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Do individual investors demand or provide liquidity? New evidence from dividend announcements☆

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ABSTRACT

This paper provides new evidence related to whether individual investors demand or provide liquidity. While net trading is often used in the literature, it is improper in our research since buying and selling by individual investors increase by almost the same amount around dividend announcements. By differentiating buying and selling, we find that individual buyers demand liquidity while individual sellers provide liquidity around dividend announcements. Specifically, the buying volume of individual investors before and during dividend announcements negatively predicts future returns, while it is positively associated with past and contemporaneous returns. The selling volume of individual investors shows a similar relationship with returns.

1. Introduction

This paper investigates whether individual investor buying is different from individual investor selling in the sense of providing or demanding liquidity around dividend announcements. Liquidity provision is very important to financial markets, especially for emerging markets. For example, liquidity drying up resulted in serious consequences during China's stock market crash in 2015, as well as during the American stock market crash in 1987. When liquidity is aggravated, it is very difficult for asset prices to reflect a fundamental value, and this harms the function of allocating resources. Therefore, who provides liquidity is a crucial issue for financial markets.

On a limit-order-book market with no dealers, providing liquidity is often ascribed mainly to individual investor trading, which justifies the important role played by individual investors. Indeed, financial economists have recently paid attention to the importance of individual investors in financial markets. Kaniel et al. (2008) demonstrate that the net trading imbalance of individual investors is positively correlated with future short-term returns. They attribute this relationship to the liquidity provision by individual investors to institutional investors. Kelley and Tetlock (2013) find that passive individual orders provide liquidity to other participants. Barrot et al. (2016) argue that a financial crisis does not lead to a massive exodus of individual investors from the stock market, and they document that active individual investors increase stock holdings with the effect of providing liquidity to the market during the financial crisis when institutional liquidity dries up. Almost all of these papers use the net trading (or trading imbalance, i.e., the difference between buying and selling) of individual investors to measure individual investors' trading behaviors, with the

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result that they do not investigate the different characteristics of individual investor buying from those of individual investor selling. At the same time, there is ongoing debate about whether individual investor trading conveys information about future stock prices, since the positive relationship between individual net trading and future cross-sectional returns contradicts the underperformance of individual investors. Kelley and Tetlock (2013) point out that this contradiction may be derived from the measurement of a net buying imbalance, which justifies our discriminating individual investor buying from individual investor selling.

Moreover, theoretical analysis warrants discriminating individual investor buying from individual investor selling. According to Barber and Odean (2008), individual investors have difficulty searching the thousands of stocks they can potentially buy, but they do not face the same search problem when selling because they tend to sell only the stocks they already hold. In addition, Merton (1987) points out that gathering information on stocks requires resources. Therefore, individual investor buying may be very different from individual investor selling because of incomplete information.

Using a unique dataset from the Taiwan Stock Exchange (TWSE hereafter), we document findings that contradict the conventional wisdom deeming individual investors as liquidity providers. TWSE's tick-by-tick data with exact trader type from January 1, 2005 to December 31, 2011 allows us to accurately identify the buying of an individual investor and the selling of an individual investor. Based on these data advantage, we find that individual investor buying in the two weeks prior to dividend announcements is negatively associated with abnormal returns during and after dividend announcements. In addition, individual investor selling in the two weeks prior to dividend announcements is negatively associated with abnormal returns during and after dividend announcements. Furthermore, individual investor buying during dividend announcements is negatively associated with postevent abnormal returns, and individual investor selling during dividend announcements is negatively associated with postevent abnormal returns. To examine the reason for these negative relationships, we adopt the method used by Barrot et al. (2016) to investigate whether individual investors demand or provide liquidity. Specifically, we examine the contemporaneous correlation between individual investor buying/selling and return as well as the response of individual investor buying/selling to past returns. The empirical results show that individual investor buying before and during dividend announcement is positively associated with contemporaneous returns and positively responds to past returns. Moreover, individual investor selling before and during dividend announcement is positively associated with contemporaneous returns and positively responds to past returns. Overall, these findings are consistent with the idea that pre-event individual investor buying demands liquidity but pre-event individual investor selling provides liquidity.

Given that liquidity provision by individual investors has been documented in previous studies, it is surprising for us to show that individual investors demand liquidity when they buy stocks despite their providing liquidity when they sell stocks. To the best of our knowledge, this is the first time that the opposite liquidity role played by individual investor buying and individual investor selling around dividend announcements has been documented. Finally, we document that both individual investor buying and individual investor selling after dividend announcements positively respond to abnormal returns caused by dividend announcements.

Compared with the extant literature, our unique dataset provides us with an opportunity to measure individual investor trading behavior accurately, which is very important. Campbell et al. (2009) and Cready et al. (2014) have documented that inferring trader type according to trade size generates too much noise and results in serious bias. In addition, Johnson et al. (2017) and O'Hara et al. (2014) demonstrate that increasing algorithm trading causes odd-lot trades to become an inappropriate proxy for individual investor trading. Fortunately, our unique TWSE dataset with exact investor type allows us to accurately identify individual investor trading, exempting us from such measurement bias.

Only a few studies focus on trading behavior around dividend announcements. Kaniel et al. (2012) are an exception; they examine individual investor trading around dividend announcements and find that individual investors' private information can explain approximately half of the returns. However, our paper differs from Kaniel et al. (2012) in several ways. First, we focus on the relationship between the individual investor trading and stock returns around dividend announcements in an emerging market (TWSE) rather than in the United States. The TWSE adopts the call auction trading mechanism without a designated market maker. Being dominated by individual investors distinguishes the TWSE from the American market, and this provides more justification for and increases the importance of research on individual investors. Second, according to the literature,[1] Taiwanese individual investors seem to have no information advantage, in contrast to the information advantage enjoyed by American individual investors, as documented by Kaniel et al. (2012). Finally, we use the method proposed by Thompson (2011) to correct both cross-sectional and time-series clustering to obtain a robust estimation.[2] Among the research papers dealing with Taiwanese individual investors, the most relevant to our paper is Chen et al. (2014). However, our paper differs from Chen et al. (2014) in several ways. First, using trading imbalance to measure individual investor trading around dividend announcements, Chen et al. (2014) do not separately analyze individual investor buying and individual investor selling around dividend announcements, whereas we differentiate individual investor buying from individual investor selling. As a result, their conclusion is limited to liquidity provision by individual investors around dividend announcements, whereas we prove that individual investor buying demands liquidity around dividend announcements. Second, both papers use different methods. Chen et al. (2014) follow Kaniel et al. (2012) in decomposing postevent returns to show that individual investors provide liquidity around dividend announcements. In contrast, this paper follows Barrot et al. (2016)'s more recent method to investigate whether individual investor buying (selling) demands (provides) liquidity. Therefore, we can ascertain whether individual investors are heterogeneous in the sense of providing or demanding liquidity when they buy and sell around dividend announcements.

[1] There are many studies (such as Barber et al. (2007), Barber et al. (2009), Chen et al. (2009), Goo et al. (2010), Ho (2011), Chen et al. (2013) and Gao and Lin (2015)) concluding that Taiwanese individual investors suffer from a disadvantage in trading because they lack information.

[2] This method is in the same spirit as Cameron et al. (2011) and Gow et al. (2010).

Our paper contributes to the literature in several ways. First, we provide evidence that individual investors demand liquidity when they buy before and during dividend announcements, contrary to previous studies that deem individual investors as liquidity providers, such as Barrot et al. (2016), Kelley and Tetlock (2013) and Kaniel et al. (2012). Nonetheless, this finding is not surprising once order aggressiveness and the overconfidence of individual investors from emerging markets are taken into account. This explanation is consistent with behavior finance, whereby individual investors suffer from overconfidence, among other psychological biases. In addition, incomplete information may aggravate the order aggressiveness of individual investors. As a result, individual investors demand immediacy when they receive dividend news. Our finding has implications for behavior finance because it produces a new situation whereby individual investors show a psychological bias.

Second, our finding that individual investor buying and individual investor selling around dividend announcements play opposite liquidity roles is evidence of heterogeneity among the same type of investor. The opposite liquidity roles played by individual investor buying and individual investor selling around dividend announcements suggest a caveat on this homogeneity of same-type investors. This caveat indicates that the theoretical asset pricing model should take the heterogeneity among the same investor type into account, and this may enable us to change our knowledge of investors' decision making.

Third, our findings enrich the growing literature comparing finer groups of individual investor trading behaviors. A growing literature compares finer groups of individual investor trading behaviors; for example, Kelley and Tetlock (2013) and Bradrania et al. (2015) compared active and passive individual order imbalance and Chen et al. (2015) compared the informational roles of large and small individual investor trading. In addition to comparing different types of orders or trading sizes documented by previous studies, we enrich this literature by discriminating individual investor buying from individual investor selling around dividend announcements in our paper.

Finally, we find that individual investor buying increases by almost the same amount as individual investor selling around dividend announcements, and this suggests that using the trading imbalance to measure a certain type of investor trade may be improper to some extent. Although Barber and Odean (2008) and Kaniel et al. (2008), among others, use trading imbalance to measure individual investor trading, our paper shows that this may be improper around dividend announcements, especially in emerging markets. Indeed, we document that the trading imbalance of individual investors fails to capture the “attention grabbing” effect documented by Barber and Odean (2008) because it is insignificant following dividend announcements. In contrast, both individual investor buying and individual investor selling are significantly higher than the normal level, and they therefore succeed in capturing the “attention grabbing” effect.

The remainder of this paper proceeds as follows: Section 2 describes our sample and data. Section 3 presents the results of the empirical analysis, including the relationship between both individual investor buying and individual investor selling and future, contemporaneous, and past returns around dividend announcements. Section 4 concludes the paper.

2. Sample and data

2.1. Measurement of individual investor buying and selling

We obtain the complete tick-by-tick transaction dataset for January 1, 2005 through December 31, 2011 from the TWSE. Our unique data provide us with an accurate record of not only individual investor type identification but also buying and selling volume traded by individual investors for each tick, which reinforces our study by providing an exact and accurate measure of individual investor buying and individual investor selling. Numerous studies suggest that accurate identification of buying and selling volume from an individual or institutional investor is not trivial. For example, both Campbell et al. (2009) and Cready et al. (2014) find that the smallest trades may come from institutions rather than individuals, because institutional investors split large orders or use small orders to gauge the liquidity situation. Moreover, Kaniel et al. (2012) report that their more accurate measure of individual investor trading imbalance leads to different trading patterns during earnings announcements from that based on individual investor trading inferred from trade size by an algorithm, such as that of Lee and Ready (1991). Fortunately, our accurate measure of individual investor buying and selling lays a solid foundation on which we can build a reliable measure in our empirical analysis.

The TWSE adopts a call auction throughout the trading hours. For each auction, computers automatically match bid and ask orders to maximize trading volume, with ordering price priority followed by time priority during the batch of orders crossing. In our dataset, we can access the trading volume by individuals, trading prices, trading direction (buying or selling), and this open access allows us to construct the exact individual investor buying and individual investor selling of every stock on every trading day.

We first multiply individual investor buying (selling) volume with corresponding trade price to obtain the dollar trading volume for each auction. Next, we aggregate individual investor buying and individual investor selling dollar trading volume to obtain the daily individual investor buying (selling) dollar volume for each stock. We download the daily dollar volume from the Taiwan Economic Journal (a leading data provider, TEJ hereafter) and compute its average for each stock every calendar year to scale individual investor buying (selling) dollar volume. In the spirit of Kaniel et al. (2012), we construct individual investor buying and individual investor selling for several periods around dividend announcements. First, we define daily individual investor buying of stock i on day t as follows:

$$IndBuy_t^i = \frac{Individual\ Buying\ Dollar\ Volume_t^i}{Average\ Daily\ Dollar\ Volume\ in\ the\ Calendar\ Year_t^i} \quad (1)$$

Individual investor selling of stock i on day t is defined as follows:

$$IndSell_t^i = \frac{Individual\ Selling\ Dollar\ Volume_t^i}{Average\ Daily\ Dollar\ Volume\ in\ the\ Calendar\ Year_t^i} \tag{2}$$

For the above two trading measures *IndTA* (denoting *IndBuy* or *IndSell*), the corresponding abnormal measure is defined as follows:

$$\mathrm{AIndTA}_t^i = \mathrm{IndTA}_t^i - \frac{1}{T}\sum_t \mathrm{IndTA}_t^i \tag{3}$$

in which T is the number of days in the whole sample period. Finally, we compute the cumulative trading measure during a window from day t_1 to day t_2 as follows:

$$IndTA_{i,[t_1,t_2]} = \sum_{t=t_1}^{t_2} AindTA_t^i \tag{4}$$

where the time period is defined relative to the dividend announcement day ($t = 0$). The day prior to the announcement is deemed a negative period (for example, the last day before announcement day is day -1, and so on), and the day after the announcements is deemed a positive period (for example, the first day after announcements is day $+1$, and so on).

2.2. Other variables

The cumulative abnormal return is another important variable in this paper. The cumulative abnormal return is achieved by computing the sum of the daily abnormal returns during a window from day t_1 to day t_2. To obtain daily abnormal returns, we first download daily stock returns, the daily time series of Fama-French three factors and momentum factor (hereafter four factors) from TEJ. We then measure the abnormal return as the difference between the raw and the expected return. To estimate expected returns, we first estimate a model of four factors during the one-year window two weeks prior to dividend announcements. We then use estimated beta and real factors around dividend announcements to compute expected returns around dividend announcements. Using the market capitalization from TEJ, we divide all the stocks into small stocks, mid-cap stocks and large stocks. At each quarter we first use the last day's market value to form 30 and 70 percentiles, then we put stocks whose market values are less (more) than the former (latter) into small (large) stocks; last, we put the remainder into mid-cap stocks.

To control for surprises caused by dividend announcements when we examine the relationship between individual investor trading and future stock returns, we need a measure of dividend surprise, in the sense of earning surprise. Following Chan et al. (1996) and Savor (2012), we choose the cumulative abnormal returns within the window $[-1, +1]$ around dividend announcements as our measure of dividend surprise because this definition aggregates the opinions of everyone rather than a subset of market participants.

We screen the dividend announcement date by keeping dividend announcement dates one year later than the IPO (initial public offering). Dividend announcement dates without trading are replaced by their immediately subsequent trading day. Finally, we obtain 3320 firm announcements. Panel E of Table 1 shows the distribution of dividend announcements across months, from which we can see that firms announce dividends mostly in the first two quarters. Panel A of Table 1 shows the mean, median and standard deviation of some daily stock variables both for all stocks and across size groups. Panel A shows that the mean daily return is 0.08%, and the average of returns increases with market value. The trading volume also increases with market value. Because return and trading volume vary with size, we divide our sample into three size groups during our empirical analysis. Although the daily turnover mean shows a hump shape, its median increases with market value monotonically. The last two columns show that daily individual investor buying and selling have almost the same statistics, indicating that the difference between them is very small. As a result, individual trading imbalance measured as the difference between individual investor buying and individual investor selling may lose information because individual investor buying and selling may cancel each other out. This problem justifies our examining individual investor buying and individual investor selling separately. Panel B presents the correlation coefficients of daily variables in Panel A. Not surprisingly, turnover correlates with dollar trading volume, individual investor buying and individual investor selling. The correlation between individual investor buying and individual investor selling is near 1, also warranting our distinguishing individual investor buying from individual investor selling. Panel C shows the mean, median and standard deviation of cumulative variables, and Panel D shows the correlation coefficients of these variables. Additionally, the correlation between cumulative individual investor buying and selling is very high.

Table 2 shows the dynamic of individual investor trading around dividend announcements. Panel A shows individual investor buying during several windows around dividend announcements. Across all columns, we find that only after dividend announcements do individual investors increase their buying. For example, $\mathrm{IndBuy}_{[-1,+1]}$ is significantly positive for all stocks and across size groups. In addition, $\mathrm{IndBuy}_{[+2,+6]}$, $\mathrm{IndBuy}_{[+2,+11]}$ and $\mathrm{IndBuy}_{[+2,+21]}$ are significantly positive and increase monotonically. The last four columns show that individual investor buying is significantly higher than average on and after dividend announcements, suggesting that individual investors buy more during and after dividend announcements, a finding that is consistent with attention grabbing, as documented by Barber and Odean (2008). This is also true across size groups. Looking at Panel B, we can see that individual investor selling shows a similar pattern as individual investor buying. $\mathrm{IndSell}_{[-1,+1]}$, $\mathrm{IndSell}_{[+2,+6]}$, $\mathrm{IndSell}_{[+2,+11]}$ and $\mathrm{IndSell}_{[+2,+21]}$ are significantly positive and increase monotonically, meaning that individual investors sell more during and after dividend announcements. This is also true across size groups. At the same time, the means of individual investor buying and individual investor selling are almost identical. Both Panels A and B indicate that the trading imbalance of individual investors shows

Table 1
Descriptive statistics and distribution of dividend announcements.

This table presents some descriptive statistics for daily and cumulative stock variables and the distribution of dividend announcements. Panel A shows the mean, median and standard deviation of stock returns, market capitalization, turnover, dollar volume, IndBuy and IndSell both for all stocks and across three size groups. Panel B presents the correlation matrix for variables in Panel A. In Panel C, we compute the mean, median and standard deviation of the cumulative variables, and we show their correlation matrix in Panel D. In Panel E, we show the number of observations within each month across each year and the entire sample. In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Descriptive statistics of daily variables

		Return (%)	Market value (Billion NTW$)	Turnover (%)	Dollar volume (Million NTW$)	IndBuy	IndSell
All stocks	Mean	0.08	26.00	0.86	149.72	0.83	0.84
	Median	0.00	5.08	0.40	25.24	0.48	0.48
	Std	2.75	96.60	1.35	463.58	1.20	1.20
Small stocks	Mean	0.05	1.40	0.62	10.61	0.91	0.91
	Median	0.00	1.28	0.24	2.92	0.45	0.46
	Std	2.88	0.79	1.18	25.12	1.56	1.54
Mid-cap stocks	Mean	0.09	5.36	1.00	57.77	0.88	0.89
	Median	0.00	4.80	0.47	22.78	0.52	0.52
	Std	2.72	2.62	1.52	101.38	1.17	1.19
Large stocks	Mean	0.10	73.62	0.91	387.93	0.70	0.71
	Median	0.00	22.58	0.49	162.60	0.47	0.47
	Std	2.66	161.04	1.23	759.21	0.77	0.80

Panel B: Correlation of daily variables

	Return	Market value	Turnover	Dollar volume	IndBuy	IndSell
Market value	0.00*	1.00				
Turnover	0.18***	−0.06***	1.00			
Dollar volume	0.06***	0.60***	0.25***	1.00		
IndBuy	0.17***	−0.07***	0.57***	0.10***	1.00	
IndSell	0.21***	−0.06***	0.57***	0.11***	0.96***	1.00

Panel C: Descriptive statistics of cumulative variables

	$CAR_{[-11,-2]}$	$CAR_{[-1,1]}$	$IndBuy_{[-11,-2]}$	$IndSell_{[-11,-2]}$
Mean	−0.30	0.36	0.74	0.81
Median	−0.61	0.15	−0.85	−0.82
Std	6.17	3.84	7.19	7.21

Panel D: Correlation of cumulative variables

	$CAR_{[-11,-2]}$	$CAR_{[-1,1]}$	$IndBuy_{[-11,-2]}$	$IndSell_{[-11,-2]}$
$CAR_{[-11,-2]}$	1.00			
$CAR_{[-1,1]}$	−0.05***	1.00		
$IndBuy_{[-11,-2]}$	0.13***	−0.18***	1.00	
$IndSell_{[-11,-2]}$	0.18***	−0.19***	0.98***	1.00

Panel E: Distribution of dividend announcements

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	2	25	231	161	15	2	0	0	0	1	0	0
2006	3	14	220	178	19	0	0	0	0	0	0	0
2007	0	11	242	209	12	0	0	0	0	1	0	0
2008	4	6	267	221	11	0	0	0	0	0	0	0
2009	2	11	230	161	8	3	0	0	0	0	0	0
2010	1	9	278	196	7	0	0	0	0	0	0	0
2011	2	15	321	208	13	0	0	0	0	0	0	0
Total	14	91	1789	1334	85	5	0	0	0	2	0	0

Table 2
Individual investor trading around dividend announcements.

This table presents individual investor buying and individual investor selling in several windows around dividend announcements for all stocks and across size groups. In the table we present the mean and two-way clustering corrected t statistics (in parentheses). Standard errors are clustered at firm and week for [−6,−2], [−1,+1] and [+2,+6], and at firm and month for the other windows. In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: IndBuy[t1,t2] around dividend announcements

	[−21,−2]	[−11,−2]	[−6,−2]	[−1,1]	[+2,+6]	[+2,+11]	[+2,+21]
All stocks	0.74	0.74	0.47*	0.64***	1.18***	1.89**	3.95**
	(0.45)	(0.88)	(1.81)	(3.75)	(4.51)	(2.56)	(2.34)
Small stocks	1.01	0.98	0.66	0.69**	1.71***	2.59**	5.43*
	(0.37)	(0.72)	(1.42)	(2.53)	(3.18)	(2.04)	(1.86)
Mid-cap stocks	0.89	0.81	0.54	0.76***	1.24***	2.02**	4.55**
	(0.44)	(0.80)	(1.61)	(3.66)	(3.80)	(2.32)	(2.37)
Large stocks	0.43	0.54	0.31	0.49***	0.87***	1.42**	2.57**
	(0.42)	(0.90)	(1.57)	(3.37)	(3.87)	(2.41)	(2.02)

Panel B: IndSell[t1,t2] around dividend announcements

	[−21,−2]	[−11,−2]	[−6,−2]	[−1,1]	[+2,+6]	[+2,+11]	[+2,+21]
All stocks	0.88	0.80	0.51*	0.64***	1.20***	1.91***	3.96**
	(0.52)	(0.94)	(1.89)	(3.55)	(4.58)	(2.62)	(2.37)
Small stocks	0.91	0.95	0.66	0.70**	1.73***	2.54**	5.30*
	(0.33)	(0.70)	(1.42)	(2.51)	(3.23)	(2.01)	(1.83)
Mid-cap stocks	0.95	0.84	0.56	0.76***	1.25***	2.06**	4.62**
	(0.46)	(0.82)	(1.64)	(3.52)	(3.72)	(2.38)	(2.43)
Large stocks	0.80	0.70	0.39*	0.47***	0.90***	1.43**	2.60**
	(0.71)	(1.09)	(1.79)	(3.13)	(4.07)	(2.37)	(2.02)

Panel C: Imbalance[t1,t2] around dividend announcements

	[−21,−2]	[−11,−2]	[−6,−2]	[−1,1]	[+2,+6]	[+2,+11]	[+2,+21]
All stocks	−0.14**	−0.06*	−0.04	0.01	−0.01	−0.01	−0.01
	(−2.45)	(−1.74)	(−1.40)	(0.32)	(−0.39)	(−0.18)	(−0.12)
Small stocks	0.10	0.03	0.00	−0.01	0.00	0.06	0.15**
	(0.85)	(0.40)	(0.02)	(−0.31)	(0.01)	(1.01)	(2.00)
Mid-cap stocks	−0.05	−0.03	−0.02	−0.00	−0.01	−0.05	−0.07
	(−0.79)	(−0.66)	(−0.63)	(−0.04)	(−0.29)	(−0.89)	(−0.98)
Large stocks	−0.36***	−0.15**	−0.08*	0.02	−0.02	−0.01	−0.02
	(−2.95)	(−1.99)	(−1.90)	(0.94)	(−0.36)	(−0.06)	(−0.10)

no significance during or after dividend announcements, as shown in Panel C. Therefore, in the following analysis, we focus on individual investor buying and individual investor selling respectively.

3. Empirical results

In this section, we examine individual investor buying and individual investor selling before, during and after dividend announcements by multivariate regression to draw robust conclusions about the liquidity role of individual investor buying and individual investor selling. We use the method provided by Thompson (2011) to implement two-way clustering corrections in the empirical analysis. In this paper, time-series clustering is defined as the correlation between residuals of a given firm across time, and cross-sectional clustering is defined as the correlation between residuals across firms at a moment in time, which is similar to Petersen (2009).

3.1. Individual investor buying and individual investor selling before dividend announcements

We first examine whether individual investor buying and individual investor selling in the two weeks prior to dividend announcements can predict dividend surprise (cumulative abnormal returns in the three days centered on dividend announcement day, $CAR_{[-1,+1]}$). To exclude the possibility that individual investor buying (selling) prior to dividend announcements coincides with contemporaneous return and this return persists or reverses, we control for $CAR_{[-11,-2]}$ when we regress $CAR_{[-1,+1]}$ on $IndBuy_{[-11,-2]}$ ($IndSell_{[-11,-2]}$) in Panel A (B) of Table 3. Specifically, we estimate the following:

Table 3
Using pre-event $IndBuy/IndSell_{[-11,-2]}$ to predict $CAR_{[-1,+1]}$.

This table presents the results of the multivariate regression of dividend surprise (cumulative abnormal returns around dividend announcements) $CAR_{[-1,+1]}$, on an intercept, individual investor buying (selling), $IndBuy_{[-11,-2]}$ ($IndSell_{[-11,-2]}$) and past cumulative abnormal returns ($CAR_{[-11,-2]}$) in Panel A (B). Each panel shows the estimates and two-way clustering corrected t-statistics (in parentheses) for all stocks and across size groups. In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Regression of $CAR_{[-1,+1]}$ on $IndBuy_{[-11,-2]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
$IndBuy_{[-11,-2]}$	−0.10***	−0.07**	−0.11***	−0.14***
	(−5.39)	(−2.09)	(−7.31)	(−3.67)
$CAR_{[-11,-2]}$	−0.02	−0.03	−0.01	−0.01
	(−0.94)	(−0.91)	(−0.66)	(−0.21)
Intercept	−0.83***	−1.82***	−1.08***	−0.29
	(−3.08)	(−4.19)	(−2.75)	(−0.69)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Panel B: Regression of $CAR_{[-1,+1]}$ on $IndSell_{[-11,-2]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
$IndSell_{[-11,-2]}$	−0.11***	−0.07**	−0.12***	−0.16***
	(−5.75)	(−2.22)	(−7.26)	(−4.13)
$CAR_{[-11,-2]}$	−0.01	−0.03	−0.01	0.01
	(−0.55)	(−0.88)	(−0.33)	(0.44)
Intercept	−0.80***	−1.78***	−1.06***	−0.28
	(−2.64)	(−4.20)	(−2.65)	(−0.50)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

$$CAR^{i}_{[t-1,t+1]} = \alpha + \beta_1 IndBuy^{i}_{[t-11,t-2]} + \beta_2 CAR^{i}_{[t-11,t-2]} + error \tag{5}$$

in Panel A and

$$CAR^{i}_{[t-1,t+1]} = \alpha + \beta_1 IndSell^{i}_{[t-11,t-2]} + \beta_2 CAR^{i}_{[t-11,t-2]} + error \tag{6}$$

in Panel B.

In Panel A, the first column shows the estimates of the regression of $CAR_{[-1,+1]}$ on $IndBuy_{[-11,-2]}$, controlling for $CAR_{[-11,-2]}$, for all stocks. The coefficient on $IndBuy_{[-11,-2]}$ is −0.10 with a two-way clustering corrected t-statistic of −5.39, which is at the 1% statistical significance level. This significantly negative coefficient on $IndBuy_{[-11,-2]}$ indicates that the more individual investors buy during the two weeks prior to dividend announcements, the more individual investors lose during the three days centered on dividend announcements, thereby showing a negative relationship between $CAR_{[-1,+1]}$ and $IndBuy_{[-11,-2]}$, even controlling for return persistence or reversals. The coefficient on $CAR_{[-11,-2]}$ is insignificant, meaning that no return persistence or reversal occurs. Turning to the next three columns, we find that the relationship between $CAR_{[-1,+1]}$ and $IndBuy_{[-11,-2]}$ exists across size groups.

In Panel B, the first column shows the estimates of the regression of $CAR_{[-1,+1]}$ on $IndSell_{[-11,-2]}$, controlling for $CAR_{[-11,-2]}$, for all stocks. The coefficient on $IndSell_{[-11,-2]}$ is −0.11 with a two-way clustering corrected t-statistic of −5.75, which is statistically significant at the 1% level. This significantly negative coefficient on $IndSell_{[-11,-2]}$ indicates that the more individual investors sell during the two weeks prior to dividend announcements, the more individual investors lose during the three days centered on dividend announcements; these observations thereby show a negative relationship between $CAR_{[-1,+1]}$ and $IndSell_{[-11,-2]}$ and even control for return persistence or reversals. The coefficient on $CAR_{[-11,-2]}$ is insignificant, meaning that no return persistence or reversal occurs. Turning to the next three columns, we find that the relationship between $CAR_{[-1,+1]}$ and $IndSell_{[-11,-2]}$ exists across size groups. Comparing Panels A and B, we find that individual investor buying and individual investor selling behave similarly with respect to predicting returns on dividend announcements.

Before we investigate the reason for the negative relationship between $IndBuy_{[-11,-2]}$ ($IndSell_{[-11,-2]}$) and $CAR_{[-1,+1]}$, we first examine the one among $IndBuy_{[-11,-2]}$ ($IndSell_{[-11,-2]}$) and $CAR_{[+2,+11]}$, and we present the result in Table 4. Specifically, we estimate the following:

$$CAR^{i}_{[t+2,t+11]} = \alpha + \beta_1 CAR^{i}_{[t-1,t+1]} + \beta_2 IndBuy^{i}_{[t-11,t-2]} + \beta_3 CAR^{i}_{[t-11,t-2]} + error \tag{7}$$

in Panel A and

$$CAR^{i}_{[t+2,t+11]} = \alpha + \beta_1 CAR^{i}_{[t-1,t+1]} + \beta_2 IndSell^{i}_{[t-11,t-2]} + \beta_3 CAR^{i}_{[t-11,t-2]} + error \tag{8}$$

in Panel B. Panel A of Table 4 shows the result of the regression of $CAR_{[+2,+11]}$ on $IndBuy_{[-11,-2]}$, controlling for $CAR_{[-1,+1]}$ and

Table 4
Using pre-event IndBuy/IndSell$_{[-11,-2]}$ to predict CAR$_{[+2,+11]}$.

This table presents the results of the multivariate regression of cumulative abnormal returns after dividend announcements, CAR$_{[+2,+11]}$, on an intercept, individual investor buying (selling), IndBuy$_{[-11,-2]}$ (IndSell$_{[-11,-2]}$) and past cumulative abnormal returns (CAR$_{[-11,-2]}$) in Panel A (B). Each panel shows the estimates and two-way clustering corrected t-statistics (in parentheses) for all stocks and across size groups. In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Regression of CAR$_{[+2,+11]}$ on IndBuy$_{[-11,-2]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
CAR$_{[-1,+1]}$	0.08*	−0.04	0.18**	−0.00
	(1.76)	(−0.56)	(2.21)	(−0.05)
IndBuy$_{[-11,-2]}$	−0.24***	−0.18***	−0.26***	−0.26***
	(−5.77)	(−3.59)	(−5.29)	(−5.53)
CAR$_{[-11,-2]}$	0.15***	0.17**	0.17***	0.14**
	(2.73)	(2.00)	(3.17)	(2.00)
Intercept	1.29	1.13*	4.20***	−1.87
	(1.31)	(1.94)	(4.04)	(−1.19)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Panel B: Regression of CAR$_{[+2,+11]}$ on IndSell$_{[-11,-2]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
CAR$_{[-1,+1]}$	0.07	−0.04	0.17**	−0.02
	(1.54)	(−0.60)	(2.05)	(−0.39)
IndSell$_{[-11,-2]}$	−0.25***	−0.19***	−0.27***	−0.31***
	(−5.70)	(−3.59)	(−5.75)	(−6.69)
CAR$_{[-11,-2]}$	0.17***	0.18**	0.18***	0.17**
	(3.02)	(2.05)	(3.42)	(2.56)
Intercept	1.34	1.23**	4.20***	−1.83
	(1.30)	(1.97)	(3.90)	(−1.01)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

CAR$_{[-11,-2]}$. The first cell of the first column shows that the coefficient on CAR$_{[-1,+1]}$ is significant only at the 10% significance level, indicating a weak positive correlation between dividend surprise and postevent abnormal returns. This result is inconsistent with the positive relationship between earning surprise and postevent abnormal returns documented by Kaniel et al. (2012). From the other columns in the same row, we see that the coefficient is insignificant both in small stocks and large stocks, except for mid-cap stocks, whose coefficient is positively significant. The positive coefficient on CAR$_{[-1,+1]}$ for mid-cap stocks indicates that there is a drift after dividend announcements for mid-cap stocks. The next cell of the first column shows that the coefficient on IndBuy$_{[-11,-2]}$ is −0.24 with a t-statistic of −5.77, indicating a negative relationship between pre-event individual investor buying and postevent returns. The remaining columns in the same row show a similar negative relationship between pre-event individual investor buying and postevent returns across size groups, indicating that this negative relationship holds across size groups. The next cell of the first column shows that the coefficient on CAR$_{[-11,-2]}$ is 0.15 with a t-statistic of 2.73, meaning that return persistence occurs around dividend announcements. The next three columns present statistically positive coefficients, suggesting that return persistence exists in small, mid-cap and large stocks.

Panel B shows the results of the regression of CAR$_{[+2,+11]}$ on IndSell$_{[-11,-2]}$, controlling for CAR$_{[-1,+1]}$ and CAR$_{[-11,-2]}$. The first cell of the first column shows that the coefficient on CAR$_{[-1,+1]}$ is insignificant, indicating a zero correlation between dividend surprise and postevent abnormal returns. This result is inconsistent with the positive relationship between earning surprise and postevent abnormal returns documented by Kaniel et al. (2012). This zero correlation between dividend surprise and postevent abnormal returns is consistent with Panel A. From the other columns in the same row, we can see that this finding is also true across size groups, except for mid-cap stocks. The next cell of the first column shows that the coefficient on IndSell$_{[-11,-2]}$ is −0.25 with a t-statistic of −5.70, indicating a negative relationship between pre-event individual investor selling and postevent returns. The remaining columns in the same row show a similar negative relationship between pre-event individual investor selling and postevent returns across size groups, indicating that this negative relationship holds across size groups. The next cell of the first column shows that the coefficient on CAR$_{[-11,-2]}$ is 0.17 with a t-statistic of 3.02, meaning that return persistence occurs around dividend announcements. The next three columns present statistically positive coefficients, suggesting that return persistence exists in small, mid-cap and large stocks, which is consistent with Panel A.

Tables 3 and 4 show that both individual investor buying and individual investor selling in the two weeks before dividend announcements is negatively associated with on and after dividend announcement returns. This result means that individual investor buying and individual investor selling may play different roles in terms of information and liquidity. According to theoretical models, such as those found in Grossman and Miller (1988) and Campbell et al. (1993), buyers demanding liquidity will be followed by prices

falling, as sellers provide liquidity. Given the unsophisticated characteristics of Taiwanese individual investors documented by Barber et al. (2007), Barber et al. (2009), Chen et al. (2013) and Gao and Lin (2015),[3] we focus on the liquidity role played by individual investor buying and individual investor selling. Prior to dividend announcements, if some individual investors buy for immediacy and other individual investors are attracted to provide liquidity, then individual investors play dual roles in liquidity. This explanation requires only that the individual investors be heterogeneous, which is not a strong assumption. If some individual investors must bid a higher price to attract others (individuals or not) to sell, and other individual investors can be attracted by these higher bidding prices to sell, but the price will go back to the normal price after trading, then we can observe that both individual investor buying and selling negatively correlate with returns on and after dividend announcements.

To test whether individual investor buying and individual investor selling play opposite liquidity roles prior to dividend announcements, we resort to the method used by Barrot et al. (2016), examining the contemporaneous correlation between individual investor buying/selling and returns[4] and the response of individual investor buying/selling to the previous returns. The logic behind both methods stems from the theoretical models developed by Grossman and Miller (1988) and Campbell et al. (1993). If individual investor buying demands liquidity, then individual buying is positively associated with contemporaneous returns. Because the buying individual must quote a high price to attract the counterparty to quickly make the deal, stock price increases, resulting in increasing returns. Similarly, we should observe a positive correlation between individual investor selling and contemporaneous returns if individual investor selling passively acts as the counterparty. Kaniel et al. (2008) have pointed out that liquidity providing can be defined in practice as selling after prices go up and buying after prices go down. With respect to the response of individual investors, providing liquidity should present a contrarian trading strategy, and demanding liquidity should present a momentum trading strategy. In this sense, if individual investor buying (selling) demonstrates a momentum (contrarian) strategy, we should observe individual investor buying (selling) being positively associated with lagged returns, after which we can draw the conclusion that individual investor buying (selling) demands (provides) liquidity.

Table 5 presents the result of the regression of $\text{IndBuy}_{[-11,-2]}$ ($\text{IndSell}_{[-11,-2]}$) on contemporaneous and past returns, controlling for the natural log of market value. Specifically, we estimate the following:

$$IndBuy^{i}_{[t-11,t-2]} = \alpha + \beta_1 CAR^{i}_{[t-11,t-2]} + \beta_2 CAR^{i}_{[t-21,t-12]} + \beta_3 log(MV^{i}_{t}) + error \tag{9}$$

in Panel A and

$$IndSell^{i}_{[t-11,t-2]} = \alpha + \beta_1 CAR^{i}_{[t-11,t-2]} + \beta_2 CAR^{i}_{[t-21,t-12]} + \beta_3 log(MV^{i}_{t}) + error \tag{10}$$

in Panel B, where upper label i and lower label t stand for stock i and dividend announcement date t, respectively.

The first cell of the first column of Panel A of Table 5 shows that the coefficient of $\text{IndBuy}_{[-11,-2]}$ on contemporaneous abnormal return $\text{CAR}_{[-11,-2]}$ is 0.13, with a two-way clustering corrected t-statistic of 3.89, which is significant at the 1% level, even after controlling for past returns and market value. The remaining columns indicate that the coefficient of $\text{IndBuy}_{[-11,-2]}$ on contemporaneous abnormal return $\text{CAR}_{[-11,-2]}$ is positive for small and large stocks, although insignificant. In addition, the coefficient of $\text{IndBuy}_{[-11,-2]}$ on contemporaneous abnormal return $\text{CAR}_{[-11,-2]}$ is significantly positive for mid-cap stocks, meaning that the positive correlation between individual investor buying and the contemporaneous return is mainly driven by mid-cap stocks. The positive relationship between individual investor buying and the contemporaneous return suggests that individual investor buying demands liquidity, especially for mid-cap stocks. The first cell of the next row shows that the coefficient of $\text{IndBuy}_{[-11,-2]}$ on past abnormal return $\text{CAR}_{[-21,-12]}$ is 0.11, with a t-statistic of 1.91. The remaining columns show that the coefficient of $\text{IndBuy}_{[-11,-2]}$ on past abnormal return $\text{CAR}_{[-21,-12]}$ is significantly positive across size groups except for small stocks. The positive coefficient on $\text{CAR}_{[-21,-12]}$ provides more evidence that individual investor buying demands liquidity before dividend announcements.

The first cell of the first column of Panel B of Table 5 shows that the coefficient of $\text{IndSell}_{[-11,-2]}$ on contemporaneous abnormal return $\text{CAR}_{[-11,-2]}$ is 0.19, with a t-statistic of 5.15, which is significant at the 1% level, even after controlling for past returns and market value. The remaining columns indicate the coefficient of $\text{IndSell}_{[-11,-2]}$ on contemporaneous abnormal return $\text{CAR}_{[-11,-2]}$ is significantly positive across size groups. The positive relationship between individual investor selling and the contemporaneous return suggests that individual investor selling provides liquidity. The first cell of the next row shows that the coefficient of $\text{IndSell}_{[-11,-2]}$ on past abnormal return $\text{CAR}_{[-21,-12]}$ is 0.13, and it has a t-statistic of 2.37. The remaining columns show that the coefficient of $\text{IndSell}_{[-11,-2]}$ on past abnormal return $\text{CAR}_{[-21,-12]}$ is significantly positive across size groups except for small stocks. The positive coefficient on $\text{CAR}_{[-21,-12]}$ offers further evidence that individual investor selling provides liquidity before dividend announcements.

3.2. Individual investor buying and individual investor selling during dividend announcements

Now we turn to individual investor buying and individual investor selling during the three days centered on dividend announcements, $\text{IndBuy}_{[-1,+1]}$ and $\text{IndSell}_{[-1,+1]}$. First, we investigate whether $\text{IndBuy}_{[-1,+1]}$ and $\text{IndSell}_{[-1,+1]}$ can predict postevent abnormal returns in Table 6. To reach this goal, we estimate the following:

[3] Others include Chen et al. (2009), Goo et al. (2010) and Ho (2011).

[4] Stoffman (2014) also uses this method to examine the price impact of investor's trading.

Table 5
Liquidity provision or consumption: pre-event individual investor trading.

This table presents the results of the regression of $IndBuy_{[-11,-2]}$ ($IndSell_{[-11,-2]}$) on an intercept (omitted in the table), contemporaneous returns ($CAR_{[-11,-2]}$), past return ($CAR_{[-21,-12]}$) and the natural log of market value (logmv) in Panel A (B) for all stocks and across size groups. We show the coefficient and two-way clustering corrected t statistics (in parentheses). In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Dependent variable: $IndBuy_{[-11,-2]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
$CAR_{[-11,-2]}$	0.13***	0.16	0.21***	0.04
	(3.89)	(1.63)	(4.56)	(1.18)
$CAR_{[-21,-12]}$	0.11*	0.16	0.09**	0.10***
	(1.91)	(1.03)	(2.46)	(2.59)
logmv	−0.06	5.65***	1.95**	−0.18
	(−0.20)	(5.23)	(2.19)	(−1.14)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Panel B: Dependent variable: $IndSell_{[-11,-2]}$

$CAR_{[-11,-2]}$	0.19***	0.17*	0.25***	0.15***
	(5.15)	(1.77)	(5.30)	(4.64)
$CAR_{[-21,-12]}$	0.13**	0.18	0.11***	0.13***
	(2.37)	(1.24)	(3.01)	(3.38)
logmv	−0.02	5.50***	2.01**	−0.21
	(−0.05)	(5.46)	(2.20)	(−1.19)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Table 6
Use $IndBuy/IndSell_{[-1,+1]}$ to predict $CAR_{[+2,+11]}$.

This table presents the results of the multivariate regression of cumulative abnormal returns around dividend announcements, $CAR_{[+2,+11]}$, on an intercept, past cumulative abnormal returns ($CAR_{[-11,\ -2]}$) and individual investor buying (selling), $IndBuy_{[-1,+1]}$ ($IndSell_{[-1,+1]}$) in Panel A (B). Each panel shows the estimates and two-way clustering corrected t-statistics (in parentheses) for all stocks and across size groups. In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Regression of $CAR_{[2,+11]}$ on $IndBuy_{[-1,+1]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
$IndBuy_{[-1,+1]}$	−0.53***	−0.57***	−0.39***	−0.71***
	(−6.53)	(−7.72)	(−4.21)	(−3.94)
$CAR_{[-11,-2]}$	0.16***	0.20**	0.15***	0.15**
	(2.95)	(2.38)	(2.81)	(2.27)
Intercept	0.54	0.50	3.01***	−2.30*
	(0.61)	(1.23)	(4.04)	(−1.66)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Panel B: Regression of $CAR_{[2,+11]}$ on $IndSell_{[-1,+1]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
$IndSell_{[-1,+1]}$	−0.51***	−0.56***	−0.40***	−0.62***
	(−6.65)	(−7.96)	(−4.61)	(−3.68)
$CAR_{[-11,-2]}$	0.16***	0.20**	0.16***	0.15**
	(2.95)	(2.39)	(2.91)	(2.28)
Intercept	0.51	0.71*	2.97***	−2.33
	(0.57)	(1.79)	(4.06)	(−1.45)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

$$CAR^{i}_{[t+2,t+11]} = \alpha + \beta_1 IndBuy^{i}_{[t-1,t+1]} + \beta_2 CAR^{i}_{[t-11,t-2]} + error \tag{11}$$

in Panel A and estimate

$$CAR^{i}_{[t+2,t+11]} = \alpha + \beta_1 IndSell^{i}_{[t-1,t+1]} + \beta_2 CAR^{i}_{[t-11,t-2]} + error \tag{12}$$

Table 7
Liquidity provision or consumption: $IndBuy_{[-1,+1]}$/$IndSell_{[-1,+1]}$.

This table presents the results of the regression of $IndBuy_{[-1,+1]}$ ($IndSell_{[-1,+1]}$) on an intercept (omitted in the table), contemporaneous returns ($CAR_{[-1,+1]}$), past return ($CAR_{[-11,-2]}$) and the natural log of market value (logmv) in Panel A (B) for all stocks and across size groups. We show the coefficient and two-way clustering corrected t statistics (in parentheses). In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Dependent variable: $IndBuy_{[-1,+1]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
$CAR_{[-1,+1]}$	0.14***	0.24***	0.15***	0.09***
	(4.42)	(2.69)	(3.98)	(2.90)
$CAR_{[-11,-2]}$	0.08***	0.11**	0.12***	0.04***
	(3.90)	(2.00)	(5.07)	(3.04)
logmv	−0.03	1.67***	0.27	−0.11**
	(−0.31)	(2.78)	(1.27)	(−1.99)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Panel B: Dependent variable: $IndSell_{[-1,+1]}$

	All stocks	Small stocks	Mid-cap stocks	Large stocks
$CAR_{[-1,+1]}$	0.18***	0.25***	0.18***	0.15***
	(5.26)	(2.87)	(4.60)	(4.78)
$CAR_{[-11,-2]}$	0.09***	0.11**	0.13***	0.05***
	(4.26)	(2.09)	(5.26)	(3.43)
logmv	−0.02	1.61***	0.37*	−0.13*
	(−0.25)	(2.87)	(1.74)	(−1.76)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

in Panel B.

In Panel A, the first column shows the estimates of the regression of $CAR_{[+2,+11]}$ on $IndBuy_{[-1,+1]}$, controlling for $CAR_{[-11,-2]}$, for all stocks. The coefficient on $IndBuy_{[-1,+1]}$ is −0.53, with a two-way clustering corrected t-statistic of −6.53, which is statistically significant. This significantly negative coefficient on $IndBuy_{[-1,+1]}$ indicates that the more individual investors buy during the three days centered on dividend announcements, the more individual investors lose during the two weeks after dividend announcements, thereby showing a negative relation between $CAR_{[+2,+11]}$ and $IndBuy_{[-1,+1]}$, even after controlling for return persistence or reversals. The next three columns indicate that the relationship between $CAR_{[+2,+11]}$ and $IndBuy_{[-1,+1]}$ exists across size groups. The next row indicates that the coefficient on $CAR_{[-11,-2]}$ is positively significant, meaning that return persistence occurs before and after dividend announcements. Moreover, this is true across size groups.

In Panel B, the first column shows the estimates of the regression of $CAR_{[+2,+11]}$ on $IndSell_{[-1,+1]}$ for all stocks, controlling for $CAR_{[-11,-2]}$. The coefficient on $IndSell_{[-1,+1]}$ is −0.51 with a two-way clustering corrected t-statistic of −6.65, which is statistically significant at the 1% level. This significantly negative coefficient on $IndSell_{[-1,+1]}$ indicates that the more individual investors sell during the three days centered on dividend announcements, the more individual investors lose during the two weeks after dividend announcements, thereby showing a negative relationship between $CAR_{[+2,+11]}$ and $IndSell_{[-1,+1]}$, even after controlling for return persistence or reversals. The remaining columns show that this negative relation exists across size groups. The next row indicates that the coefficient on $CAR_{[-11,-2]}$ is positively significant, meaning that return persistence occurs during and after dividend announcements. Moreover, this result is true across size groups, which is consistent with Panel A.

To investigate why a negative relation exists between individual investor buying (selling) on dividend announcements and postevent returns, we regress $IndBuy_{[-1,+1]}$ ($IndSell_{[-1,+1]}$) on contemporaneous, past returns and the natural log of the market value, which is seen in Table 7. Specifically, we estimate the following:

$$IndBuy^{i}_{[t-1,t+1]} = \alpha + \beta_1 CAR^{i}_{[t-1,t+1]} + \beta_2 CAR^{i}_{[t-11,t-2]} + \beta_3 log(MV^{i}_{t}) + error \quad (13)$$

in Panel A and

$$IndSell^{i}_{[t-1,t+1]} = \alpha + \beta_1 CAR^{i}_{[t-1,t+1]} + \beta_2 CAR^{i}_{[t-11,t-2]} + \beta_3 log(MV^{i}_{t}) + error \quad (14)$$

in Panel B, in which upper label i and lower label t stand for stock i and dividend announcements date t, respectively.

The first cell of the first column of Panel A of Table 7 shows that the coefficient of $IndBuy_{[-1,+1]}$ on contemporaneous abnormal return $CAR_{[-1,+1]}$ is 0.14, with a t-statistic of 4.42, which is significant at the 1% level, even after controlling for past returns and the market value. The remaining columns indicate the coefficient of $IndBuy_{[-1,+1]}$ on contemporaneous abnormal return $CAR_{[-1,+1]}$ is significantly positive across size groups, meaning that the positive correlation between individual investor buying and the contemporaneous return holds across size groups. The positive relationship between individual investor buying and the

contemporaneous return suggest that individual investor buying demands liquidity, and this result is true across size groups. The first cell of the next row shows that the coefficient of $IndBuy_{[-1,+1]}$ on past abnormal return $CAR_{[-11,-2]}$ is 0.08, and it has a t-statistic of 3.90. The remaining columns show that the coefficient of $IndBuy_{[-1,+1]}$ on past abnormal return $CAR_{[-11,-2]}$ is significantly positive across size groups. The positive coefficient on $CAR_{[-11,-2]}$ produces further evidence that individual investor buying demands liquidity during the three days centered on dividend announcements.

The first cell of the first column of Panel B of Table 7 shows that the coefficient of $IndSell_{[-1,+1]}$ on contemporaneous abnormal return $CAR_{[-1,+1]}$ is 0.18, and it has a t-statistic of 5.26, which is significant at the 1% level, even after controlling for past returns and market value. The remaining columns indicate the coefficient of $IndSell_{[-1,+1]}$ on contemporaneous abnormal return $CAR_{[-1,+1]}$ is significantly positive across size groups. The positive relationship between individual investor selling and the contemporaneous return suggests that individual investor selling provides liquidity. The first cell of the next row shows that the coefficient of $IndSell_{[-1,+1]}$ on past abnormal return $CAR_{[-11,-2]}$ is 0.09, and it has a t-statistic of 4.26. The remaining columns show that the coefficient of $IndSell_{[-1,+1]}$ on past abnormal return $CAR_{[-11,-2]}$ is significantly positive across size groups. The positive coefficient on $CAR_{[-11,-2]}$ provides further evidence that individual investor selling provides liquidity during the three days centered on dividend announcements.

3.3. Individual investor trading after dividend announcements

We have documented that following dividend announcements, both individual investor buying and individual investor selling are statistically significant in Table 2. Since both individual investor buying and individual investor selling positively respond to past returns before and on dividend announcements, will this response hold true following dividend announcements? Would postevent individual investors buying and individual investor selling also positively respond to dividend surprise? What is the trading strategy of individual investors? If individuals trade on information prior to the announcements, then they will reverse their position after the announcements. In aggregate, individuals may trade in the opposite direction of the news after the announcements. However, if individuals do not trade on information prior to the announcements, then no reverse position will occur after the announcements in aggregate. To examine these questions, we regress individual buying on dividend surprise and past returns, controlling for the lag of individual buying in the following regression:

$$IndBuy^{i}_{[t+2,t+11]} = \alpha + \beta_1 CAR^{i}_{[t-1,t+1]} + \beta_2 CAR^{i}_{[t-11,t-2]} + \beta_3 IndBuy^{i}_{[t-11,t-2]} + error \quad (15)$$

Table 8
Response of individual investor buying (selling) to dividend surprises.
In this table, we regress individual investor buying (selling) after dividend announcement $IndBuy_{[+2,+11]}$ ($IndSell_{[+2,+11]}$) on an intercept, dividend surprise $CAR_{[-1,+1]}$, past cumulative abnormal returns $CAR_{[-11,-2]}$, individual investor buying (selling) before dividend announcement $IndBuy_{[-11,-2]}$ ($IndSell_{[-11,-2]}$) in Panel A (B). In this table, we present the estimates and two-way clustering corrected t-statistics (in parentheses). In this table, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Response of $IndBuy_{[+2,+11]}$ to dividend surprises

	All stocks	Small stocks	Mid-cap stocks	Large stocks
Intercept	−0.67	−8.20***	−1.08	1.68
	(−0.58)	(−8.98)	(−0.92)	(0.85)
$CAR_{[-1,+1]}$	0.44***	0.72***	0.44***	0.22***
	(4.54)	(2.93)	(4.56)	(3.30)
$CAR_{[-11,-2]}$	0.11***	0.11	0.16***	0.09***
	(5.99)	(1.38)	(3.38)	(3.01)
$IndBuy_{[-11,-2]}$	0.26***	0.22**	0.22***	0.34***
	(5.13)	(2.44)	(2.75)	(5.28)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Panel B: Response of $IndSell_{[+2,+11]}$ to dividend surprises

	All stocks	Small stocks	Mid-cap stocks	Large stocks
Intercept	−1.47*	−7.16***	−1.21	−0.33
	(−1.70)	(−7.52)	(−1.20)	(−0.21)
$CAR_{[-1,+1]}$	0.47***	0.73***	0.48***	0.25***
	(4.94)	(3.01)	(5.35)	(3.73)
$CAR_{[-11,-2]}$	0.10***	0.10	0.15***	0.08**
	(4.08)	(1.32)	(3.04)	(2.04)
$IndSell_{[-11,-2]}$	0.26***	0.22**	0.23***	0.30***
	(5.24)	(2.38)	(3.00)	(4.48)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Similarly, we regress individual selling on dividend surprise, past returns and the lag of individual selling in the following regression:

$$IndSell^{i}_{[t+2,t+11]} = \alpha + \beta_1 CAR^{i}_{[t-1,t+1]} + \beta_2 CAR^{i}_{[t-11,t-2]} + \beta_3 IndSell^{i}_{[t-11,t-2]} + error \quad (16)$$

Table 8 presents the analysis for Eqs. (15) and (16) in Panels A and B, respectively. In Panel A the first row shows the estimates of the intercept. The next row of the first column shows that the coefficient on $CAR_{[-1,+1]}$ is 0.44 with a t-statistic of 4.54, and the remaining columns show that this significantly positive coefficient holds across size groups. The positive coefficient on $CAR_{[-1,+1]}$ suggests that postevent individual investor buying positively responds to dividend surprise. The next row shows that the coefficient on $CAR_{[-11,-2]}$ is significantly positive and this result is mainly derived from mid-cap and large stocks. The next row shows that the coefficient on $IndBuy_{[-11,-2]}$ is significantly positive, indicating some persistence of individual investor buying around dividend announcements.

In Panel B the first row shows the estimates of the intercept. The next row of the first column shows that the coefficient on $CAR_{[-1,+1]}$ is 0.47 with a t-statistic of 4.94, and the remaining columns show that this significantly positive coefficient holds across size groups. The positive coefficient on $CAR_{[-1,+1]}$ suggests that postevent individual investor selling positively responds to dividend surprise. The next row shows that the coefficient on $CAR_{[-11,-2]}$ is significantly positive, and this result is mainly derived from mid-cap and large stocks. The next row shows that the coefficient on $IndSell_{[-11,-2]}$ is significantly positive, indicating some persistence of individual investor selling around dividend announcements.

Combining panels A and B of Table 8, both individual investor buying and selling positively respond to the dividend surprise, which means that individual investors have heterogeneous beliefs. Dividend announcements lead to a divergence of opinion within individual investors. Additionally, both individual investor buying and individual investor selling positively respond to their lags, which means that individual investors do not reverse their positions after dividend announcements.

4. Conclusion

Using a unique dataset that allows us to accurately measure individual investor buying and individual investor selling around dividend announcements, we investigate individual investor buying and individual investor selling before, during and after dividend announcements. We first document that both pre-event individual investor buying and individual investor selling negatively predict dividend surprise (abnormal returns on dividend announcements) and abnormal returns after dividend announcements. We then document that both individual investor buying and individual investor selling in the three days centered on dividend announcements negatively associate with postevent abnormal returns. Next, we find that both individual investor buying and individual investor selling during the two weeks before and the three days centered on dividend announcements are positively associated with contemporaneous and past returns. The evidence indicates that both individual investor buying and individual investor selling around dividend announcements show identical correlations with past, contemporaneous and future returns. Moreover, all of these results are consistent with the idea that individual investor buying demands liquidity but individual investor selling provides liquidity. Finally, we document that both individual investor buying and individual investor selling positively respond to dividend surprise and persist around dividend announcements.

Our results indicate that individual investor buying is different from individual investor selling in terms of providing (demanding) liquidity. Our finding that individual investors consume liquidity as they buy before and during dividend announcements is novel in the literature, because previous papers almost all show that individual investors provide liquidity. In addition, our paper contributes to the literature by providing evidence that buying is different from selling, even if the activity is performed by the same type of investor. Finally, following dividend announcements, different individual investors make opposite decisions, even based on identical signals, showing heterogeneous beliefs among individual investors.

Our paper has implications for policy making. We document that individual investor buying demands liquidity but individual investor selling provides liquidity around dividend announcements. As a result, policy makers should consider discriminating buying from selling around dividend announcements. For example, policy makers can consider taxing individual investor buying at a higher rate than that of individual investor selling around dividend announcements.

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