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Net Buying Pressure and Informed Trading in the Options Market: Evidence from Earnings Announcements

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Abstract: By employing the modified net buying pressure as a measure of informed option trading, this study tested whether option trading around quarterly earnings announcements is either directionally motivated and/or volatility motivated. We found evidence that is consistent with the idea that option investors have private information prior to positive earnings announcements and use at-the-money options to exploit their informational advantage. In the post-event period, however, informed option investors trade by using deep-out-of-the-money and out-of-the-money options. We documented limited evidence on the volatility-motivated option trading, and our results suggest that this type of option trading could be motivated by hedging purposes only.

Keywords: earnings; announcements; options; informed trading; net buying pressure; volatility; direction; at-the-money; out-of-the-money; deep-out-of-the-money

JEL Classification: G10; G13; G14

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1. Introduction

The literature reports that option investors trade on the volatility of underlying stock returns (e.g., Patell and Wolfson 1981; Gharghori et al. 2017; Chen and Wang 2016). Other studies, however, document that option investors are able to predict the direction of stock prices prior to major corporate events (e.g., Jin et al. 2012; Atilgan 2014; Chan et al. 2015).

Kang and Park (2008) propose direction-learning hypothesis and volatility-learning hypothesis and provide notable evidence (for KOSPI 200 index options) supporting direction-learning hypothesis while rejecting the volatility-learning hypothesis. Later Chen and Wang (2016) extend the study of Kang and Park (2008) by arguing that option investors betting on the direction of stock returns trade differently from those betting on the volatility of stock returns. When positive news is expected to increase both stock returns and volatility, directional (volatility) traders will sell (buy) put options. By contrast, when negative news is expected to decrease stock returns but increase volatility, directional (volatility) traders will sell (buy) call options. This exogenous shock, consequently, can have simultaneous, but offsetting effects on option informed trading measures. Given that the directional and volatility option investors may trade differently on the same impending news, it is important to distinguish these two types of option trades.

Except for Kang and Park (2008) and Chen and Wang (2016), prior studies do not differentiate trading strategies of these two types of option investors.[1] To fill this gap in the literature, this paper examines US option investors' trading prior to quarterly earnings announcements with respect to both expected changes in stock returns and the volatility of stock returns related to the event. We focus on earnings announcements due to the fact that the two types of option investors are likely to trade around such an event (Patell and Wolfson 1981; Jin et al. 2012; Atilgan 2014). To separate these two types of option trading from each other, we employ net buying pressure (NBP), which was initially developed

by Bollen and Whaley (2004) and then modified further by Chen and Wang (2016), as the informed option trading measure in our study. Our study also examines at which option moneyness informed option trading occurs. To investigate this issue, we split our sample based on the moneyness of the options in an effort to better understand how moneyness affects option informed trading.

Additionally, Kim and Verrecchia's (1991, 1994) information-based trading theory suggests that informed investors trade, not only on private information prior to an event, but could also trade in the post-event period due to their superior ability in processing publicly disclosed information from a corporate announcement. Therefore, to test this conjecture, we also examine the relation between net buying pressures and both stock returns and stock return volatility during the post-event window.

We found that directional informed trading prior to earnings announcements occurs in at-the-money (ATM) options. This finding could be due to the relatively higher liquidity and lower transactions costs of ATM options (Chakravarty et al. 2004). We also found evidence that option investors trade on stock-return volatility prior to earnings announcements, particularly in OTM options. A further analysis showed that option investors trade by using deep-out-of-the-money (DOTM) and out-of-the-money (OTM) call and put options in the post-event window period.

Our study contributes to the literature in several ways. First, we provide empirical evidence whether option investors trade on the expected changes in stock returns and/or on the volatility of stock returns around quarterly earnings announcements. Second, we provide evidence that option investors have private information on good announcements prior to this event and have superior ability to process publicly disclosed information. Third, our study provides a deeper insight by providing empirical evidence about in which option moneyness these informed option transactions occur.

The remainder of this paper proceeds as follows. The next section reviews the research design and option informed trading measures. Section 3 describes the sample selection process. Section 4 presents the empirical results. Section 5 concludes.

2. Research Design

To proxy for demand in the underlying stock equivalent, Bollen and Whaley (2004) propose net buying pressure (NBP), measured as the difference between the number of buyer-motivated contracts and the number of seller-motivated contracts, multiplied by the absolute value of option delta. Bollen and Whaley (2004) identify buyer-motivated options as trades executed at the price above the midpoint of prevailing bid and ask prices. We collected option-related data from the OptionMetrics database. This database, however, does not provide transaction prices of options. Therefore, we used the current midpoint of bid and ask prices as the proxy for transaction price of an option. We identified an option trading as a buyer-(seller-) motivated option trading if a current midpoint price of an option is higher (lower) than its previous midpoint price. This procedure was repeated for the entire universe of call and put options for US equities. Option net buying pressure (NBP) measure is calculated as the difference between the number of buyer-motivated contracts and seller-motivated contracts, multiplied by the absolute value of the option's delta. Following Bollen and Whaley (2004), we scaled option net buying pressure measure by the total trading volume across all options in the class on that day.

To separate directional-motivated option trading effects from volatility-motivated option trading effects, we used the modified NBP measures proposed by Chen and Wang (2016). The modified NBP measures allowed us to distinguish between informed trading on the direction of the underlying asset price and volatility-based informed trading. Following Chen and Wang (2016), the directional-motivated demands for the kth-moneyness category of call and put options, respectively, are measured as follows:

$$NBPD^{k}_{C,t} = \frac{NBP^{k}_{C,t} - NBP^{k}_{P,t}}{2} \quad (1)$$

$$NBPD^{k}_{P,t} = \frac{NBP^{k}_{P,t} - NBP^{k}_{C,t}}{2}. \quad (2)$$

where $NBPD_c$ ($NBPD_p$) is the difference between the NBPs of calls (puts) and puts (calls) options divided by 2 categorized by moneyness k over the time interval t, and $k \in$ {DOTM, OTM, ATM}. Similarly, the volatility-motivated demand for the kth-moneyness category option is measured as follows:

$$NBPV^{k}_{t} = \frac{NBP^{k}_{C,t} + NBP^{k}_{P,t}}{2} \quad (3)$$

Following Jin et al. (2012), we measured the event window from days −1 to +1 relative to the announcement day. Option informed trading measures are computed during the base-, pre-, and post-event windows associated with days −50 to −11 prior to earnings announcements, days −10 to −1 prior to the event, and days +1 to +5 days after the event, respectively. Call- and put-option net-buying pressures that are directional during the base-, pre-, and post-event window are denoted as *NBPD_CALL_BASE, NBPD_PUT_BASE, NBPD_CAL_PRE, NBPD_PUT_PRE, NBPD_CALL_POST*, and *NBPD_PUT_POST* respectively. Call- and put-option net-buying pressures' volatility during the base-, pre-, and post-event window is denoted as *NBPV_BASE, NBPV_PRE*, and *NBPV_POST*, respectively.

Cumulative abnormal returns (CAR) for the ith stock are computed as follows:

$$CAR_{it} = \sum(r_{i,t} - r_{m,t}), \quad (4)$$

where the CRSP value-weighted market return, $r_{m,t}$, was obtained from Kenneth French's website. Cumulative abnormal stock returns during the event (post-event) window on days -1 to +1 (+6 to +90) are denoted as *XRET* (*XRET_POST*).

Similar to Jin et al. (2012), to examine whether options traders have private information on the expected change in stock prices prior to the earnings announcement date or have better processing skills of publicly disclosed information in the post-event period, we employed the following regression specifications:

$$\begin{aligned} XRET(-1,+1)_i &= Intercept + \alpha PRE_{NBPD^{k}_{C,i}} + \beta PRE_{NBPD^{k}_{P,i}} + \delta BASE_{NBPD^{k}_{C,i}} \\ &\quad + \gamma BASE_{NBPD^{k}_{P,i}} + \mu PRE_{SVOLi} + \theta SURP_i + \vartheta SIZE_i + \rho MB_i \\ &\quad + \varepsilon_i \end{aligned} \quad (5a)$$

$$\begin{aligned} XRETPOST(+6,+90)_i &= Intercept + \alpha POST_{NBPD^{k}_{C,i}} + \beta POST_{NBPD^{k}_{P,i}} \\ &\quad + \delta BASE_{NBPD^{k}_{C,i}} + \gamma BASE_{NBPD^{k}_{P,i}} + XRET_i + \mu POST_{SVOLi} \\ &\quad + \theta SURP_i + \vartheta SIZE_i + \rho MB_i + \varepsilon_i \end{aligned} \quad (5b)$$

where *PRE_SVOL* (*POST_SVOL*) is the logarithm of the volume of stocks traded during the pre-(post-)event window. If the option trading measures contain information relevant to expected changes in stock prices, then the estimated coefficients on *PRE_NBPDc* and *POST_NBPDc* should be positively related to *XRET* and *XRETPOST*, respectively. SURP is earnings surprise. Control variables are size (natural logarithm of market capitalization) and M/B (market to book ratio) of sample firms.

Following Chen and Wang (2016) and Gharghori et al. (2017), we also examined whether option trading measures of volatility-motivated informed trading are related to stock return volatility based on the following regression specifications:

$$STDEVSHORT(-1,+1)_i = Intercept + \alpha PRE\_NBPV^{k}_{i} + \beta BASE\_NBPV^{k}_{i} + \varepsilon_i \quad (6a)$$

$$STDEVLONG(+6,+90)_i = Intercept + \alpha POST\_NBPV^{k}_{i} + \beta BASE\_NBPV^{k}_{i} + \varepsilon_i \quad (6b)$$

where *STDEVSHORT (STDEVLONG)* is the standard deviation of the daily market-adjusted returns in the event window period −1 to +1 (+6 to +90) days. If option volatility trading measures contain information relevant to expected volatility changes of stocks, then the estimated coefficients on *PRE_NBPV* and *POST_NBPV* should be positively related to *STDEVSHORT* and *STDEVLONG*, respectively.

3. Data

We obtained equity options and stock-related information from the OptionMetrics database from 1 January 2005 to 30 April 2016. The database provides daily bid and ask quotes; open interest; volume; implied volatility; and Greeks, such as delta, gamma, vega, and theta, for call and put options listed on all option exchanges for underlying US equities. From this database, we collected the underlying stock-related data for daily stock bids and ask quotes, closing prices, total returns, trading volume, and outstanding shares. We collected quarterly earnings announcement dates from 2005 to 2016 from the Research Insight database. The CRSP market index data were obtained from Kenneth French's website. We merged data from these three databases based on whether firms that announce quarterly earnings during the sample period are optionable.

We selected options (calls and puts) with maturity from 10 to 60 days (Cremers and Weinbaum 2010; Jin et al. 2012). We observed many observations with zero open interest and zero volume in the data. Therefore, to address thin trading issues, we removed options with zero open interest and zero volume from the sample. Net buying pressures for both call and put options were then calculated based on the available option volume data. We excluded observations with zero net buying pressures.

Panel A of Table 1 shows the daily average of the number of option contracts during the pre-, base-, and post-windows. The number of contracts shows that call options, except for DOTM call options in the pre-window period, are traded more often than put options in all three window periods. The numbers of daily option contracts traded in the post window are the largest across option moneyness. On average, daily transaction volumes increase in the pre-window period and further in the post-window period. The increase in the number of daily contracts traded in the pre-window period may indicate that informed option investors trade during these periods. The numbers of net purchases displayed in Panel B of Table 1 are, on average, negative (except for ATM call and put options in the base- and pre-window periods and ATM put options in the post-event period), which suggests that these contracts are seller motivated. Panel C of Table 1 illustrates the net buying pressure of call and put options across the three windows. As can be seen, investors generally have net buying positions in call options in the base- and pre-windows, except DOTM calls. However, in the post-window, investors have selling positions in call options. Somehow, similar positions are observed for puts; however, the selling level in the post-window for puts in contrast to calls is high in the categories of OTM and ATM options.

Table 1. Daily average of number of option contracts and net buying pressure.

	Panel A. Number of Contracts					
	BASE		**PRE**		**POST**	
	CALL	**PUT**	**CALL**	**PUT**	**CALL**	**PUT**
DOTM	3,355,564	3,136,258	3,467,501	3,641,739	7,012,477	6,098,234
OTM	9,445,297	7,006,597	12,213,275	9,500,400	17,278,566	12,767,542
ATM	4,208,167	2,382,670	5,899,880	3,241,505	7,223,099	4,348,246
	Panel B. Net Purchases of Contracts					
DOTM	−1,214,728	−1,115,330	−1,021,626	−1,195,070	−3,681,233	−2,626,351
OTM	−1,327,765	−969,565	−895,825	−1,318,548	−4,210,721	−2,346,881
ATM	340,380	141,210	541,999	138,619	−305,685	264,422
	Panel C. Net Buying Pressure					
DOTM	−9052	−1492	−6443	−783	−14,955	−3991
OTM	12,883	14,785	22,587	19,485	−952	−20,464
ATM	7093	−1948	20,287	11,138	−2727	−15,980

This table reports daily average number of option contracts, net purchase of option contracts, and net buying pressure during the base, pre, and post windows for deep-out-the-money, out-of-the-money and at-the-money call and put option contracts. Base-, pre-, and post-event windows associated with days −50 to −11 prior to earnings announcement day, days −10 to −1 prior to the event, and days +1 to +5 days after the event, respectively. The net buying pressure is calculated as the difference between the number of buyer-motivated contracts, multiplied by the absolute value of option delta.

4. Results

4.1. Directional-Motivated Options Trading

Table 2 reports the relation between informed option trading measures during the pre-event window period and the cumulative announcement return during the event window (Equation (5a)).[2] Each panel reports directional informed trading tests for each option of moneyness. As prior studies suggest that option investors may trade differently depending on the quality of an announcement (Chen and Wang 2016), we examined the effect of pre-event informed option trading measures on good or bad announcements. We define bad or good news if the cumulative abnormal return during the event window is negative or positive, respectively. We found that the coefficients on NBPD_CALL_PRE and NBPD_PUT_PRE for DOTM and OTM options, as reported in Panels A and B, are not positively related to the cumulative announcement returns. The negative coefficient of NBPD_CALL_PRE for good news in the OTM option, however, is not consistent with the informed trading hypothesis. One possible explanation for this conflicting sign is that it could be related to hedging purposes due to the moneyness of the options. Overall, these results suggest that informed option investors do not use DOTM or OTM options to trade on the expected changes on the underlying stocks' prices.

Panel C of Table 2 examines the relation between the cumulative abnormal announcement period returns and net buying pressures for ATM options. We found that, for good announcements, the net buying pressures of call options are positively related to announcement-period returns. This result suggests that informed trading occurs in ATM options during the pre-announcement period of good announcements. The (in)significant relationship between announcement return and net buying pressures of ATM options may suggest that option investors are more (less) likely to trade if the impending earnings announcement is good (bad) news. These results are consistent with the direction-learning hypothesis and findings of Kang and Park (2008) that informed investors use options to trade on the direction of the underlying. Moreover, our finding that option investors are informed on the good earnings announcement is consistent with the evidence of Whalen and Collver (2004).

Table 2. Relationship between option NBPDs of calls (puts) and event returns.

Panel A. DOTM	**All**	**Bad News**	**Good News**
NBPD_CALL_PRE	0.018	0.031	−0.027
	(0.31)	(0.18)	(0.12)
NBPD_PUT_PRE	0.017	0.008	−0.001
	(0.36)	(0.67)	(0.98)
NBPD_CALL_BASE	0.012	0.029 ***	−0.013 *
	(0.12)	(0.00)	(0.08)
NBPD_PUT_BASE	−0.002	−0.003	0.005
	(0.85)	(0.71)	(0.56)
Intercept	−0.029 ***	−0.206 ***	0.197 ***
	(0.00)	(0.00)	(0.00)
Observations	6134	3067	3067
Adjusted R^2	0.0024	0.1222	0.1022
Panel B. OTM			
NBPD_CALL_PRE	0.000	−0.002	−0.009 **
	(0.96)	(0.62)	(0.05)
NBPD_PUT_PRE	0.005	−0.001	0.004
	(0.37)	(0.84)	(0.46)
NBPD_CALL_BASE	−0.003	0.000	−0.009 ***
	(0.20)	(0.96)	(0.00)
NBPD_PUT_BASE	−0.002	0.000	−0.004
	(0.55)	(0.91)	(0.17)
Intercept	−0.020 ***	−0.185 ***	0.187 ***
	(0.00)	(0.00)	(0.00)
Observations	9543	4775	4768
Adjusted R^2	0.0031	0.0975	0.1052

Table 2. *Cont.*

Panel C. ATM			
NBPD_CALL_PRE	0.002	−0.001	0.008 **
	(0.56)	(0.84)	(0.03)
NBPD_PUT_PRE	0.006	0.001	0.002
	(0.17)	(0.75)	(0.68)
NBPD_CALL_BASE	0.000	−0.001	0.000
	(0.93)	(0.64)	(0.97)
NBPD_PUT_BASE	−0.001	−0.003	−0.001
	(0.70)	(0.32)	(0.76)
Intercept	−0.041 ***	−0.188 ***	0.173 ***
	(0.00)	(0.00)	(0.00)
Observations	4146	2136	2010
Adjusted R^2	0.0072	0.0976	0.0923

This table reports results for the effect of net buying pressure of call and put options on the event excess returns for different moneyness categories. The dependent variable is the cumulative abnormal stock returns (−1, +1). *PRE_NBPD* and *BASE_NBPD* are the option net buying pressure directional measures for days −10 to −2 and days −50 to −11, respectively. To conserve space, control variables are not reported. Bad news is for negative announcement returns; good news is for positive announcement returns; *p*-values are in parentheses; *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

4.2. Volatility-Motivated Options Trading

Figlewski and Frommherz (2017) and Gharghori et al. (2017) argue that transactions in the options market may be related to expected changes in the volatility of underlying asset values. To test this conjecture, following Chen and Wang (2016), we employed a measure of informed option trading based on options transactions—namely net buying pressure volatility (NBPV). This measure reflects option trading information related to the volatility (rather than the direction) of underlying asset values. Table 3 reports net buying pressures of volatility trading prior to announcement dates. The coefficient on NBPV_PRE is negative and significant for OTM options, suggesting that volatility-based trading by using OTM options prior to the event is probably hedging motivated. These results are also consistent with the findings of Kang and Park (2008), who do not find informed trading on the volatility instead they find option trading on the direction of the underlying.

Table 3. Relationship between option NBPVs and event returns volatility.

Panel A. DOTM	**All**	**Bad News**	**Good News**
NBPV_PRE	−0.009	−0.009	−0.008
	(0.10)	(0.24)	(0.27)
NBPV_BASE	−0.007 ***	−0.011 ***	−0.003
	(0.00)	(0.00)	(0.35)
Intercept	0.027 ***	0.028 ***	0.026 ***
	(0.00)	(0.00)	(0.00)
Observations	6234	3118	3116
Adjusted R^2	0.0018	0.0034	0.0001
Panel B. OTM			
NBPV_PRE	−0.003 **	−0.001	−0.005 ***
	(0.03)	(0.71)	(0.01)
NBPV_BASE	−0.006 ***	−0.005 ***	−0.007 ***
	(0.00)	(0.00)	(0.00)
Intercept	0.032 ***	0.032 ***	0.032 ***
	(0.00)	(0.00)	(0.00)
Observations	9684	4849	4835
Adjusted R^2	0.0066	0.0044	0.0091

Table 3. *Cont.*

Panel C. ATM			
NBPV_PRE	0.001	0.000	0.002
	(0.43)	(0.79)	(0.15)
NBPV_BASE	−0.002 **	−0.002	−0.001
	(0.04)	(0.13)	(0.14)
Intercept	0.032 ***	0.033 ***	0.032 ***
	(0.00)	(0.00)	(0.00)
Observations	4227	2177	2050
Adjusted R^2	0.0007	0.0002	0.001

This table reports results for the effect of net buying pressure of call and put options on the event excess returns volatility for different moneyness categories. The dependent variable is the volatility of abnormal stock returns during the event window period (−1,+1). *PRE_NBPV* and *BASE_NBPV* are the option net buying pressure volatility measures for days −10 to −2, and −50 to −11, respectively. Bad news is for negative announcement returns; good news is for positive announcement returns; *p*-values are in parentheses; ** and *** denote statistical significance at 5% and 1% levels, respectively

4.3. Post-Event Options Trading

Prior studies suggest that option investors may have superior skills compared to other investors to process publicly disclosed information. To test this conjecture, in the spirit of Jin et al. (2012), we examined whether net buying pressures measured in the post-event period (+1, +5) are positively related to abnormal stock returns in the post-event period (+6, +90). Panels A and B of Table 4 show, that for good earnings announcements, net buying pressures of DOTM and OTM call and put options in the post-event period (+1, +5) are significantly related to post-event cumulative abnormal stock returns measured during days +6 to +90 relative to the announcement dates. This significant relation, however, is absent for ATM options. Thus, we infer that option investors have information-processing skills with respect to information from earnings announcements and trade by using DOTM and OTM options on this information.

Table 4. Relationship between option NBPDs of calls (puts) and post-event returns.

Panel A. DOTM	**All**	**Bad News**	**Good News**
NBPD_CALL_POST	0.152 ***	0.144 ***	0.172 ***
	(0.00)	(0.00)	(0.00)
NBPD_PUT_POST	−0.114 ***	−0.091 ***	−0.132 ***
	(0.00)	(0.00)	(0.00)
NBPD_CALL_BASE	−0.001	−0.002	0.002
	(0.89)	(0.86)	(0.79)
NBPD_PUT_BASE	−0.003	0.015	−0.021 ***
	(0.70)	(0.14)	(0.01)
Intercept	−0.002	−0.042 ***	0.001
	(0.76)	(0.00)	(0.86)
Observations	6139	3067	3072
Adjusted R^2	0.3865	0.2109	0.3828
Panel B. OTM			
NBPD_CALL_POST	0.009	0.003	0.006
	(0.91)	(0.98)	(0.38)
NBPD_PUT_POST	−0.016	−0.008	−0.032 ***
	(0.86)	(0.96)	(0.00)
NBPD_CALL_BASE	−0.078 ***	−0.157 ***	0.002
	(0.01)	(0.01)	(0.45)
NBPD_PUT_BASE	−0.014	−0.027	0.000
	(0.66)	(0.67)	(0.94)
Intercept	−0.183 ***	−0.467 ***	−0.002
	(0.00)	(0.00)	(0.80)
Observations	9518	4761	4757
Adjusted R^2	0.0034	0.0019	0.2567

Table 4. *Cont.*

Panel C. ATM			
NBPD_CALL_POST	−0.004	−0.014	0.005
	(0.97)	(0.95)	(0.46)
NBPD_PUT_POST	−0.020	−0.039	−0.018 **
	(0.87)	(0.87)	(0.04)
NBPD_CALL_BASE	0.003	0.002	−0.001
	(0.95)	(0.98)	(0.63)
NBPD_PUT_BASE	−0.033	−0.051	−0.005 *
	(0.47)	(0.56)	(0.08)
Intercept	−0.350 ***	−0.879 ***	0.014
	(0.01)	(0.00)	(0.17)
Observations	4066	2102	1964
Adjusted R^2	0.0015	0.0029	0.2206

This table reports results for the effect of net buying pressure of call and put options on the event excess returns for different moneyness categories. The dependent variable is the post-event cumulative abnormal stock returns (+6,+90). *POST_NBPD* and *BASE_NBPD* are the option net buying pressure directional measures for days +1 to +5, and −50 to −11, respectively. To conserve space, control variables are not reported. Bad news is for negative announcement returns; good news is for positive announcement returns; *p*-values are in parentheses; *, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively.

Table 5 shows the regression results for Equation (6b) relating stock return volatility to post-event option net buying pressure. The coefficient on NBPV_POST is statistically insignificant for each category of option moneyness. Thus, we did not find evidence that options investors trade on expected stock returns volatility in the post-event period.

Table 5. Relationship between option NBPVs and post-event returns volatility.

Panel A. DOTM	**All**	**Bad News**	**Good News**
NBPV_POST	−0.007	−0.004	−0.008
	(0.19)	(0.61)	(0.32)
NBPV_BASE	−0.009 ***	−0.013 ***	−0.005 **
	(0.00)	(0.00)	(0.05)
Intercept	0.018 ***	0.019 ***	0.017 ***
	(0.00)	(0.00)	(0.00)
Observation	6208	3103	3105
Adjusted R^2	0.0044	0.008	0.0011
Panel B. OTM			
NBPV_POST	0.000	−0.005	0.003
	(0.99)	(0.93)	(0.14)
NBPV_BASE	0.017	0.038 *	−0.005 ***
	(0.12)	(0.07)	(0.00)
Intercept	0.028 ***	0.035 ***	0.021 ***
	(0.00)	(0.00)	(0.00)
Observations	9642	4825	4817
Adjusted R^2	0	0.0003	0.0082
Panel C. ATM			
NBPV_POST	0.006	0.012	0.002
	(0.88)	(0.89)	(0.19)
NBPV_BASE	0.005	0.011	−0.001
	(0.75)	(0.72)	(0.26)
Intercept	0.035 ***	0.048 **	0.021 ***
	(0.00)	(0.04)	(0.00)
Observations	4121	2128	1993
Adjusted R^2	−0.0005	−0.0009	0.0006

In this table *POST_NBPV* and *BASE_NBPV* are the option net buying pressure volatility measures for days +1 to +5 and −50 to −11, respectively. Bad news is for negative announcement returns; good news is for positive announcement returns; *p*-values are in parentheses; *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

5. Conclusions

Our empirical results suggest that option investors have private information on the expected direction of the underlying stocks prices prior to good earnings announcements, and they trade by using ATM options to exploit their private information. This is probably because ATM options have high liquidity and lower transaction costs compared to the other option, moneyness. Further results suggest that option investors have the processing ability of information from publicly disclosed announcements in terms of predicting the direction of stock returns during the post-event window period. In the post-event period, however, these investors do not use ATM options, but trade by using OTM and DOTM options. We found limited evidence that option investors trade on the expected volatility of the underlying stocks' prices prior to and after the announcements, and the results suggest that these transactions could be related to hedging purposes. Overall, our empirical evidence suggests that informed option traders' benefit from their private information related to both the expected direction and volatility of underlying asset values.

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Notes

[1] Chen and Wang (2016) document evidence supporting both directional and volatility trading on stock index option in the Taiwanese option market prior to 2011.

[2] To conserve space, we do not report the results for the other variables in the regression model.

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