223-260.

Cieslak, Anna, Adair Morse, and Annette Vissing-Jogensen, 2019, Stock returns over the FOMC cycle, *Journal of Finance 74*, 2201-2248.

Corwin, Shane A., and Jay F. Coughenour, 2008, Limited attention and the allocation of effort in securities trading, *Journal of Finance* 63, 3031-3067.

Da, Zhi, Joseph Engelberg, and Pengjie Gao, 2011, In search of attention, *Journal of Finance* 66, 1461-1499.

DeHaan, E., Shevlin, T., and Thornock, J., 2015. Market (in) attention and the strategic scheduling and timing of earnings announcements. *Journal of Accounting and Economics* 60, 36-55.

DellaVigna, Stefano, and Joshua M. Pollet, 2009, Investor inattention and Friday earnings announcements, *Journal of Finance* 64, 709-749.

Drake, Michael S., Darren T. Roulstone, and Jacob R. Thornock, 2012, Investor information

demand: Evidence from Google searches around earnings announcements, *Journal of Accounting Research* 50,1001-1040.

Engelberg, Joseph, R. David McLean, and Jeffrey Pontiff, 2018, Anomalies and news, *Journal of Finance* 73, 1971-2001.

Fama, Eugene F., 1970, Efficient capital markets: A review of theory and empirical work, *Journal of Finance* 25, 383-417.

Fama, Eugene F. and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.

Fisher, Adlai J., Charles Martineau, and Jinfei Sheng, 2021, Macroeconomic attention and announcement risk premia, Working paper, *Available at SSRN 2703978*.

Frazzini, Andrea, and Owen A. Lamont, 2007, The earnings announcement premium and trading volume, Working paper, *Available at SSRN 986940.*

Gilbert, Thomas, 2011, Information aggregation around macroeconomic announcements: Revisions matter, *Journal of Financial Economics* 101, 114-131.

Gilbert, Thomas, Chiara Scotti, Georg Strasser, and Clara Vega, 2017, Is the intrinsic value of macroeconomic news announcements related to their asset price impact? *Journal of Monetary Economics* 92, 78-95.

Goldstein, Itay, and Liyan Yang, 2015, Information diversity and complementarities in trading and information acquisition, *Journal of Finance* 70, 1723-1765.

Griffin, John M., Federico Nardari, and Rene M. Stulz, 2007, Do investors trade more when stocks have performed well? Evidence from 46 countries, *Review of Financial Studies* 20, 905-951.

Gulen, Huseyin, and Byoung-Hyoun Hwang, 2012, Daily stock market swings and investor reaction to firm-specific news, Working paper, *Available at SSRN 1934873*.

Hartzmark, Samuel M., and Kelly Shue, 2018, A tough act to follow: Contrast effects in financial markets, *Journal of Finance* 73, 1567-1613.

Hillert, Alexander, Heiko Jacobs, and Sebastian Müller, 2014, Media makes momentum. *Review of Financial Studies* 27, 3467-3501.

Hirshleifer, David, and Siew Hong Teoh, 2003, Limited attention, information disclosure, and financial reporting, *Journal of Accounting and Economics* 36, 337-386.

Hirshleifer, David, Sonya Lim, and Siew Hong Teoh, 2009, Driven to distraction: Extraneous events and underreaction to earnings news, *Journal of Finance* 64, 2289-2325.

Hirshleifer, David, Sonya Lim, and Siew Hong Teoh, 2011, Limited investor attention and stock market misreactions to accounting information, *Review of Asset Pricing Studies* 1, 35-73.

Johnson, Travis L., and Eric C. So, 2018, Time will tell: Information in the timing of scheduled earnings news, *Journal of Financial and Quantitative Analysis 53*, 2431-2464.

Kempf, Elisabeth, Alberto Manconi, and Oliver Spalt, 2017, Distracted shareholders and corporate actions, *Review of Financial Studies* 30, 1660–1695.

Liu, Hongqi and Peng, Lin and Tang, Yi, 2019, Retail Attention, Institutional Attention, Working paper, Baruch College.

Lucca, David O., and Emanuel Moench, 2015, The Pre-FOMC announcement drift, *Journal of Finance* 70, 329-371.

Peng, Lin, and Wei Xiong, 2006, Investor attention, overconfidence and category learning, *Journal of Financial Economics* 80, 563-602.

Rosch, Dominik M., Avanidhar Subrahmanyam, and Mathijs A. van Dijk, M., 2017, The dynamics of market efficiency. *Review of Financial Studies* 30. 1151–1187.

Sadka, Ronnie, 2006, Momentum and post-earnings-announcement drift anomalies: The role of liquidity risk, *Journal of Financial Economics* 80, 309-349.

Savor, Pavel, and Mungo Wilson, 2013, How much do investors care about macroeconomic risk? Evidence from scheduled economic announcements, *Journal of Financial and Quantitative Analysis* 48, 343-375.

Savor, Pavel and Mungo Wilson, 2014, Asset pricing: A tale of two days, *Journal of Financial Economics* 113, 171-201.

Schmalz, Martin C., and Sergey Zhuk, 2018, Revealing downturns, *Review of Financial Studies* 32, 338-373.

Sims, Christopher A., 2003, Implications of rational inattention, *Journal of Monetary Economics* 50, 665–690.

Statman, Meir, Steven Thorley, and Keith Vorkink, 2006, Investor overconfidence and trading volume. *Review of Financial Studies* 19, 1531-1565.

Figure 1. Performance of drift at different horizons

This figure plots the cumulative abnormal returns over different horizons. Cumulative abnormal return for each stock is based on the market model. For event time, day 0 is the day of earnings announcement. X-axis is the event time window, and Y-axis is average cumulative abnormal returns (Quantile 11 minus Quantile 1).

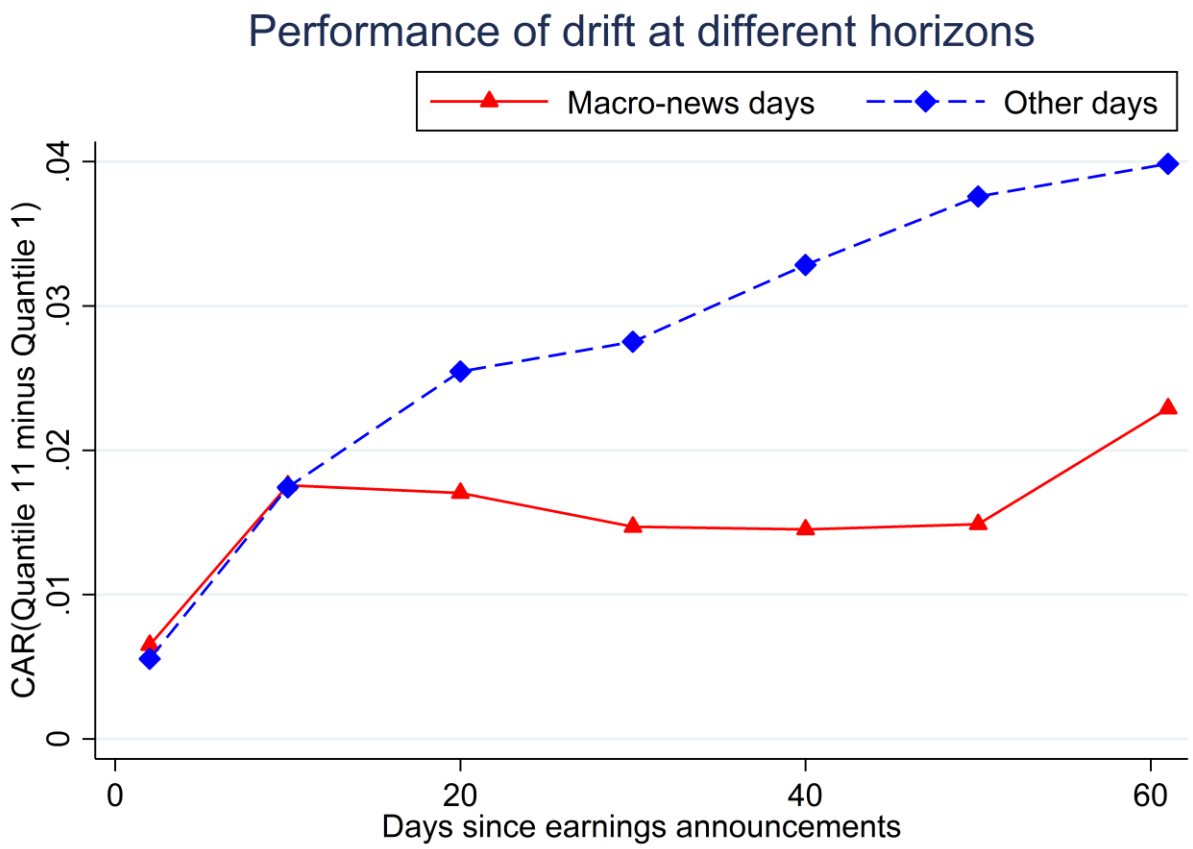

Table 1. Summary statistics

This table reports summary statistics. *SUE* is earnings surprise. # *Earnings news* is number of earnings announcements per day. # *Analyst* is the number of analysts following the firm. *Market cap* is the market capitalization. *Share turnover* is the turnover of a firm's share. and *Market return* is the daily value-weighted market return from CRSP, *CAR[0,1]* is the cumulative abnormal return based on market model over days [0,1].*CAR[2,61]* is the cumulative abnormal return based on market model over days [2,61]. Macro news days (*Macroday*) include days with announcements of Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption.

Panel A. Full Sample

	Count	Mean	SD	P25	P50	P75
ES %	158399	-0.01	1.10	-0.05	0.04	0.21
# Earnings news	158399	118	79	46	107	180
# Analyst	158399	6.03	5.78	2	4	8
Market cap($ml)	158399	5187	20513	238	735	2617
Share turnover %	158399	2.42	4.01	0.48	1.22	2.83
Market returns %	158399	0.04	1.31	-0.60	0.09	0.67
CAR[0,1] %	158399	0.10	8.54	-3.77	0.02	3.96
CAR[2,61] %	158399	1.05	27.16	-12.44	-0.68	11.44

Panel B. Sample of Macroday vs. sample of other days

	Count		Mean		Mean comparison	
	Macroday	Other days	Macroday	Other days	Mean diff	T-stat
ES %	18876	139523	-0.004	-0.010	0.006	0.76
# Earnings news	18876	139523	110	119	-9	-13.92
# Analyst	18876	139523	6.12	6.02	0.10	2.16
Market cap($ml)	18876	139523	4895	5227	-332	-2.09
Share turnover %	18876	139523	2.63	2.39	0.24	7.78
Market returns %	18876	139523	0.25	0.01	0.24	23.75
CAR[0,1] %	18876	139523	0.24	0.08	0.16	2.34
CAR[2,61] %	18876	139523	0.70	1.09	-0.40	-1.88

Table 2. The complementary relationship between macro and micro news

This table reports the attention trigger effect. The dependent variable is cumulative abnormal return and is indicated under each column heading. *ES* is earnings surprise quantile (11 groups). ES Top equals to 1 if earnings surprise quantile is 11 and 0 if the earnings surprise quantile is 1. *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. *Size* is the deciles of market capitalization of a firm. # *Earnings news* is the number of earnings announcements on that day. # *Analyst* is the number of analysts following the firm. Turnover is the turnover ratio, defined by trading volume divided by shares outstanding. Market return top is a dummy variable that equals to 1 if the market return of that day belongs to the top 10% during the sample period. Other control variables include dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Top and bottom groups

VARIABLES	CAR[0,1]		CAR[2,61]	
	(1)	(2)	(3)	(4)
ES Top	8.352***	8.127***	4.846***	5.190***
	(0.175)	(0.179)	(0.527)	(0.535)
Macroday	-0.667*	-0.514	1.912	1.468
	(0.369)	(0.377)	(1.349)	(1.358)
(ES Top)×Macroday	1.277***	1.373***	-3.458**	-3.682**
	(0.446)	(0.450)	(1.504)	(1.504)
Friday		-0.614		1.452
		(0.385)		(1.298)
Size		0.255***		-0.322***
		(0.036)		(0.101)
# Analyst		-0.917***		-0.572
		(0.147)		(0.426)
# Earnings news		-0.193*		0.804**
		(0.109)		(0.316)
Turnover		0.128***		0.022
		(0.043)		(0.059)
Market return top		0.352**		1.314**
		(0.165)		(0.533)
Constant	-4.491***	-3.299***	-0.385	3.328
	(0.137)	(0.633)	(0.446)	(2.275)
Controls	Y	Y	Y	Y
Observations	26,460	26,460	26,460	26,460
Adj. R2	0.119	0.124	0.004	0.018

Table 2 (continued)

Panel B. Full sample

VARIABLES	CAR[0,1]		CAR[2,61]	
	(1)	(2)	(3)	(4)
ES	0.848***	0.842***	0.357***	0.388***
	(0.011)	(0.011)	(0.029)	(0.029)
Macroday	-0.459**	-0.354*	1.056*	0.776
	(0.186)	(0.183)	(0.586)	(0.588)
ES×Macroday	0.089***	0.092***	-0.192**	-0.201***
	(0.026)	(0.025)	(0.076)	(0.076)
Friday		-0.263**		0.342
		(0.112)		(0.359)
Size		0.138***		-0.306***
		(0.011)		(0.030)
# Analyst		-0.213***		0.286**
		(0.044)		(0.112)
# Earnings news		-0.184***		0.155*
		(0.032)		(0.091)
Turnover		-0.235***		-0.003
		(0.017)		(0.021)
Market return top		0.183***		0.967***
		(0.051)		(0.154)
Constant	-5.737***	-5.019***	-1.513***	0.981
	(0.079)	(0.226)	(0.212)	(0.728)
Controls	Y	Y	Y	Y
Observations	158,399	158,399	158,399	158,399
Adj. R2	0.086	0.100	0.002	0.008

Table 3. Drift over different horizons and longevity of the drift

This table reports the impact of macro news on drift over different horizons. In Panel A, the dependent variable is cumulative abnormal return and is indicated under each column heading. *ES* is earnings surprise quantile (11 groups). *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market return, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Panel B presents the longevity of the post-earnings announcement drift (PEAD). We calculate the PEAD over different time horizons and report the PEAD as a fraction of 240-day drift. We compare earnings announcements released on days with important macro announcements (Macroday) and earnings announcements on other days (Other days).

Panel A. Drift over different horizons

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	CAR[2,30]	CAR[2,45]	CAR[2,61]	CAR[2,75]	CAR[2,90]	CAR[2,210]
ES	0.250***	0.306***	0.388***	0.372***	0.376***	0.718***
	(0.018)	(0.023)	(0.029)	(0.035)	(0.038)	(0.071)
Macroday	0.135	1.262**	0.785	0.572	0.538	0.692
	(0.397)	(0.571)	(0.589)	(0.660)	(0.685)	(1.254)
ES×Macroday	-0.100*	-0.213***	-0.201***	-0.186**	-0.206**	-0.354**
	(0.051)	(0.072)	(0.076)	(0.087)	(0.090)	(0.162)
Constant	0.506	0.714	1.152	1.541*	2.039**	4.737***
	(0.462)	(0.553)	(0.727)	(0.819)	(0.850)	(1.350)
Controls	Y	Y	Y	Y	Y	Y
Observations	158,399	158,399	158,399	158,399	158,399	158,336
Adj. R2	0.005	0.005	0.008	0.006	0.005	0.004

Panel B. Longevity of the drift

	PEAD as a fraction of 240-day drift	
	(1)	(2)
Drift horizons	Macroday	Other days
[2,61]	0.234	0.209
[2,120]	0.457	0.383
[2,180]	0.746	0.653
[2,210]	1.000	0.888
[2,240]	1.000	1.000

Table 4. Trading strategy on drift portfolios

This table presents the results from a post-earning announcement drift trading strategy. The stock returns data is from CRSP and is matched with firms' characteristics from Compustat and I/B/E/S. The trading strategy portfolio based on non-macro-day drift is constructed as following. In month t, it purchases firms that, in month $t-1$ made an announcement on a non-macro-day in the top quantile; sells firms that made an announcement on a non-macro-day in the bottom quantile. Therefore, the return for the non-macro-day drift portfolio is $R^{D}_{NM} = R^{11}_{NM} - R^{1}_{NM}$. We construct the macro-day drift portfolio for month t following a similar procedure except that we only include firms that made an earnings announcement on a macro-day in a previous month. The return for this portfolio is $R^{D}_{M} = R^{11}_{M} - R^{1}_{M}$. The long-short portfolio of buying the non-macro-day drift portfolio and selling macro-day portfolio has return, $R^{D}_{NM-M} = R^{D}_{NM} - R^{D}_{M}$. The Fama-French three-factor returns are from Ken French's website. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Value-weighted			Equally-weighted		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Other days	Macroday	Difference	Other days	Macroday	Difference
Constant	0.970**	0.157	0.891**	1.150***	0.350***	0.804**
	(0.387)	(0.478)	(0.437)	(0.397)	(0.108)	(0.406)
Market Excess Return	0.078	-0.092	0.170	0.263	-0.027	0.290*
	(0.200)	(0.148)	(0.234)	(0.166)	(0.065)	(0.164)
Size Factor Return (SMB)	0.180	-0.336**	0.517**	0.015	-0.172**	0.187
	(0.235)	(0.142)	(0.259)	(0.168)	(0.072)	(0.180)
Value Factor Return (HML)	0.020	-0.211	0.231	0.059	-0.154	0.213
	(0.227)	(0.215)	(0.276)	(0.206)	(0.122)	(0.220)
Observations	179	179	179	179	179	179
Adj. R2	0.011	0.025	0.018	0.002	0.019	0.014

Table 5. Investor attention

This table presents the results of investor attention. Abnormal institutional investor attention (AIA) is the news-searching and news-reading activity for Russell 3000 firms from Bloomberg terminal. AIA is a dummy variable if AIA index is higher than 2. The regression for AIA test is a probit test and the reported coefficient is marginal effects (there is no constant term reported and Pseudo R-squared is reported). Both measures are at daily frequency. *Eday* is dummy variable equaling 1 if that has one or more earnings announcements. Google search volume index (SVI) is the ticker-searching activity for S&P 500 firms. Control variables include dummy variables for year, month, and day of week. *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market return, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Attention measure	AIA		SVI	
Macroday	0.011***	0.012***	0.000	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Eday	0.522***	0.525***	0.098***	0.106***
	(0.008)	(0.008)	(0.035)	(0.035)
Macroday×Eday		0.055***		-0.025***
		(0.017)		(0.008)
Constant			0.008***	0.008***
			(0.001)	(0.001)
Controls	Y	Y	Y	Y
Observations	1,173,450	1,173,450	632,494	632,494
Adj. R2/Pseudo R2	0.039	0.039	0.003	0.003

Table 6. Analyst revisions

This table presents the result of the test on whether analyst revisions are different for earnings announcements released on days with important macro news (Macroday) compared to earnings released on other days. # *of revisions* is number of analyst revision 1 to 10 days before earnings announcements. *Forecast quality* is the negative value of forecast errors, which is defined as the absolute value of the difference between predicted earnings by analysts and actual earnings, scaled by stock prices. $Macroday$ is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. *Size* is the deciles of market capitalization of a firm. # *Earnings news* is the number of earnings announcements on that day. # *Analyst* is the number of analysts following the firm. Turnover is the turnover ratio, defined by trading volume divided by share outstanding. Market return top is a dummy variable that equals to 1 if the market return of that day belongs to the top 10% during the sample period. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
VARIABLES	# of revisions	Forecast quality
Macroday	0.092***	0.014***
	(0.031)	(0.005)
Size	0.127***	0.030***
	(0.008)	(0.002)
# Analyst	1.008***	-0.106***
	(0.055)	(0.007)
# Earnings news	-0.314***	0.003
	(0.035)	(0.005)
Turnover	0.046***	-0.009***
	(0.006)	(0.001)
Market return top	-0.020	-0.016***
	(0.013)	(0.003)
Constant	-0.671***	-0.073**
	(0.146)	(0.028)
Controls	Y	Y
Observations	158,399	158,399
Adj. R2	0.189	0.024

Table 7. Strategic timing of earning announcements

This table tests whether the complementary relationship is driven by a firm's strategic timing of earning announcements. Δ*date* is the difference between the day of the current earnings announcements and the previous year's same-quarter earnings announcement. Panel A presents results of t-test on the difference between average earnings surprise (*Avg.ES*) on macro-news days and *Avg. ES* on other days. Panel B examines whether firms are more likely to strategically change their earnings announcements to a macro-news day when their earning surprise is positive versus negative. *Eday Change* is a dummy variable equaling 1 if the absolute value of Δ*date* is greater than 5. *Positive ES* is a dummy variable equaling 1 if the earning surprise is positive. *Negative ES* and *Neutral ES* are defined in the same way. Panel C presents regression results. The dependent variable is cumulative abnormal return and is indicated under each column heading. *ES* is earnings surprise quantile (11 groups), and *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market volatility, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Earnings date change and surprise

	Δ date<-5			Δ date>5		
	Count	Mean	SD	Count	Mean	SD
Avg.ES (%) on macro days	1137	0.052	1.230	6851	-0.063	1.327
Avg.ES (%) on other days	7202	0.039	1.185	53540	-0.067	1.241
Differences		0.013			0.004	
t-stat		0.349			0.246	

Panel B. Changes in earnings date and earnings surprises

	Eday Change		
Positive ES	-0.011*		
	(0.006)		
Negative ES		0.011*	
		(0.007)	
Neutral ES			0.003
			(0.011)
Constant	0.227***	0.217***	0.221***
	(0.005)	(0.004)	(0.003)
Observations	17,631	17,631	17,631
Adj. R2	0.000	0.000	0.000

Panel C: Earning announcement date change and the impact of macro news

	CAR[0,1]	CAR[2,61]
	(1)	(2)
ES×Macroday if abs(Δ date)<=5	0.095***	-0.263***
	(0.029)	(0.090)
ES×Macroday if abs(Δ date)>5	0.077	-0.010
	(0.051)	(0.146)

Table 8. Trading frictions

This table tests whether the complementary relationship is driven by a firm's liquidity. The dependent variables are bid-ask spread and turnover. *ES* is earnings surprise decile (11 groups), and *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. *Bid-ask* is bid-ask spread and *Turnover* is the firm's trade volume divided by number of shares outstanding. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, market return, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	Bid-ask		Turnover	
ES	-0.182***	-0.201***	0.002***	0.002*
	(0.028)	(0.041)	(0.000)	(0.001)
Macroday	-0.008***	-0.008***	0.000***	0.000***
	(0.001)	(0.002)	(0.000)	(0.000)
ES×Macroday		0.003		0.000
		(0.004)		(0.000)
Constant	1.703***	1.706***	0.031***	0.031***
	(0.064)	(0.064)	(0.001)	(0.001)
Controls	Yes	Yes	Yes	Yes
Observations	127,045	127,045	158,399	158,399
Adj. R2	0.105	0.105	0.006	0.006

Table 9. Earnings announcements before or after macro-news days

This table presents the lead and lag effect of macro news and earnings news. The dependent variable is cumulative abnormal return and is indicated under each column heading. ES is earnings surprise quantile (11 groups). "One day before" indicates that the macro news announcement is one day before the earnings announcement. The same definition applies to other lead and lag windows. For cases where the macro-news day is one-day before the earnings announcements, $Macroday_{t-1}$ equals to 1 if there is macro-news on day $t-1$ for an earnings announcement released on day t. Macro announcements include Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market return, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Earnings announcements are released after Macro news

	1 day after (j=1)		2 days after (j=2)		3 days after(j=3)	
	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]
$ES \times Macroday_{t-j}$	0.045*	-0.064	0.019	-0.102	0.006	-0.039
	(0.023)	(0.070)	(0.023)	(0.066)	(0.023)	(0.071)

Panel B. Earnings announcements are released before Macro news

	1 day before (k=1)		2 days before (k=2)		3 days before(k=3)	
	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]
$ES \times Macroday_{t+k}$	0.061***	-0.028	0.063***	-0.032	0.023	-0.040
	(0.021)	(0.061)	(0.022)	(0.063)	(0.022)	(0.068)

Table 10. Heterogeneity

This table reports how the complementary relationship varies with firm size, analyst coverage, and institutional ownership. The dependent variable is cumulative abnormal return and is indicated under each column heading. ES is earnings surprise decile (11 groups), $Macroday$ is a dummy variable equaling 1 if day t is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Panel A reports the tests on three subsamples partitioned based on firm size decile. Small, medium, and large firms are in size decile 1 to 3, 4 to 7, and 8 to 10, respectively. Panel B reports the tests on three subsamples partitioned based on analyst coverage. Low, medium, and high coverage firms are firms in decile 1 to 3, 4 to 7, and 8 to 10, respectively. Panel C reports the tests on three subsamples partitioned based on institutional ownership ($Instown$) decile calculated from Thomson Reuters Institutional (13f) Holdings data. Firms with low, medium, and high institutional ownership are in $Instown$ decile 1 to 3, 4 to 7, and 8 to 10, respectively. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market return, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Firm size

	(1)	(2)	(3)	(4)	(5)	(6)
	Small firms		Medium firms		Large firms	
VARIABLES	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]
ES	0.765***	0.597***	0.966***	0.255***	0.783***	0.257***
	(0.018)	(0.050)	(0.020)	(0.052)	(0.016)	(0.044)
Macroday	0.184	-2.000**	-0.570*	0.503	-0.875***	3.914***
	(0.296)	(0.921)	(0.343)	(1.007)	(0.308)	(1.136)
ES×Macroday	0.027	0.007	0.117**	-0.192	0.154***	-0.529***
	(0.040)	(0.125)	(0.048)	(0.129)	(0.042)	(0.146)
Controls	Y	Y	Y	Y	Y	Y
Observations	50,134	50,134	53,952	53,952	54,313	54,313
Adj. R2	0.096	0.015	0.136	0.008	0.089	0.009

Panel B. Analyst coverage

	(1)	(2)	(3)	(4)	(5)	(6)
	Low analyst coverage		Medium analyst coverage		High analyst coverage	
VARIABLES	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]
ES	0.764***	0.611***	0.936***	0.190***	0.852***	0.257***
	(0.015)	(0.044)	(0.018)	(0.047)	(0.020)	(0.057)
Macroday	-0.381	0.134	-0.226	-0.285	-0.564	3.272**
	(0.263)	(0.927)	(0.316)	(0.917)	(0.425)	(1.274)
ES×Macroday	0.094**	-0.176	0.077*	-0.107	0.114**	-0.423**
	(0.037)	(0.121)	(0.043)	(0.119)	(0.058)	(0.165)
Controls	Y	Y	Y	Y	Y	Y
Observations	54,792	54,792	53,710	53,710	49,897	49,897
Adj. R2	0.093	0.012	0.120	0.008	0.090	0.011

Table 10 (continued)

Panel C. Institutional ownership

	(1)	(2)	(3)	(4)	(5)	(6)
	Low Instown		Medium Instown		High Instown	
VARIABLES	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]
ES	0.706***	0.621***	0.933***	0.244***	1.038***	0.225***
	(0.013)	(0.044)	(0.013)	(0.037)	(0.017)	(0.044)
Macroday	-0.065	-0.441	-0.078	0.600	-0.740**	1.544*
	(0.280)	(0.951)	(0.275)	(0.776)	(0.348)	(0.885)
ES×Macroday	0.038	-0.140	0.042	-0.109	0.127***	-0.246**
	(0.038)	(0.127)	(0.036)	(0.102)	(0.046)	(0.116)
Controls	Y	Y	Y	Y	Y	Y
Observations	40,705	40,705	54,267	54,267	40,677	40,677
Adj. R2	0.079	0.011	0.112	0.008	0.129	0.009

Table 11. Different industries

This table presents evidence on the effects of macro news on the processing of earnings in different industries. We use Fama-French 10 industries. For each industry, we run the regression Equation (4) in the paper. The coefficients on the interaction term *ES* ×*Macroday* are reported for each industry in Columns (1) and (2). We regress the value-weighted industry portfolio returns on *Macroday*. Industry sensitivity is measured by the coefficient on *Macroday* and reported in Column (3). Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Fama French 10 Industries	**CAR[0,1]**	**CAR[2,61]**	**Industry sensitivity**
Consumer Non-durables	0.097	-0.540**	-0.131
	(0.145)	(0.271)	(0.338)
Consumer Durables	-0.026	-0.478	-0.154
	(0.160)	(0.385)	(0.513)
Manufacturing	0.093	-0.025	0.436
	(0.059)	(0.179)	(0.282)
Oil, Gas, and Coal extraction and production	0.063	-0.432	0.099
	(0.094)	(0.356)	(0.322)
Business Equipment	0.121*	-0.170	0.032
	(0.063)	(0.168)	(0.368)
Telephone and Television Transmission	0.117	0.090	-0.447
	(0.158)	(0.348)	(0.494)
Wholesale, Retail, and Some Services	0.206**	-0.514**	-0.624**
	(0.094)	(0.239)	(0.289)
Healthcare, Medical Equipment, and Drugs	0.133**	-0.416	-0.232
	(0.064)	(0.266)	(0.333)
Utilities	0.063	-0.238	0.171
	(0.047)	(0.164)	(0.187)
Other (finance, business service, etc)	0.083**	-0.226**	0.557**
	(0.035)	(0.104)	(0.258)

Table 12. The importance of macro news

This table tests whether the complementary relationship varies with the size of the macro news. The dependent variable is cumulative abnormal return and is indicated under each column heading. *ES* is earnings surprise quantile (11 groups). ES Top equals to 1 if earnings surprise quantile is 11 and 0 if the earnings surprise quantile is 1. *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Whether a macro news is big or small is measured by the absolute value of the market return (*Market_Ret_Abs*) on the day when the macro news is released. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) CAR[0,1]	(2) CAR[2,61]
ES	0.842***	0.388***
	(0.011)	(0.029)
Macroday	-0.358*	0.780
	(0.183)	(0.587)
Market_Ret_Abs	-0.173***	0.243***
	(0.032)	(0.088)
ES× Macroday	0.047*	-0.147*
	(0.027)	(0.080)
ES× Macroday× Market_Ret_Abs	0.048***	-0.056*
	(0.011)	(0.030)
Constant	-4.901***	0.820
	(0.226)	(0.730)
Controls	Y	Y
Observations	158,399	158,399
Adj. R2	0.100	0.008

Table 13. Robustness

This table reports several robustness tests. The dependent variable is cumulative abnormal return and is indicated under each column heading. *ES* is earnings surprise quantile (11 groups). *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Panel A reports the test excluding firms that have strong preference to issue their earnings on macro-news days. Abnormal Announcement Preference Ratio (AAPR) for a firm is the number of earnings announcements on macro-news day divided by the total number of its announcements. Panel B reports the test excluding days with a low number of earnings announcements (bottom quantile). Panel C reports the test excluding days with high S&P market returns (top quantile). Panel D reports with a test using an alternative measure of CAR calculated based on Fama-French Three-Factor model. Panel E reports the test that uses earnings surprise deciles (10 groups). Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market return, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Exclude firms with strong preference

	(1)	(2)	(3)	(4)
	exclude AAPR>0.5		exclude AAPR>0.33	
VARIABLES	CAR[0,1]	CAR[2,61]	CAR[0,1]	CAR[2,61]
ES	0.843***	0.386***	0.844***	0.383***
	(0.011)	(0.029)	(0.011)	(0.029)
Macroday	-0.350*	0.759	-0.573***	0.686
	(0.185)	(0.592)	(0.199)	(0.616)
ES×Macroday	0.091***	-0.194**	0.120***	-0.173**
	(0.026)	(0.077)	(0.027)	(0.080)
Constant	-5.235***	1.531**	-5.352***	1.625**
	(0.234)	(0.764)	(0.236)	(0.763)
Controls	Y	Y	Y	Y
Observations	157,717	157,717	152,221	152,221
Adj. R2	0.100	0.008	0.101	0.008

Panel B. Exclude days with low number of earnings news

	(1)	(2)
VARIABLES	CAR[0,1]	CAR[2,61]
ES	0.830***	0.397***
	(0.012)	(0.031)
Macroday	-0.324	0.529
	(0.208)	(0.640)
ES×Macroday	0.095***	-0.178**
	(0.028)	(0.083)
Constant	-4.653***	-0.877
	(0.302)	(0.931)
Controls	Y	Y
Observations	125,161	125,161
Adj. R2	0.097	0.009

Table 13 (continued)
Panel C. Exclude days with top S&P returns

	(1)	(2)
VARIABLES	CAR[0,1]	CAR[2,61]
ES	0.841***	0.366***
	(0.011)	(0.030)
Macroday	-0.438**	1.047
	(0.199)	(0.663)
ES×Macroday	0.091***	-0.207**
	(0.028)	(0.084)
Constant	-4.948***	1.217
	(0.233)	(0.775)
Controls	Y	Y
Observations	141,639	141,639
Adj. R2	0.103	0.007

Panel D. Alternative measures of stock price reactions

	(1)	(2)
VARIABLES	CAR[0,1]	CAR[2,61]
ES	0.838***	0.108***
	(0.007)	(0.025)
Macroday	-0.523***	1.086**
	(0.157)	(0.530)
ES×Macroday	0.088***	-0.159**
	(0.021)	(0.070)
Constant	-5.195***	-0.608
	(0.228)	(0.769)
Controls	Y	Y
Observations	158,399	158,399
Adj. R2	0.101	0.016

Panel E. 10 Earnings Surprise Groups

	(1)	(2)
VARIABLES	CAR[0,1]	CAR[2,61]
ES	0.861***	0.402***
	(0.011)	(0.029)
Macroday	-0.574***	0.663
	(0.158)	(0.483)
ES×Macroday	0.111***	-0.175**
	(0.026)	(0.077)
Constant	-4.607***	-1.256***
	(0.064)	(0.170)
Controls	Y	Y
Observations	158,399	158,399
Adj. R2	0.084	0.002

Internet Appendix for

"Macro News, Micro News: Complements or Substitutes?"

A. Details about Macro Announcements

This section tests the impact of individual macro news on market risk premium. Following Savor and Wilson (2013), we find important macro announcements for stock markets by running the following regression over a sample period of January 1997 to December 2014.

$$Mkt_t = \gamma_0 + \gamma_1 Macroday_t + \gamma_2 Mkt_{t-1} + \gamma_3 (Mkt_{t-1})^2 + e_t$$

where Mkt_t is the CRSP value-weighted market return minus the risk-free rate. $Macroday_t$ is a dummy variable equaling 1 if day t is an announcement day for a specific type of macro news, and 0 otherwise. For example, if my focus is on ISM PMI, then $Macroday$ equals 1 if that day has an ISM announcement, and 0 otherwise. We also include dummy variables for the day of week.

Due to limited space, we only listed macro announcements that have statistically and economically significant impact on market risk premium. Table IA.2 presents results for macro announcements that have statistically and economically significant impact on market risk premium. Panel A shows the results for FOMC news. Column (1) is parsimonious specification without including any control variables. The coefficient on $Macroday$ is positive and significant, suggesting that the market risk premium is higher on FOMC days than other days. We include the market excess return lagged 1 day and squared market return as control in column (2) and add the day of week as an additional control in column (3). The $Macroday$ effect remains positive and highly significant in all specifications. Panels B-D show similar macro-day effects for announcements of Nonfarm Payroll, ISM PMI, and Personal Consumption. Panel E shows results on all of these four macro announcements. The coefficient on $Macroday$ is also positive and significant. Overall, Table IA.2 shows that these four important macro announcements are market-moving indicators and therefore investors care about these types of macro news.

Here is more information about these four macroeconomic announcements.

1. FOMC: The Federal Open Market Committee (FOMC) is the policy-making arm of the Federal Reserve. It determines short-term interest rates in the U.S. when it decides the overnight rate that banks pay each other for borrowing reserves when a bank has a shortfall in required reserves. The Fed announces its policy decision at the end of each FOMC meeting. This is the FOMC announcement, which happens eight times a year. The

announcement also includes brief comments on the FOMC's views on the economy and how many FOMC members voted for and how many voted against the policy decision.

2. Nonfarm payroll: The NFP number is the number of jobs added or lost in the economy over the last month. The data is released monthly, usually on the first Friday of the month, by Bureau of Labor Statistics, U.S. Department of Labor. Other employment situation information released on the same day includes unemployment rate, average workweek, and average hourly earnings.
3. ISM PMI: ISM manufacturing index is a diffusion index calculated from five of the eleven sub-components of a monthly survey of purchasing managers at roughly 300 manufacturing firms nationwide. It is a leading indicator of output.
4. Personal Consumption: Personal consumption expenditures are the monthly analogues to the quarterly consumption expenditures in the GDP report, available in nominal and real (inflation-adjusted) dollars.

B. Additional results

This section provides additional results. We test whether there is a complementary relationship between macro and earnings news when there is a large number of macro announcements. While macro announcements that are important are attention-grabbing, a large numbers of macro news events, even if we do not require each to be individually important, can also draw heavy attention. Also, there is more information investors can learn from if many macro announcements released on a day. To test this idea, we examine whether investors' reactions to earnings announcements are different on days with many macroeconomic announcements. Using a full list of macroeconomic announcements from Bloomberg Econoday, we identify days with a large number of macroeconomic announcements. The cutoff point for the top 10% of the number of macroeconomic announcements is 7. Thus, we define a "High Macro News" day as one that has 7 or more macro announcements.

Table IA.3 presents the results of this test. The coefficients on the interaction terms are positive and significant for immediate reaction, and negative and significant for the delayed reaction. These results suggest that investors' immediate reactions to earnings announcements increase and delayed reactions decrease when a large number of macro announcements are released on the same day. The economic magnitudes are significant as well. Thus, this confirms that the relationship between macro news and earnings news is complementary.

Table IA.1 Characteristics of Macroeconomic Announcements
This table presents the four important macroeconomic announcements used in analysis. The release time is Eastern Time.

Announcement	Source	Frequency	Unit/Type	Release Time	# of events
Federal Funds Rate	FOMC	8/year	% level	14:00	144
Nonfarm Payrolls	BLS	M	K, change	8:30	216
ISM PMI	ISM	M	index	10:00	216
Personal consumption	BEA	M	% change	8:30	216

Table IA.2 Macro announcements and market risk premium

This table reports the results of OLS regressions of daily stock market excess return on a macro announcement day (*Macroday*) dummy variable and control variables. The dependent variable MKT is the CRSP value-weighted market return minus the risk-free rate. Macro-day for Panel A-E is a dummy variable equaling 1 if day *t* is an announcement day for FOMC, Nonfarm Payroll, ISM PMI, Personal Consumption, and all these four respectively, and 0 otherwise. Monday-Thursday are dummy variables for the corresponding days of the week. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: FOMC			**Panel B: Nonfarm Payroll**			**Panel C: ISM PMI**		
Variable	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Macroday	0.25**	0.23**	0.23**	0.14*	0.14*	0.18**	0.27***	0.26***	0.27***
	(2.561)	(2.418)	(2.358)	(1.817)	(1.897)	(2.170)	(3.669)	(3.519)	(3.593)
MKT_{t-1}		0.01	0.01		0.01	0.01		0.01	0.01
		(0.522)	(0.521)		(0.556)	(0.550)		(0.580)	(0.585)
$(MKT_{t-1})^2$		40.19	39.00		38.80	38.60		48.00	46.57
		(0.461)	(0.447)		(0.445)	(0.443)		(0.551)	(0.534)
Monday			-0.01			0.03			-0.02
			(-0.131)			(0.614)			(-0.463)
Tuesday			-0.02			0.04			-0.01
			(-0.393)			(0.676)			(-0.128)
Wednesday			0.02			0.08			0.04
			(0.451)			(1.448)			(0.759)
Thursday			-0.00			0.04			-0.00
			(-0.048)			(0.700)			(-0.018)
Constant	0.03	0.02	0.02	0.03	0.02	-0.01	0.02	0.02	0.01
	(1.580)	(1.270)	(0.679)	(1.590)	(1.258)	(-0.363)	(1.184)	(0.890)	(0.401)
Observations	4,357	4,289	4,289	4,357	4,289	4,289	4,357	4,289	4,289
Adj. R2	0.10%	0.10%	0.15%	0.20%	0.60%	0.90%	0.30%	0.52%	1.60%

Table IA.2 (continued)

	Panel D: Personal Consumption			Panel E: All Top 4 News		
Variable	(1)	(2)	(3)	(1)	(2)	(3)
Macro-day	0.21**	0.21**	0.21**	0.25***	0.25***	0.26***
	(2.286)	(2.287)	(2.303)	(5.629)	(5.485)	(5.627)
MKT_{t-1}		0.01	0.01		0.01	0.01
		(0.665)	(0.669)		(0.556)	(0.549)
$(MKT_{t-1})^2$		18.78	18.17		39.46	40.28
		(0.220)	(0.213)		(0.454)	(0.463)
Monday			0.00			0.04
			(0.069)			(0.790)
Tuesday			0.00			0.04
			(0.090)			(0.748)
Wednesday			0.03			0.08
			(0.600)			(1.616)
Thursday			-0.01			0.05
			(-0.134)			(0.898)
Constant	0.03	0.02	0.02	-0.00	-0.01	-0.05
	(1.594)	(1.256)	(0.462)	(-0.235)	(-0.264)	(-1.235)
Observations	4,357	4,289	4,289	4,357	4,289	4,289
Adj. R2	0.10%	0.21%	1.10%	0.70%	0.96%	2.60%

Table IA.3 Many macroeconomic announcements

This table presents results with many macroeconomic announcements on earnings days. The dependent variable is cumulative abnormal return and is indicated under each column heading. *ES* is earnings surprise quantile (11 groups). *High Macro News* equals to 1 if that day has 7 or more macroeconomic announcements. *Macroday* is a dummy variable equaling 1 if that day is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. *Macroday High* is a dummy variable equaling 1 if that day has the listed announcement and has more than 7 macro announcements at the same time. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market return, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(3)	(4)
VARIABLES	CAR[0,1]	CAR[2,61]
High Macro News	-0.581***	1.188**
	(0.172)	(0.583)
ES	0.841***	0.385***
	(0.011)	(0.029)
ES×(High Macro News)	0.101***	-0.179**
	(0.024)	(0.075)
Constant	-5.175***	1.340*
	(0.232)	(0.761)
Controls	Y	Y
Observations	158,399	158,399
Adj. R2	0.100	0.008

Table IA4. Strategic timing of earning announcements-robustness

This table tests whether the complementary relationship is driven by a firm's strategic timing of earning announcements. Δ*date* is the difference between the day of the current earnings announcements and the previous year's same-quarter earnings announcement. The dependent variable is cumulative abnormal return and is indicated under each column heading. *ES* is earnings surprise quantile (11 groups), and *Macroday* is a dummy variable equaling 1 if day *t* is an announcement day for Federal Open Market Committee (FOMC) decision, Employment situation, ISM PMI, or personal consumption. Control variables include the number of earnings announcements, the number of analysts following the firm, analyst dispersion, market capitalization, share turnover, market volatility, and dummy variables for year, month, and day of week. Standard errors are adjusted for heteroscedasticity and clustered by the day of earnings announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	CAR[0,1]	CAR[2,61]
	(1)	(2)
ES×Macroday if abs(Δ date)<=3	0.097***	-0.263***
	(0.029)	(0.093)
ES×Macroday if abs(Δ date)>3	0.072	-0.044
	(0.048)	(0.135)