Investors Trading and Return Patterns after Earnings Announcements

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This study examines the difference in trading behaviors around earnings announcement period across three types of investors in Thailand stock market; Individual, institutional and foreign investors, and also the relationship between their trading behaviors and the stock return patterns before and after announcement periods. The results using trading data of stocks in SET100 during 2013-2017 show that there is persistence of stock price after earnings announcements in the same direction of earnings surprise. In term of trading behavior, before earnings announcement, we find that there is no trading pattern for all investor types and the pre-announcement trading flows has no correlation with future earnings surprise. After earnings announcement, there are clear difference in trading behavior in response to earnings news. Individual investors trade in the opposite direction to earning surprise which slows down the stock price adjustment on earnings information. Conversely, foreign investors appear to trade in the same direction of earnings information and exploit abnormal return from price drift to their advantage. While institutional investors has unclear trading pattern in response to earnings surprise, but they trade in momentum-following pattern by trading in the same direction of recent return prior to earnings announcement. Moreover, we find that individual investors' news-contrarian trading pattern has strong positive relationship with the magnitude of post-earning announcement drift. The magnitude of price drift following the same direction of earnings surprise become higher when individual investors trade in the opposite direction of earnings surprise. We also find that the price drift tend to occur when institutional and foreign investor trade in the same direction of earnings surprise.

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1.INTRODUCTION

Background and Significance of the problem

Earnings announcement are regular informational events that inform investors firm's financial performance of the previous quarter. In the stock market that consists of many investor types, the heterogeneity of investors' behavior across different investor type forms their expectation on future value of firms and make them interpret and react differently on the firms' earnings information. If the information received from announcement is different from the investors' expectation, the share price shall fully and instantaneously reflect on publicly available information such as earning announcement according to the semi-strong form of the Market Efficient Hypothesis.

However, prior researches reported the evidence of a stock return anomaly in the pattern that share prices are slowly adjusted in the direction of earnings surprise after the announcement, which is referred to post-earnings-announcement drift (PEAD). This phenomenon implies that one can earn abnormal by trading on the announced earning information; buying stocks with top rank of positive earnings surprise and shorting stocks with the bottom rank of negative earnings surprise. Studies that provide explanations for the predictability of stock return after earnings announcement events can mainly categorized into two groups: The first group that give rational explanations based on latent risk/risk measurement error and the second group, which is more related to this study, that give behavioral explanations based on investor trading behavior.

Existing studies demonstrate the difference in investor trading behavior among individual, institutional and foreign investors. Individuals are believed to have cognitive biases that lead to investment mistakes in general (Odean 1999, Barber and Odean 2000). Hirshleifer et al. (2008) proposed the individual trading hypothesis that individuals trade in the opposite direction of earning surprise and impede price to instantly react to earning information. While, Institutional investors are viewed more sophisticated. Bartov et al. (2000) report that PEAD is lower in firms with high institutional shareholdings. Similar results by Ke and Ramalingegowda (2005) find the evidence that actively trading institutional investors institutional investors exploit

PEAD by trading in the same direction of earnings surprises. While Grinblatt and Keloharju (2000) report report that foreign investors trade in momentum-following pattern because of their information disadvantage to domestic institutional and local investors. However, foreign investors still gain consistence profit from information-processing advantages and sophisticated analytical skills (Bae et al. 2006)

Previous studies about the relationship between PEAD and investors' trading behavior were mostly conducted in the U.S and European countries and the focus of studies are limited to the trading behavior of only one specific investor type such as individual or institutional investors. Moreover, previous researches mostly use indirect data to measures the trading activity of each investor type. For example, in the studies of Radhakrishna (2000) and Lee (1992), trade size was selected as a proxy for investor type by assuming that small trades are retail trades whereas large trades are institutional trades. In this study, I use Thailand SET intra-day transaction data with actual client flag to identify investor type so that the trading reactions around earning announcement of all investor types can be accurately observed.

The results will help demonstrate empirical evidence supporting the existing studies on how each investor type response to earnings announcement and provide insights in term of the presence of PEAD and the magnitude of PEAD based on the effect of each investor type trading and other controlling parameters.

Objectives

- To investigate the trading behaviors of different type of investor in response to quarterly earnings announcement and provide explanation and comparison with model/predictions from prior studies.
- To examine the presence of the PEAD in Thai market and examine whether magnitude of PEAD, measured by the cumulative abnormal return after earning announcement events, could be attributed to the trading behavior of any investor type.

Research Hypothesis

Firstly, we examine the pre-announcement trading behavior across investor types and its predictability on future earnings surprise. As reported in the studies (Odean 1999, Barber and Odean 2000 and Kaniel et al. 2012), individual investors are claimed to be less sophisticated and generally make investment mistakes. Thus, we expect them to trade in the opposite side of the future earnings surprise. That is, they tend to sell (buy) stocks before good (bad) earnings surprise. While, Institutions and foreign investors who are considered more sophisticated in term of investment strategies, so we expect them to correctly forecast the earnings surprise and trade rationally in the same direction of future earnings surprise. That is, they tend to buy (sell) stocks before good (bad) earning surprise occurs.

> **H1**: Before earnings announcements, Individual investors tend to trade in the opposite direction of future earnings surprise
>
> **H2**: Before earnings announcements, institutional and foreign investors tend to trade in the same direction of future earnings surprise.

After earnings announcement, stock prices are expected to instantly and fully adjusted to reflect earnings information. However, in the market that consist of different types of investor with different investment capability and risk tolerance, some studies purpose models that stock prices reflect the weighted average of market participants' expectation (Fischer and Verrecchia 1999), so the price can be affected by both sophisticated and naive investors in the short run.

Individual investors are in general considered naive, make investment mistake and underperform market (Barber and Odean 2000). While institutional and foreign investor are considered sophisticated due to superior information processing and investment decision. Referred to the individual trading hypothesis (Hirshleifer et al. 2008), I expect sophisticated investor like institutional and foreign investors to make rational trading in the direction of recent earnings surprise and their trading move the price to instantly reflect the information. In order for prices drift to occur, there would be naïve investors trading irrationally to earnings news and cause mispricing. For

market to clear, it could be implied that individual investors, who are considered less sophisticated, are likely to trade in the other side of institutional and foreign investor and opposite to the direction of earnings surprises, resulting in sluggish price adjustment after announcement. The hypothesis regarding to post-announcement trading by investor types can be summarized as below

H3: When prices drift in the direction to earning information, Individual investors tend to trade in the opposite direction of earnings surprise after earnings announcements.

H4: When prices drift in the direction to earning information, institutional and foreign investors tend to trade in the same direction of earnings surprises after earnings announcements.

Another hypothesis is developed to examine the effect of individual trading in the slow the full adjustment of price in response to earnings information. As hypothesized earlier that the drift in price following the direction of earning occurs when individual trade contrarian to earnings information. If more individual contrarian trading behavior after earnings surprises, the higher magnitude of the PEAD is expected. In other word, the magnitudes of PEAD is greater when individuals sell (buy) more aggressively after positive (negative) earnings surprise

H5: The magnitude of the price persistence in the direction of earning information is higher when individual investors trade more in the opposite direction of earnings surprises after earnings announcements.

2. LITERATURE REVIEW

Investors' Trading around earning announcement

There are many academic researches that explain the difference in trading behavior between individuals and institutional investors around earnings announcements. Studies in behavior finance field claim that Individuals naturally have cognitive biases and tendency to make investment mistakes in general (Odean 1999, Barber and Odean 2000). While, Institutions are viewed as informed investors

and more sophisticated in term of collaborating public information into their trading strategies (Hand 1990, Lee et al. 1991). Bernard and Thomas (1990) confirms the difference in investors 'sophistication when processing earning information. They conclude that some investors hold naïve earning expectations which partly reflect into price and cause price underreaction after earning announcement. Lee (1992), Hirshleifer et al. (2004), and Dey and Radhakrishna (2006) find that individual investors seem to make irrational trading decisions. Referred as attention-grabbing hypothesis, individual investors trade concentratedly and are net buyers on earnings announcements for both good and bad news.

Return Pattern after earning announcement

There are numerous researches examining the return pattern after earning announcement. One of robust phenomena that has been long documented is post-earning-announcement drift (PEAD). This phenomenon is described as the tendency of price to continue move in the direction of previously announced earnings.

Although this phenomenon has been documented first in 1960, the explanations are still inconclusive. There are two hypotheses and explanations that arguably dominate the debate. The first is the rational explanation and the second is the behavioral finance which claims that investors are irrational. In the rational and efficient market perspective, PEAD demonstrates contradiction with the Semi-strong form of the Efficient Market Hypothesis which investors cannot exploit abnormal returns using publicly available data such as earning announcement data. The EMH supporters suggest that drift could be attributed to the inaccuracy in measuring risk or methodological biases in general. Additionally, the drift is claimed as a compensation for risk associated with shocks in the earning news (Garfinkel and Sokobin, 2006).While, in the behavioral finance perspective, the deviation from the assumption of rational expectations in the Efficient Market Hypothesis comes from irrationality in form of cognitive biases that cause people to make errors of judgment and lead to observed patterns of abnormal returns.

Individual Investors

Prior studies suggest that the predictability of the return after earning announcement could be attributed to investor sophistication. Bernard and Thomas' (1990) conclude that naïve investors fail to understand the time-series character of earnings and cause price drift. Similarly, Hvidkjaer (2006) find that small-size trading exhibit a clear different pattern from large-size around earning announcements. The large-size traders tend to trade early in momentum style while small-size traders show initial underreaction and then trade in delayed reaction.

Much of the literatures on PEAD focus on trading behavior of individual investors who are believed less sophisticated than institutional investors. Hirshleifer et al. (2008) hypothesize that individual trading are strong contribution to the PEAD, commonly referred to Individual Trading Hypothesis. They suggest that the slow price adjustment to earning announcement exists when individual investors trade oppositely to the earnings information by selling stocks with good earnings surprise and buying stocks with bad earnings surprise. But the results from the Clients from one of US brokerage's firm show that individuals are net buyers for both good and bad earnings surprises, and this is inconsistent with the hypothesis. Conversely, Kaniel et al. (2012) find that individual investors at the NYSE trade in the opposite direction of earning news. They summarize that individual investors' news-contrarian trading slow the instant adjustment of stock prices to earnings surprise.

Institutional Investors

Bartov et al. (2000) examined the relationship between post-announcement price drift and the proportional share held by institutional investors in NYSE/AMEX firms. They find that firms with low institutional shareholdings illustrate the higher PEAD. The results confirm that the level of investors' sophistication attribute to the predictability of stock return after earnings announcement. Ke and Ramalingegowda (2005) report similar finding that institutional investors gain abnormal returns in subsequent quarters by adjusting their stockholdings in the same direction as unexpected earnings. These results suggest that institutional investors take advantage of PEAD. However, these studies suggested that trade size may not be an accurate

indicator for representing investor types or the investment sophistication since the sophisticated investors can split trade size in smaller size to reduce the price impact of their trades.

Foreign Investors

There exists literatures demonstrate trading behavior of foreign investors. Brennan and Cao (1997) and Grinblatt and Keloharju (2000) find that foreign investors trade in momentum-follow strategies because of their informational disadvantage to domestic institutional and local investors. Similarly, Dvorak (2005) report evidence that foreign investors experience informational disadvantage compared to individual investors in the Indonesian stock market. Conversely, foreign investors appear to be advantageous in processing information and analytical skills. They also find that foreign investors are skillful momentum followers, and they have gain superior return than local investors in the Finnish stock market. Bae et al. (2006) reported similar results of the consistent good performance of foreign investors in the Japanese stock market.

In general, foreign investors are viewed to share some common characteristics with local institutional investors in such a way that they follow momentum trading strategies and prefer large stocks to lessen liquidity and transaction costs issue (Gompers and Metrick, 2001). Thus, the hypothesis related to institutional trading are applicable to foreign investors due to the similar nature between these two investors types.

3. DATA

I use the intraday trading data of all stocks listed in SET100 which are the100 largest stocks based on market capitalization in Thailand from 2013 to 2017. The information related to stock information and earnings which are announcement date, actual and forecast earnings come from Thompson Reuter DataStream database.

4. METHODOLOGY

Event study

The announcement date is the event day, denoted by day 0 (t=0). In case that the announcements occur after the trading hours, I use the following trading day as the event day. The event window used in this study is 30 trading days before and after announcement date to the study only the effect of recently announced earnings period. The estimation period for calculating the expected return is the period between 200 to 20 days before announcement.
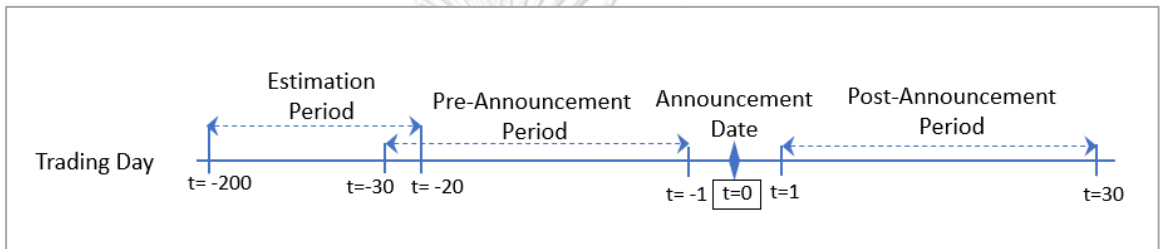
Cumulative abnormal return

The daily abnormal return (AR_{it}) for a stock i on date t is calculated by subtracting the return on the stock (R_{it}) by the expected return on from the market model $E(R_{it})$. The estimation period for constructing expected return is 200 days (t=-200) and 20 days (t=-20) before the event day. The equation of daily expected return $E(R_{it})$ from CAPM is:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

The equations of the daily abnormal returns for each stock (AR_{it}) and the average daily abnormal return (AAR_{it}) are:

$$AR_{it} = R_{it} - E(R_{it})$$

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

The equations of cumulative abnormal returns for stock i between period T_1 and T_2 $(CAR_i [T_1, T_2])$ and the cumulative average abnormal returns $(CAAR [T_1, T_2])$

is a sum of daily abnormal return and average abnormal return for the observed period T_1 and T_2 are:

$$CAR_i\,[T_1, T_2] = \sum_{t=T_1}^{T_2} AR_{it}$$

$$CAAR\,[T_1, T_2] = \sum_{t=T_1}^{T_2} AAR_t$$

Trading behavior around earnings announcements by investor type

In market microstructure data, investor types are categorized into three groups which are individual, institutional, and foreign trade as shown in Port/Client Flag as "C", "M", "F", respectively. The buyer and seller identity of each matched order can be directly found in Buyer_PC_flag and Seller_PC_flag, respectively. The directional measure of trading by each investor type is the cumulative trading of a stock during the observed period around earnings announcements. Refer to Hirshleifer et al. (2008), the activity of each investor type is measured by Net Buy for stock i in day t ($NET\ BUY_{it}$), which are defined as the difference between the number of shares bought and the number of shares sold and divide by the number of shares outstanding at the quarter in which earning is announced.

$$NET\ BUY_{it} = \frac{No.\,of\ share\ bought_{it} - No.\,of\ share\ sold_{it}}{No.\,of\ share\ outstanding\ _i}$$

Earning surprise

Earnings surprise for stock i in each quarter is measured by standardized unexpected earnings (SUE) which is the actual quarter earnings minus by the average earnings analyst forecast and divide by the share at the quarter in which earning is announced.

$$Earning\ Surprise_i = \frac{Actual\ EPS_i - Expected\ EPS_i}{Stock\ Price_i}$$

Then, the earning surprise of all events are categorized into five groups ranked from the most negative (lowest) earnings surprise as quintile 1 to the most positive (highest) earnings surprise as quintile 5.

Regression Models

The hypothesis 1 and 2 are related to pre-announcement trading of each investor type. we will examine whether the pre-announcement trading behavior have predictive power on the future earnings surprise. The dependent variable of regression equation is earnings surprise reported as standardized earning surprise (SUE). The independent variables include the cumulative trading 30 days before earning announcement date by investor type ($\sum$NET BUY). I also include three controlling factors that might affect the future firm's earnings surprise which are natural log of the firms' market value of equity (ln(MV)), price-to-book value (PBV) and previous return 30-day prior to announcement (CAR[-30,-1]) into the regression equation as follow.

$$SUE_i = a + b * \sum_{t=-1}^{-30} \text{NET BUY}_i^{Investor\ Type} + d * \ln(MV_i) +$$
$$e * PBV_i + f * CAR[-30, -1]_i + \varepsilon_i$$

For Individual investors, I expect coefficient b to be significantly negative. While, or Institutional and Foreign investors, I expect coefficient b to be significantly positive. As hypothesized, the more sophisticated investors are expected to forecast the direction of earnings correctly, while individual investor are expected to trade in opposite direction of future earnings surprise.

The hypothesis 3 and 4 are related to investor trading response to earnings announcements. It is hypothesized that, when price drift after earning announcement occurs, individual investors net sell after positive earnings surprise and net buy after negative earnings surprise. while, Institutional and foreign investors likely to trading the same direction of the earnings surprise to rationally reflect earning information. The dependent variable of regression equation include the cumulative trading 30 days after earning announcement date by investor type ($\sum$NET buy). The independent variables include earning surprise reported as standardized earning surprise (SUE). I

also include three controlling factors that might affect the trading of stocks apart from earning information which are natural log of the firms' market value of equity (ln(MV)), price-to-book value (PBV) and previous return 30-day prior to announcement (CAR[-30,-1]) into the regression model to control the effect of firm's size, value factor and momentum factors, respectively.

$$\sum_{t=1}^{30} \text{NET BUY}_i^{Investor\ Type} = a + b * SUE_i + d * \ln(MV_i) +$$
$$e * PBV_i + f * CAR[-30, -1]_i + \varepsilon_i$$

To be consistent with individual trading hypothesis (Hirshleifer 2008), I expect coefficient b to be significantly negative so that individual investors trade oppositely to earning surprise and I expect coefficient b to be significantly positive so that institutional and foreign investors' trading follow the direction of earnings surprise.

I further analyze the effect of different level of earnings surprise on the investors' trading flows after announcements. Dummy variables are used to represent the earnings surprise of each event in term of quintile. The dependent variable is the cumulative trading 30 days after earning announcement date by investor type ($\sum$NET buy) and the controlling variable are natural log of the firms' market value of equity (ln(MV)), price-to-book value (PBV) and previous return 30-day prior to announcement (CAR[-30,-1]). The regression equation is shown as below.

$$\sum_{t=1}^{30} \text{NET BUY}_i^{Investor\ Type} = a + b * Q1 + c * Q2 + d * Q4 + e * Q5 +$$
$$f * \ln(MV_i) + g * PBV_i + h * CAR[-30, -1]_i + \varepsilon_i$$

I expect coefficient b and c to be significantly positive so that individual investors are net buyers after bad earnings surprise quintile 1 and quintile 2, and coefficient d and e to be significantly negative so that individual investors are net sellers after good earnings surprise quintile 4 and quintile 5. For institutional and foreign investors, I expect coefficient b and c to be significantly negative and coefficient d and e to be significantly positive so that their trading flows follow the direction of earnings surprise.

Next, I will examine the effect of post-announcement individual investors' trading on the magnitude of the PEAD. According to individual trading hypothesis (Hirshleifer 2008), I hypothesize that individual investors tend to trade in opposite direction in response to earnings surprises. Moreover, I hypothesize further that if individual investor trade more aggressively in the opposite direction of earnings surprises, the higher magnitude of the PEAD is expected. That is, in case of negative earnings surprise, if individual increase their net buying pressure, the downward price drift is expected to be higher. In case of positive earnings surprise. If individual increase their net selling pressure, the upward price drift is expected to be higher.

The dependent variable is the cumulative abnormal return of the 30 days after the announcement date. The independent variables are the cumulative trading 30 days after earning announcement date by investor type ($\sum$NET buy), earning surprise reported as actual standardized earning surprise (SUE) and the interaction term of these two parameters to measure the marginal effect of the cumulative trading on earning surprise. The controlling factors that might affect the cumulative abnormal return which are natural log of the firms' market value of equity (ln(MV)), price-to-book value (PBV) and previous return 30-day prior to announcement (CAR[-30,-1]) into the regression model to control the effect of firm's size, value factor and momentum factors, respectively.

$$CAR[1,30]_i = a + b * SUE_i + c * \sum_{t=1}^{30} \text{NET BUY}_i^{Investor\ Type}$$
$$+d * SUE_i * \sum_{t=1}^{30} \text{NET BUY}^{Investor\ Type} + e * \ln(MV_i) + e * PBV_i + f * CAR[-30,-1]_i + \varepsilon_i$$

I expect coefficient b to be significantly positive for all investor types because the magnitude of PEAD should increase with the earnings surprise. Additionally, I expect coefficient c and d to be negative for individual investors so that when individuals trade more in the opposite direction of earnings surprise, the PEAD will become higher. Complementary to individual investors, I expect coefficient c and d to be positive so that when institutional and foreign trade more in the same direction with earnings surprise, the PEAD is expected to become higher.

5. RESULTS

Return pattern around earnings announcement

Firstly, I examine the pattern of return around earnings announcement for the universe of SET100 stocks in the selected study period. Abnormal returns are calculated by subtracting the benchmark return calculated from the market model. Then abnormal returns are accumulated conditionally on the earning surprise quintile from the lowest earnings surprise quintile (Q1) to the highest earnings surprise (Q5) to get cumulative abnormal returns (CAR) as shown in figure 1.

In figure 2, the plot of CARs prior to the announcement suggests the presence of information leakage. A downward drift in abnormal return occurs at around 10 trading days before announcements for bad surprise stocks Q2. The negative CAR of Q2 is also significantly negative as reported in table 1.

In figure 3, the plot of CARs after earnings announcements shows a strong pattern of post-earning announcement drift (PEAD) that the stock returns continue drifting in the same direction as earnings surprise. In the 5-day post announcement window, as reported in table 1, the signs of CARs follow the earnings surprises direction which are positive for the good earnings surprise Q5 and Q4, and negative for the bad earnings surprise Q1 and Q2. Additionally, the magnitude of CARs also follow the level of earnings surprise. However, only the CARs of extreme earnings surprise quintile Q1 and Q5 are statistically significant from zero. In the 20- day post announcement window, the CAR of Q1 are significantly negative (-2.22%, t-statistic of 3.02) while the CAR of Q5 are significantly positive (1.25%, t-statistic of 2.02). At the 30 days after announcement, the magnitude of downward drift in CARs for bad earning surprise (Q1) are higher than the magnitude of upward drift for good earnings surprise (Q5). In term of price adjustment persistence, the downward drift for Q1 persists for longer period up to 10 days, compared to the upward price drift for Q5 that immediately reach the stable level in 3 days.

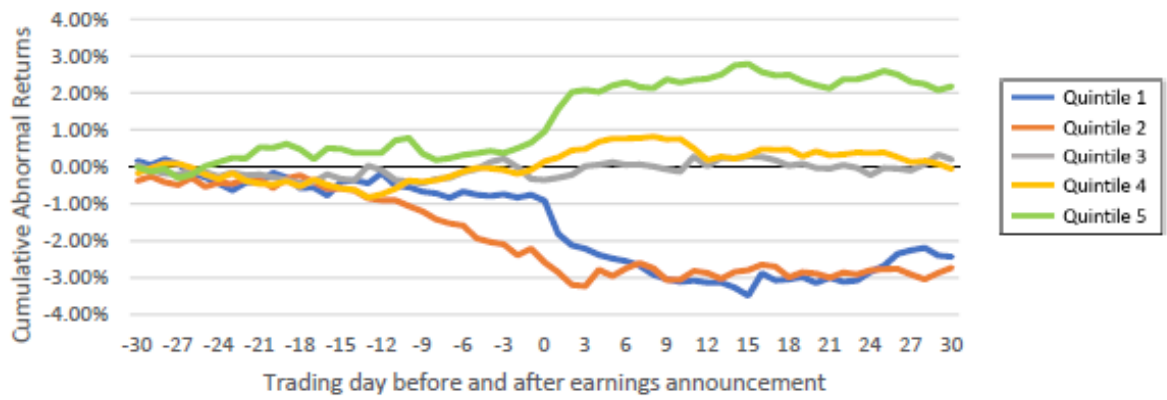Figure 1: Return pattern around earnings announcement

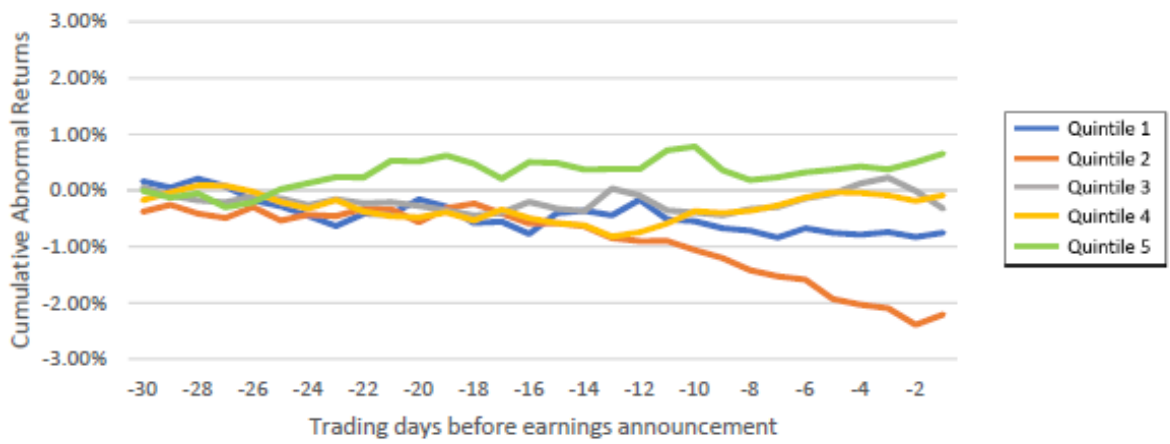Figure 2: Return pattern before earnings announcement

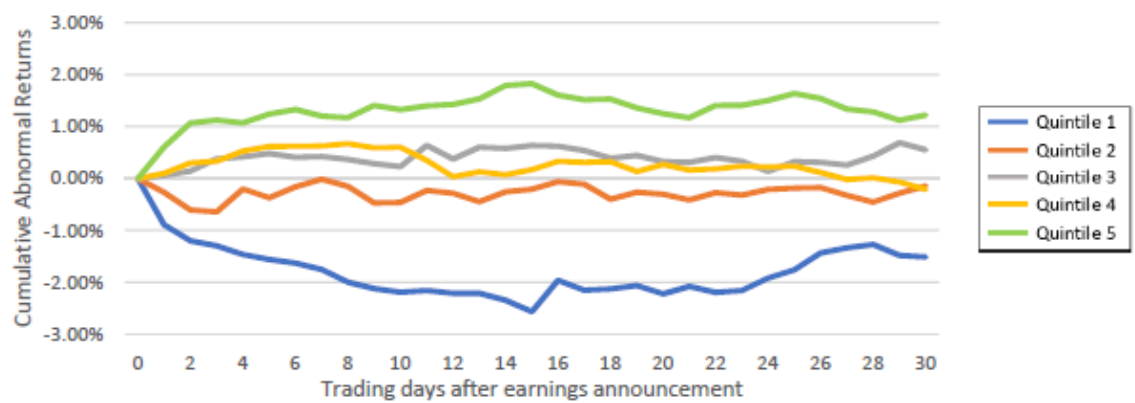Figure 3: Return pattern after earnings announcement

Table 1: Cumulative abnormal return around earnings announcement categorized by earnings surprise quintile

Earning surprise Quintile	Cumulative abnormal return of day interval periods (Day0 is earnings announcement date)							
	[-30,-1]	[-20,-1]	[-10,-1]	[-5,-1]	[1,5]	[1,10]	[1,20]	[1,30]
1	-0.75%	-0.33%	-0.24%	-0.08%	-1.56%	-2.19%	-2.22%	-1.51%
	(-0.94)	(-0.46)	(-0.5)	(-0.2)	(-3.62)	(-4.1)	(-3.02)	(-1.87)
2	-2.21%	-1.88%	-1.31%	-0.62%	-0.37%	-0.46%	-0.30%	-0.14%
	(-3.27)	(-2.77)	(-3.02)	(-2.25)	(-1)	(-0.98)	(-0.5)	(-0.17)
3	-0.32%	-0.12%	0.03%	-0.18%	0.48%	0.23%	0.32%	0.55%
	(-0.43)	(-0.18)	(0.09)	(-0.62)	(1.44)	(0.49)	(0.52)	(0.79)
4	-0.08%	0.37%	0.50%	0.04%	0.62%	0.60%	0.27%	-0.21%
	(-0.1)	(0.59)	(1.16)	(0.13)	(1.85)	(1.5)	(0.44)	(-0.29)
5	0.66%	0.13%	-0.06%	0.33%	1.24%	1.33%	1.25%	1.22%
	(0.95)	(0.21)	(-0.13)	(1.25)	(3.61)	(2.95)	(2.02)	(1.59)

Note: -t statistics in parenthesis
-The bold letter represents $p<0.05$

Trading behavior before earnings announcements

The plot of pre-announcement cumulative trading is shown in figure 4. For individual investors, there is unclear pattern for the trading before the announcement. As reported in table 2 panel A, their cumulative trading by individual investor in every quintile are insignificant different from zero for all trading windows prior to the announcement.

For institutional investors, the pattern of their pre-announcement cumulative trading in figure 4 shows no pattern for almost all earning surprise quintiles except for Q3 that they are net buyers. As reported in panel B, the pre-announcement cumulative trading is significantly positive for only the quintile of stocks that meet analysts' expectation (Q3) while their cumulative trading for other quintiles are insignificant.

For foreign investors, the pattern of their pre-announcement cumulative trading in figure 4 shows no pattern for almost all earning surprise quintiles except for Q2 that they are net seller shortly before the announcement. As reported in Panel C, their cumulative trading is significantly negative only for bad earnings surprise Q2 in the short 10- and 5-days before earnings announcements while trading flows for other quintiles are insignificant.

Trading behavior after earnings announcements

The plot of post-announcement cumulative trading is shown in figure 5. For individual investors, their cumulative trading are clearly in the opposite direction of the earnings surprise quintiles. For positive earnings surprise, individual investors on average sell stocks with the extreme good earnings surprise (Q5). Their cumulative trading are significantly negative in all windows after announcement as reported in table 2 panel A. For negative earnings surprise, individual investors on average buy stocks with bad earnings surprise (both Q1 and Q2). Their cumulative trading are significantly positive for 20-day window after announcement for Q2 and all windows after announcement for Q1.

Unlike individual investors, the foreign investors' net cumulative trading are in the same direction of the earnings surprise quintiles. According to panel C, Foreign investors on average buy stocks with the extreme good earnings surprise (Q5), and their cumulative trading are significantly positive for all windows after announcement. Moreover, Foreign investors on average sell stocks with bad earnings surprise (both Q1 and Q2), and their cumulative trading are significantly positive for all windows after announcement for both Q1 and Q2.

For institutional investors, their post-announcement trading in figure 5 reveal no relationship with earnings surprise and their cumulative trading are not significant in any quintiles. A possible explanation for these results may be the heterogeneity of the fund types across institutional investors. The trading data of institutional investors provided by SEC after 2012 combine the data from both proprietary trading and domestic mutual funds together. This limitation prevents us from identifying the trading for each fund types in detail, thus the trading behavior across institutional funds in response to earnings surprise might not be clearly observed.

Table 2: Cumulative trading flows by investor types around earnings announcement

Panel A: Individual investors

Earning surprise Quintile	Individual investors cumulative trading in day interval periods (Day0 is earning announcement date)							
	[-30,-1]	[-20,-10]	[-10,-1]	[-5,-1]	[1,5]	[1,10]	[1,20]	[1,30]
1	0.008%	0.017%	0.036%	0.030%	**0.223%**	**0.326%**	**0.387%**	**0.320%**
	(0.069)	(0.201)	(0.71)	(0.969)	(3.634)	(4.092)	(3.73)	(2.717)
2	0.053%	0.121%	0.133%	0.063%	**0.084%**	**0.149%**	0.175%	0.172%
	(0.497)	(1.323)	(2.136)	(1.666)	(2.046)	(2.049)	(1.578)	(1.170)
3	-0.087%	-0.123%	-0.086%	-0.042%	0.015%	0.017%	-0.002%	0.020%
	(-0.816)	(-1.473)	(-1.854)	(-1.539)	0.325	(0.267)	(-0.017)	(0.171)
4	-0.009%	-0.030%	-0.034%	-0.022%	-0.022%	-0.010%	-0.029%	-0.122%
	(-0.098)	(-0.482)	(-0.893)	(-0.809)	(-0.572)	(-0.158)	(-0.317)	(-1.142)
5	-0.128%	-0.026%	0.005%	-0.040%	**-0.131%**	**-0.179%**	**-0.281%**	**-0.321%**
	(-1.233)	(-0.304)	(0.084)	(-1.333)	(-3.229)	(-3.187)	(-3.834)	(-3.284)

Note: -t statistics in parenthesis
-The bold letter represents $p<0.05$

Panel B: Institutional investors

Earning surprise Quintile	Institutional investors cumulative trading in day interval periods (Day0 is earning announcement date)							
	[-30,-1]	[-20,-10]	[-10,-1]	[-5,-1]	[1,5]	[1,10]	[1,20]	[1,30]
1	0.098%	0.069%	0.005%	0.003%	-0.042%	-0.043%	-0.045%	0.019%
	(1.034)	(0.989)	(0.118)	(0.090)	(-0.883)	(-0.728)	(-0.531)	(0.193)
2	-0.004%	-0.040%	-0.013%	-0.003%	-0.024%	-0.001%	0.007%	0.029%
	(-0.049)	(-0.525)	(-0.251)	(-0.099)	(-0.608)	(-0.022)	(0.073)	(0.220)
3	**0.256%**	**0.180%**	**0.090%**	**0.041%**	0.040%	0.081%	0.133%	0.145%
	(2.556)	(2.453)	(2.136)	(1.428)	(1.137)	(1.469)	(1.734)	(1.628)
4	-0.089%	-0.050%	0.017%	0.017%	-0.015%	-0.044%	0.032%	0.079%
	(-1.011)	(-0.738)	(0.442)	(0.730)	(-0.600)	(-0.998)	(0.439)	(0.877)
5	0.089%	0.050%	-0.021%	0.010%	0.022%	0.026%	0.086%	0.131%
	(0.858)	(0.719)	(-0.476)	(0.429)	(0.713)	(0.599)	(1.200)	(1.223)

Note: -t statistics in parenthesis
-The bold letter represents $p<0.05$

Panel C: Foreign investors

Earning surprise Quintile	Foreign investors cumulative trading in day interval periods (Day0 is earning announcement date)							
	[-30,-1]	[-20,-10]	[-10,-1]	[-5,-1]	[1,5]	[1,10]	[1,20]	[1,30]
1	-0.106%	-0.086%	-0.042%	-0.032%	-0.181%	-0.283%	-0.342%	-0.340%
	(-1.286)	(-1.440)	(-1.176)	(-1.722)	(-3.981)	(-4.213)	(-3.888)	(-3.271)
2	-0.049%	-0.081%	-0.120%	-0.060%	-0.060%	-0.147%	-0.182%	-0.201%
	(-0.467)	(-1.138)	(-2.799)	(-2.405)	(-2.038)	(-2.994)	(-2.672)	(-2.238)
3	-0.169%	-0.057%	-0.004%	0.001%	-0.055%	-0.098%	-0.131%	-0.166%
	(-2.025)	(-0.944)	(-0.133)	(0.035)	(-1.792)	(-1.950)	(-1.655)	(-1.568)
4	0.097%	0.080%	0.018%	0.005%	0.037%	0.054%	-0.002%	0.043%
	(1.148)	(1.327)	(0.502)	(0.271)	(1.170)	(1.038)	(-0.027)	(0.464)
5	0.039%	-0.024%	0.016%	0.030%	0.109%	0.153%	0.195%	0.190%
	(0.393)	(-0.325)	(0.383)	(1.467)	(3.554)	(3.396)	(2.753)	(1.983)

Note: -t statistics in parenthesis
         -The bold letter represents $p<0.05$

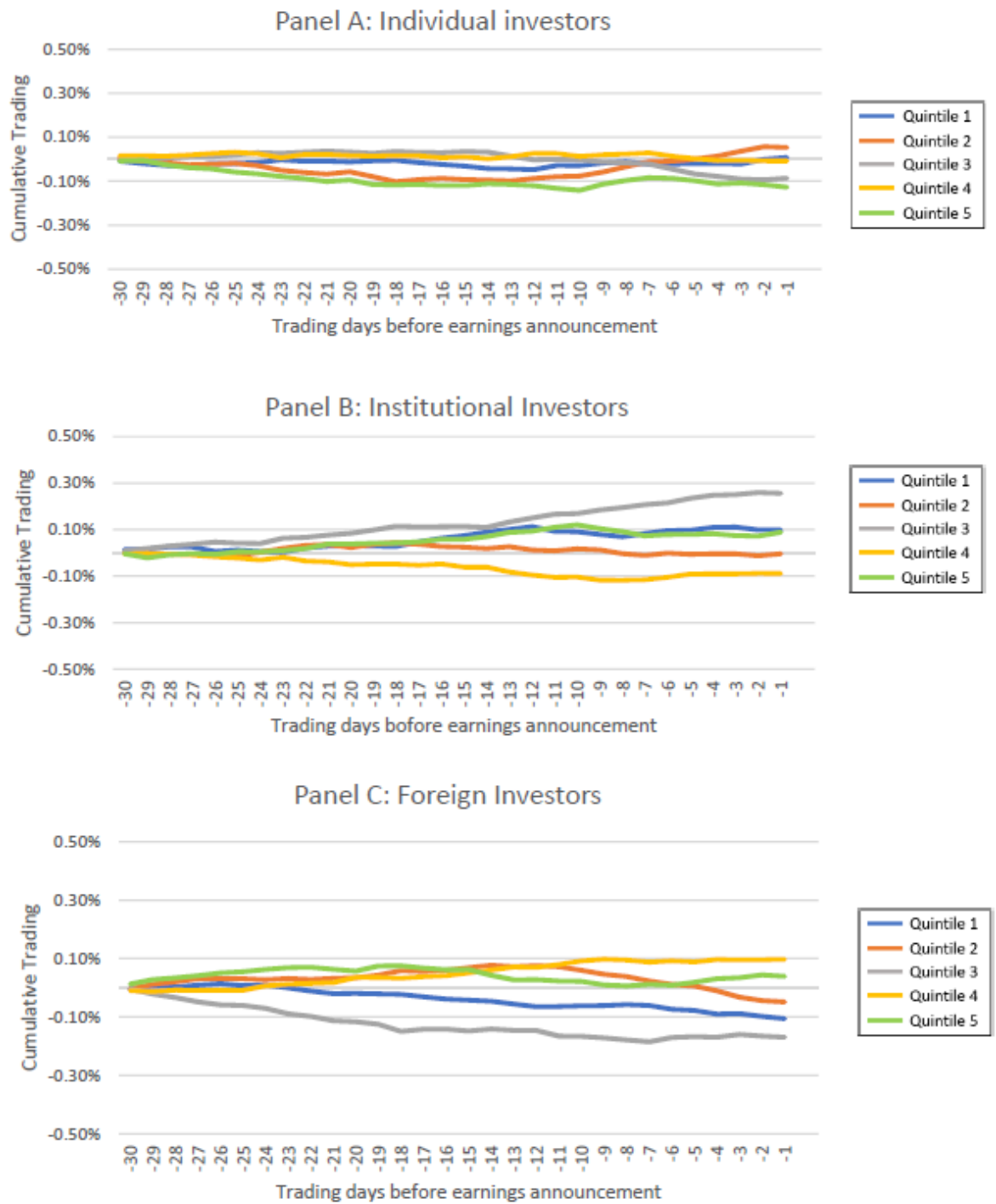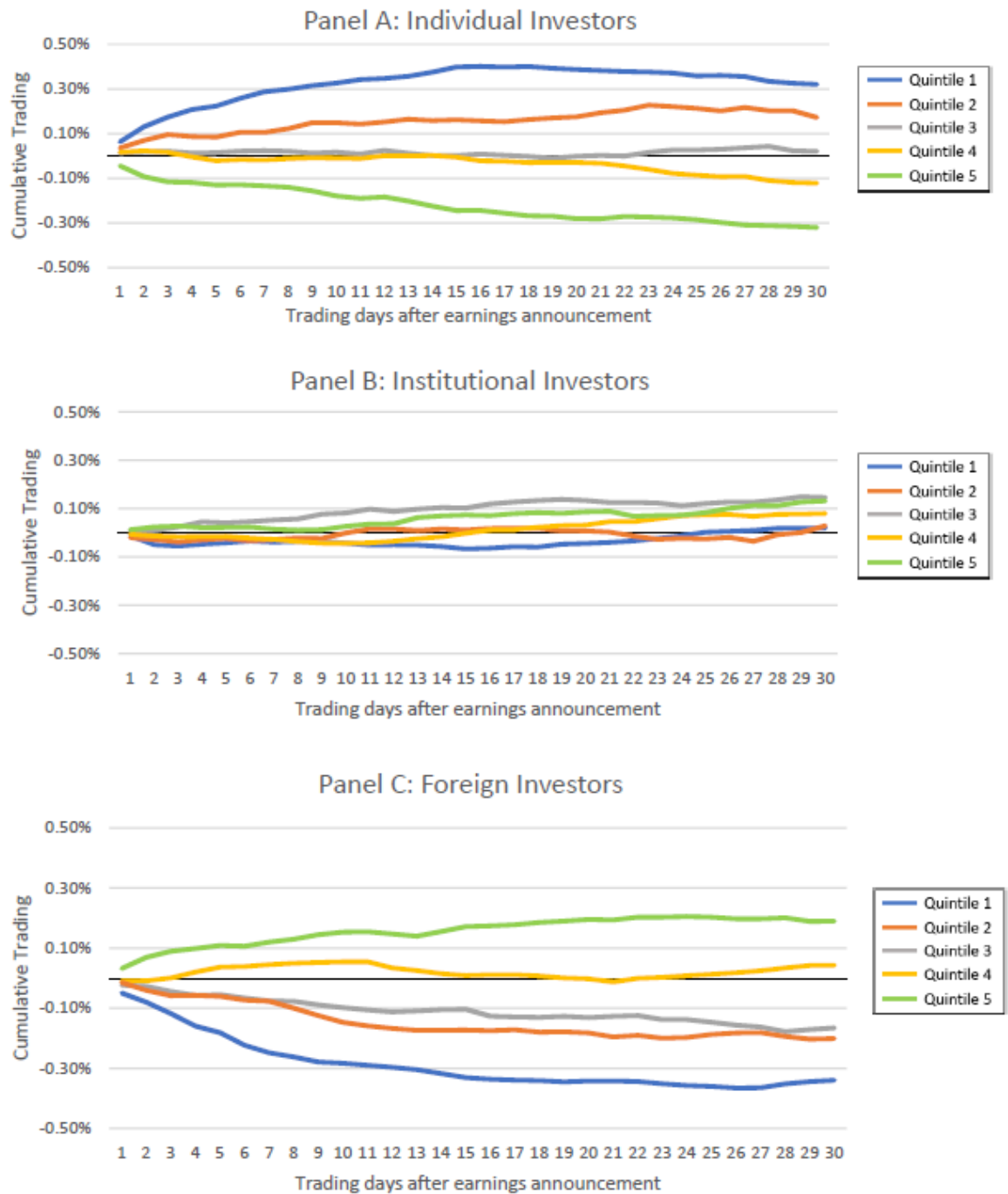Figure 4: Cumulative trading before earnings announcement

Figure 5 Cumulative trading after earnings announcement

Regression results

In this section I examine the relationship between pre-announcement trading behavior of each investor types and the future earnings surprise. Table 3 shows the results of the regression equation in H1 and H2 where the dependent variable is earning surprise. The coefficients of pre-announcement cumulative trading of all investor types are not significantly different from zero. It can be explained that pre-event trading behavior of individual, Institutional and foreign investors does not predict earning surprise. While price-to-book value and market size has strong association with earnings surprise. The coefficients of price-to-book value and market size are significantly negative and positive, respectively, which means that the stocks with low price-to-book value and large firm size have higher chance to experience better earnings surprise than the stocks with high price-to-book value and small firm size.

Table 3: Regression of earnings surprise on pre-announcement trading

	Intercept	NET BUY[-30,-1]	PBV	CAR[-30,-1]	ln(MV)	adj. R-sq
Individual investors	-2.680*	-1.811	-0.0481**	1.292	0.112*	0.012
	(-1.66)	(-0.24)	(-2.35)	(1.24)	(1.77)	
Institutional investors	-2.477	-8.880	-0.0499**	1.945*	0.105*	0.015
	(-1.54)	(-1.14)	(-2.43)	(1.96)	(1.66)	
Foreign investors	-2.682*	8.304	-0.0480**	1.309	0.112*	0.015
	(-1.67)	(1.13)	(-2.35)	(1.46)	(1.79)	

Note: -t statistics in parenthesis
         -The subscript *, ** and *** represent p<0.10, p<0.05 and <0.01, respectively

Next, I examine the relationship between the earnings surprise and post-announcement trading behavior of each investor types. Table 4 shows the results of the regression equation in H3 and H4 where the dependent variable is post-announcement cumulative trading by investor types and the main independent variable measuring earning surprise is actual earnings surprise SUE For individual investors, the coefficient estimates for the earnings surprise are negative, which indicates that individual investors trade contrarian to earnings surprise after the announcement. This finding are consistent with individual trading hypothesis. Additionally, coefficients on abnormal return prior to announcement (CAR[-30,-1]) is

significantly negative. It means that individual investor are also return-contrarian investors, trading in the opposite direction to the previous return before the earnings announcement.

For foreign investors, the coefficient for the earnings surprise is significantly positive. It means that foreign investors trade in the same direction as the earnings surprise: they are net sellers of stocks with bad earnings surprise and net buyers of stocks with good earnings surprise. This news-followers of foreign investors is consistent with previous studies by Dvorak (2005) that foreign investors have Information disadvantage compared to domestic individual and institutional investors, thus they likely to trade stocks using the publicly available information like earnings news.

Institutional investors' post-announcement trading behavior shows no association with earnings surprise. It might be described that institutional investors have different perception on the earning surprise or different trading objectives across institutional fund types. The variety of fund types might lead to the mixed reaction on the earnings announcement surprise. Additionally, institutional investors appear to be momentum traders since the coefficient of the pre-announcement abnormal return CAR[-30, -1] is significantly positive.

Table 4: Regression of post-announcement trading by investor types on earnings surprise SUE

	Intercept	SUE	PBV	CAR[-30,-1]	ln(MV)	adj. R-sq
Individual investors	-0.0157	-0.000238**	0.0000213	-0.0213***	0.000595	0.042
	(-1.69)	(-2.66)	(0.18)	(-4.13)	(1.63)	
Institutional investors	0.0107	-0.00000424	-0.0000419	0.0186***	-0.000368	0.030
	(1.40)	(-0.11)	(-0.43)	(4.39)	(-1.22)	
Foreign investors	-0.00129	0.000228**	0.000122	0.00220	-0.0000006	0.012
	(-0.16)	(2.90)	(1.18)	(0.49)	(-0.00)	

Note: -t statistics in parenthesis
-The subscript *, ** and *** represent $p<0.10$, $p<0.05$ and <0.01, respectively

Table 5 also shows the results of the regression equation in H3 and H4 but the independent variables measuring earnings surprise is changed from actual earnings surprise SUE to dummy variable representing earnings surprise quintile. The

regression results are consistent with the results from table 4. It can be interpreted that only extremely good (Q5) and bad news (Q1) have significant positive and negative correlation with trading flows of individual investors, respectively. While, only extreme good (Q5) have positive correlation with trading flows of foreign investors. For institutional investor, their trading flows has no correlation with earnings surprise quintile. Additionally, it appears that good news have more impact on trading flow than bad news as indicated by larger coefficient for Q1.

Table 5: Regression of post-announcement trading by investor types on earnings surprise quintile

	Intercept	Q1	Q2	Q4	Q5	PBV	CAR [-30,-1]	ln(MV)	adj. R-sq
Individual	-0.0120	0.00282*	0.000812	-0.00154	-0.00315**	0.000133	-0.0325***	0.000459	0.067
	(-0.90)	(1.74)	(0.43)	(-0.99)	(-2.11)	(0.76)	(-4.44)	(0.89)	
Institutional	0.00150	-0.00099	-0.000488	-0.000631	-0.000543	-0.000239*	0.0317***	0.0000314	0.051
	(0.13)	(-0.75)	(-0.31)	(-0.50)	(-0.39)	(-1.67)	(4.74)	(0.07)	
Foreign	0.0105	-0.00184	-0.000325	0.00217	0.00370**	0.000106	0.00078	-0.000490	0.028
	(0.95)	(-1.23)	(-0.24)	(1.54)	(2.58)	(0.95)	(0.15)	(-1.17)	

Note: -t statistics in parenthesis
-The subscript *, ** and *** represent p<0.10, p<0.05 and <0.01, respectively

The magnitude of PEAD and post-announcement trading behavior by investor type

In this section we investigate whether news-contrarian trading behavior of individual investors cause the larger price drift in the direction of earnings surprise. Firstly, we examine the cumulative abnormal return and cumulative net trading by investor types in different periods after announcement. As reported in table 6. CAR clearly follow the direction of earning surprise in short periods after announcement. That is, for negative surprise quintile 1, CAR is significantly negative in the 5-day and 10-day period after announcement and, for good surprise quintile 5, CAR is significantly positive in the 5-day period after announcement. The magnitude of CAR after announcement is the largest in 5-day period after both good and bad earning surprise announcement so we see the strongest prices drift following the direction of earnings surprise in the first 5 days after announcement date and then the price drift rate is slower since the magnitude of CAR sharply diminish and become insignificant

different from zero for the subsequent periods after 5 days for good surprise and 10 days for bad surprise. Interestingly, CAR of quintile 1 even revert to positive in the 20-day period after event. In term of investors' trading flows, the net trading flows of individual and foreign investors are largest in the first 5 days after announcement. To be specific, individual investors have the most net buy (sell) after the bad (good) surprise in 5-day period. It can be interpreted that individual investors' contrarian trading behavior is the most intensive in the first 5 days after announcement for good and bad earnings surprise. In the following periods, the net trading flow of individual and foreign investors reduce and become insignificant. While, the net trading flows of institutional investors are insignificant in any periods.

Table 6: Cumulative abnormal return and cumulative trading by investor types in different return windows after earnings announcement

Panel A: Negative earnings surprise (Quintile 1)

Day	CAR	Cumulative trading		
		Individual	Institutional	Foreign
+1 to +5	**-1.56%**	**0.223%**	-0.042%	**-0.181%**
	(-3.62)	(3.63)	(-0.88)	(-3.98)
+6 to +10	**-0.63%**	**0.103%**	-0.001%	**-0.102%**
	(-2.08)	(3.46)	(-0.05)	(-3.28)
+11 to +20	-0.03%	0.061%	-0.002%	-0.059%
	(-0.05)	(1.16)	(-0.04)	(-1.46)
+21 to +30	**0.71%**	-0.067%	0.064%	0.002%
	(2.12)	(-1.65)	(1.70)	(0.06)

Note: -t statistics in parenthesis
        -The bold letter represents p<0.05

Panel B: Positive earnings surprise (Quintile 5)

Day	CAR	Cumulative trading		
		Individual	Institutional	Foreign
+1 to +5	**1.24%**	**-0.131%**	0.022%	**0.109%**
	(3.61)	(-3.23)	(0.71)	(3.55)
+6 to +10	0.08%	-0.049%	0.004%	0.044%
	(0.28)	(-1.96)	(0.21)	(1.85)
+11 to +20	-0.08%	**-0.102%**	0.060%	0.042%
	(-0.20)	(-2.99)	(1.46)	(1.06)
+21 to +30	-0.03%	-0.039%	0.045%	-0.006%
	(-0.08)	(-0.78)	(0.81)	(-0.13)

Note: -t statistics in parenthesis
        -The bold letter represents p<0.05

Table 7 reports the regression results of H5 where the dependent variable is cumulative abnormal return (CAR). Four return windows are selected to examine the impact of earnings surprise and post event trading flows on CAR within 5, 10, 20 and 30 days after earnings announcements.

The results of table 7 panel A reveals that the coefficient of earnings surprise SUE are significantly positive in all return windows, which means that CARs become more positive (negative) when earnings surprise SUE are positive (negative). Next, we include the individual investors' trading flows and interaction term in second regression model to investigate the effect on CAR. Table 7 panel A shows that the models including post announcement trading flows give higher adjusted R-square and the coefficient of post-announcement individual investors' trading are negative in all return windows, which means that CARs moves in the opposite direction of the trading flows of individual investors. That is, in negative earnings surprise, the news-contrarian trading behavior of individual investors likely to cause buying pressure and drive CAR more negative. Conversely, in positive earnings surprise, the negative trading flow of individual investors will drive CARs more positive. Thus, it can be concluded that post-earning announcement drift exists and become higher in magnitude for both positive and negative surprise when individual investors trade in the opposite direction of earning surprise. Additionally, we can see the effect of individual investors' contrarian trading on CAR is largest in the 5-day period after announcement when price drift and net trading flows of individual investors occur most intensively. In the subsequent periods, trading flows of investors are less effective to explain the magnitude of price drift as seen in the smaller coefficient and lower adjusted R-square in 10, 20 and 30 days after earnings announcements.

we investigate further on the relationship between PEAD magnitude and the trading behavior of institutional and foreign investors. As reported in panel B and C, the coefficient on the trading flow of institutional and foreign investors are positive in all return windows, meaning that CARs become larger when institutional and foreign investors trade in the same direction of the earning surprise. That is, the upward drift follows positive earnings surprise occurs when institutional and foreign investors are net buyers of the stocks which individual investors sell, while the downward drift following negative earnings surprise when institutional or foreign investors are net

sellers of the stocks which individual investors buy. The results support previous studies which found that the news-contrarian trading behavior of individual investors attributes to PEAD, and institutional and foreign investors, who are the other side of the individual investors, tend to trade take advantage of the PEAD. Similarly tot the trading of individual investors, the results of table 7 Panel B and C also indicate that the effect of institutional and foreign investors' trading flows on CAR decreases together with the lower adjusted R-square in the subsequent periods after announcement.

Table 7: Regression of return after announcement on the post-trading behavior of each investors type

Panel A: Individual investors

Day	Intercept	SUE	PBV	CAR [-30,-1]	ln(MV)	NETBUY	SUE* NETBUY	adj. R-sq
+1 to +5	-0.0105	0.000709***	-0.000896	0.000556	0.0186			0.025
	(-0.27)	(3.32)	(-1.65)	(0.37)	(0.79)			
	-0.00811	0.000471***	-0.000649	0.000487	-0.0271	-5.188***	-0.0289	0.433
	(-0.27)	(5.73)	(-1.50)	(0.42)	(-1.44)	(-12.59)	(-0.98)	
+1 to +10	0.00886	0.000906***	-0.000448	-0.000321	0.0893***			0.040
	(0.19)	(5.18)	(-0.64)	(-0.17)	(3.04)			
	0.0130	0.000636***	-0.00000745	-0.000474	0.0251	-3.897***	-0.0576	0.338
	(0.32)	(6.95)	(-0.01)	(-0.29)	(0.99)	(-7.61)	(-1.41)	
+1 to +20	0.0946	0.00128***	-0.000973	-0.00363	0.109***			0.042
	(1.37)	(8.27)	(-0.99)	(-1.33)	(2.79)			
	0.0726	0.000850***	-0.000641	-0.00278	0.0270	-3.244***	-0.0616	0.263
	(1.15)	(4.44)	(-0.58)	(-1.11)	(0.75)	(-6.44)	(-1.33)	
+1 to +30	0.0823	0.00103***	-0.00210*	-0.00295	0.118**			0.028
	(0.97)	(4.09)	(-1.67)	(-0.88)	(2.58)			
	0.0588	0.000697**	-0.00151	-0.00213	0.0181	-3.066***	-0.0845	0.239
	(0.76)	(2.49)	(-1.17)	(-0.70)	(0.42)	(-8.07)	(-1.09)	

Note: -t statistics in parenthesis
        -The subscript *, ** and *** represent p<0.05, <0.01 and <0.001, respectively

Panel B: Institutional investors

Day	Intercept	SUE	PBV	CAR [-30,-1]	ln(MV)	NETBUY	SUE* NETBUY	adj. R-sq
+1 to +5	-0.0173	0.000691***	-0.000629	0.000787	-0.0201	4.235***	-0.0931	0.196
	(-0.50)	(4.21)	(-1.27)	(0.59)	(-0.93)	(7.79)	(-0.99)	
+1 to +10	0.0119	0.000904***	-0.000123	-0.000496	0.0445	2.876***	-0.00413	0.141
	(0.27)	(5.49)	(-0.17)	(-0.28)	(1.62)	(5.76)	(-0.06)	
+1 to +20	0.0822	0.00129***	-0.000661	-0.00324	0.0545	2.342***	-0.0180	0.123
	(1.22)	(6.54)	(-0.65)	(-1.22)	(1.47)	(4.93)	(-0.28)	
+1 to +30	0.0807	0.00107***	-0.00166	-0.00302	0.0602	1.813***	-0.00965	0.082
	(0.96)	(3.01)	(-1.29)	(-0.91)	(1.37)	(4.29)	(-0.11)	

Note: -t statistics in parenthesis
-The subscript *, ** and *** represent p<0.05, <0.01 and <0.001, respectively

Panel C: Foreign investors

Day	Intercept	SUE	PBV	CAR [-30,-1]	ln(MV)	NETBUY	SUE* NETBUY	adj. R-sq
+1 to +5	-0.00242	0.000590***	-0.000944**	0.000284	0.0185	4.791***	0.152	0.210
	(-0.07)	(4.32)	(-1.98)	(0.21)	(0.84)	(8.76)	(1.26)	
+1 to +10	0.00784	0.000715***	-0.000413	-0.000227	0.0857***	3.349***	0.141	0.175
	(0.18)	(5.59)	(-0.61)	(-0.13)	(3.03)	(8.41)	(1.10)	
+1 to +20	0.0900	0.000997***	-0.000999	-0.00340	0.104***	2.387***	0.144	0.121
	(1.36)	(5.74)	(-1.00)	(-1.30)	(2.70)	(6.21)	(1.16)	
+1 to +30	0.0647	0.000940***	-0.00218*	-0.00220	0.115***	2.423***	0.162	0.121
	(0.81)	(2.92)	(-1.78)	(-0.70)	(2.61)	(6.84)	(1.56)	

Note: -t statistics in parenthesis
-The subscript *, ** and *** represent p<0.05, <0.01 and <0.001, respectively

6. CONCLUSION

This study examines the difference in trading behaviors across three type of investor around earnings announcement period and the relationship between their trading behaviors and the post-earning announcement drift. The results can be summarized as following. First, there are persistence in price following the same direction of earnings surprises for stocks in SET100 during 2013-2017, which are significant for extremely positive and negative earnings surprise.

Second, there is no difference in trading behavior across investor type before earnings announcement and pre-announcement trading flows has no correlation with future earnings surprise.

Third, there are clear difference in trading behavior after the earnings announcement. The results show that individual investors trade in the opposite direction to earning surprise by selling stocks with bad earnings surprise and buying stocks with bad earnings surprise and. This result is consistent with individual trading hypothesis (Hirshleifer et al. 2008) which suggest that news-contrarian trading behavior of individual investors slow down the price response to earning information. Conversely, foreign investors appear to trade in the same direction of earnings information and exploit price drift to their advantage. That is, they are net buyers of stocks with good earnings surprise and net sellers of stocks with bad earning surprise. While institutional investors has unclear trading pattern in response to earning surprise, but they tend to trade in momentum-following pattern by trading in the same direction of recent stock's return prior to earnings announcement.

Fourth, individual investors' news-contrarian trading behavior has strongly positive relationship with the magnitude of post-earning announcement drift. The price drift following the direction of earning surprise become higher when individual investors trade more in the opposite direction of earnings surprise. While the price drift following earning surprise occur when institutional and foreign investor trade in the same direction of earning surprise.

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