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Asymmetric Effect of Dumb Money on Momentum Evidence from the Stock Market

Xiaowei Lin[a], Peng Dong Zhang[b*]

Abstract

This paper is moviated by money flowing from retail investors into mutual funds will exacerbate the momentum anomaly, which is referred to as "dumb money". Here, with the Taiwan stock market considered as the setting, we document that aggregate mutual fund flows (dumb money) have a significantly negative impact on short-term momentum profit. Considering that momentum profits depend on the market states, we show that the impact of aggregate mutual fund flows on momentum profit is stronger following positive market returns. However, the impact of aggregate mutual fund flows on momentum profit is insignificant following negative market returns. Further, we confirm that mutual fund managers tend to buy loser stocks during a period of positive market returns compared with one of negative market returns by using an analysis of net trading volume. Our results not only suggest the importance of the influential role of mutual fund flows on momentum strategy but also provide the useful information for regulators to monitor the dynamic trading of mutual funds in the stock market.

Keywords: dumb money; momentum; aggregate mutual fund flows; market states JEL classification: G12, G14

1. Introduction

Jegadeesh and Titman (1993) show that momentum is responsible for buying the top 10% and selling the bottom 10% of stocks ranked by returns during the past 6 months, it holds the positions for 6 months, and it produces profits of 1% per month in U.S. stock markets. There is substantial evidence indicating that momentum not only exists in U.S. stock markets, but also exist in the markets of other developed countries (Griffin et al., 2003; Rouwenhorst, 1998).

The phenomenon of momentum, however, presents a significant challenge to the efficient market hypothesis. There is a substantial body of literature pointing out behavioral biases to explain the momentum phenomenon. One of the explanations for momentum according to behavioral biases is "dumb money". Flows to mutual funds (dumb money) have been shown to create distortions in U.S. stock markets, and retail investors are major contributors to these distortions. For example, Sirri and Tufano (1998) show that retail investors in the U.S. tend to "chase performance" by directing their money to mutual funds which have recently outperformed and redeeming their capital from mutual funds with recent underperformance. Frazzini and Lamont (2008) suggest that retail investors in U.S. tend to directly put their money into mutual funds and cause mutual fund managers to hold overvalued stocks. Feng et al. (2014) document that mutual funds underperforms significantly following receiving more new money. Specifically, when mutual fund managers receive an increased flow from retail investors, and they usually increase positions in their holdings of existing stocks. As a result, net inflows are associated with higher contemporaneous returns and subsequent return reversal (Coval and Stafford, 2007). Therefore, mutual funds, in general, are underperformance than market return (Białkowski and Otten, 2011). These behavioral biases from retail investors cause price pressure that generally causes prices to depart from their fundamentals (Lou, 2014). Akbas et al. (2015) show that aggregate flows to mutual funds appear to exacerbate cross-sectional mispricing, particularly for momentum.

In this paper, we investigate whether mutual fund inflows influence momentum profits in the Taiwan stock market. We select this particular market because of two important features. First, empirical evidence shows that emerging or Asian markets exhibit no momentum premium (Chui et

[a,b]School of Finance and Accounting, Fuzhou University of International Studies and Trade
**Corresponding Author: Peng Dong Zhang*
Email: linxiaowei@fzfu.edu.cn

al., 2000; Du et al., 2009; Hameed and Kusnadi, 2002), and particularly Lin et al. (2016) point out that momentum profit is unstable in the Taiwan stock market. Second, Li and Lin (2004) indicate that the existence of distorted behavior in Taiwan fund companies, such as delaying trade, allowing short trading by some investors. Goo and Chang (2010) show that the Taiwan mutual funds actively pursue corporate-level strategy to enhance their performance. Thus, the current study provides an ideal setting in which to examine how the biases of retail investors affect stock prices through mutual fund flows, which is a topic of significant interest.

Our empirical evidence shows that the aggregate mutual fund flows have a significantly negative impact on short-term momentum profit. This result suggests that aggregate mutual fund flows seem to impede arbitrage and thus cause momentum reversal in the short-term. In particular, we find that the impact of mutual fund flows on loser stocks is significantly positive. This finding confirms the contention that retail investors tend to direct dumb money to mutual funds, and accordingly higher inflows to mutual funds force mutual fund managers to overinvest in their positions of existing stock holdings. Consequently, price pressure causes momentum reversal in the short-term.

Furthermore, Ben-Rephael et al. (2012) suggest that mutual fund flows can reflect investor sentiment because mutual fund investors are small and uninformed. To confirm that mutual fund flows are a suitable proxy for sentiment, they show that the mutual fund flows can only partially be explained by risk premium changes. Specifically, when investor sentiment increases along with the market price, the optimism associated with changing the risk aversion has an effect on momentum profit. Therefore, aggregate mutual fund flows may have an asymmetric impact pattern on momentum profits with market states and thus should be most pronounced when market prices are in increasing trend. Following this notion, we define market states using the measurement of Cooper et al. (2004) in which UP (DOWN) indicates whether the past 12 months market return is nonnegative (negative). We then extend the regression model to investigate whether aggregate mutual fund flows have an asymmetric impact pattern across different market states.

Our findings show that aggregate mutual fund flows have a significant impact on short-term momentum profit following an UP-market state. Following a DOWN market state, however, the impact of aggregate mutual fund flows on short-term momentum profit is insignificant. To shed light on the asymmetric trading behavior of mutual fund managers, we separately estimate stock-by-stock net trading volume for large investors across UP and DOWN-market states. Our analysis indicates that mutual fund managers generally are more likely to buy loser stocks during UP market periods than during DOWN market periods.

However, prior literature has no direct evidence to provide an explanation for the insignificant level of momentum profits in Taiwan stock market. Our findings fill the gap and suggest that dumb money leads to prices departing from fundaments in the short-term, and this impact pattern is stronger during an UP-market state due to accumulated optimism. Overall, our findings suggest that dumb money leads to prices departing from fundaments in the short-term, and this impact pattern is stronger during an UP-market state due to accumulated optimism.

The remainder of this paper is organized as follows. Section 2 presents a literature review. In Section 3, the data and the construction of the momentum strategy and measurement of aggregate mutual fund flow is described. Section 4 considers the momentum profits and tests for the impact of aggregate mutual fund flows on momentum profit in explaining our results. We further investigate the asymmetric impact pattern of aggregate mutual fund flows conditioning on UP and DOWN-market states in Section 4. Section 5 presents conclusions.

2. Literature Reviews

The momentum phenomenon is a highly salient and has been widely reported. There is empirical evidence showing that the momentum effect exists in the markets of many developed countries. Some of studies have used behavioral biases to explain the momentum phenomenon, and the dumb money effect may be one of the factors that influences momentum profit. Akbas et al. (2015) show that dumb money (mutual fund flows) exacerbates stock return anomalies. They suggest that mutual fund managers receive an increased flow of investment from retail investors, and they usually increase positions in their current stock holdings. Inflows from retail investors are associated with mutual funds that recently have exceptionally high performance. Consistent with the behavior of “chasing performance”, retail investors tend to direct dumb money to mutual funds that hold overvalued stocks. Consequently, net inflows in mutual funds are associated with contemporaneous returns and subsequent return

reversals (Coval and Stafford, 2007).

A large and growing body of research on mutual funds shows that the behavioral biases of retail investors affect mutual fund selection. For example, Gruber (1996) indicates that the momentum effect can increase positive short-term fund returns and thus attract greater fund inflow from retail investors. Bailey et al. (2011) show that investors with strong behavioral biases or lack of attention to firm-specific or macro-economic news are likely to hold mutual funds or select mutual funds for the wrong reasons. More specifically, biased investors are more likely to chase fund performance, casting doubt on the idea that trend-chasing reflects rational fund selection decisions. Therefore, investors with a preference for speculative stocks could select funds that facilitate aggressive switching across asset classes without considering their higher fees, and thus trend chasing appears related to behavioral biases (Bailey et al., 2011). This relationship may cause high-performing mutual funds to attract relatively higher flows, which are then reinvested by fund managers into their existing stock holdings. The combination of behavioral biases from retail investors and a tendency by mutual fund managers to invest into existing stock holdings leads to positive contemporaneous relationship between fund flows and stock returns. Akbas et al. (2015) show that that mutual fund flows can exacerbate stock return anomalies in U.S. stock markets.

Moreover, De Long et al. (1990) analyze the limits of arbitrage and demonstrate that arbitrageurs not only bear fundamental risk but also face the noise trader risk. Arbitrageurs' positions are deterred by the additional risk that investors' optimism could become more extreme in the near future, and that stock prices could increase even more significantly (Chung et al., 2012).

The above literature, taken together, suggests that as money flows from retail investors into mutual funds, this leads mutual fund to hold overvalued stocks as mutual fund managers receive increased flows. Combined with the limits on arbitrage, there is the additional risk that investor optimism could cause stock prices to deviate from their fundamental values in the short-term. Therefore, investor optimism is associated with higher inflows to mutual funds, leading mutual fund managers to disproportionately invest in their existing stock holdings, which leads to a subsequent momentum short-run reversal.

3. Data and Variable Construction

We use all common stocks listed on the Taiwan Stock Exchange (TWSE) and TAIEX (a proxy for the market index in Taiwan) from monthly and daily files of the Taiwan Economic Journal (TEJ), which is a local data vendor in Taiwan. Data for mutual fund flows were also obtained from TEJ. However, the number of listed firms on TWSE and the time series were initially insufficient compared to U.S. stock markets. Accordingly, we extract the sample time period is from January 2000 to December 2016.[1]

We construct a momentum strategy by using the methodology of George and Hwang (2004), which is based on cross-sectional regressions similar to Fama and MacBeth (1973) to control for the effects of firm size and bid-ask bounce.[2] The dependent variable in these regressions is the month t return for stock *i*, $R_{i,t}$; and the independent variables are dummies that indicate whether stock *i* is held (either long or short) in month t. We also skip a month between ranking and holding periods, and include the month t–1 return, $R_{i,t-1}$, and $Size_{i,t-1}$ as independent variables to mitigate the impact of bid-ask bounce and market capitalization on the coefficient estimates, respectively.[3] For example, the profit from a winner or loser portfolio in month t for a (6, 6) strategy can be calculated as the sum of returns to six portfolios, each formed in one of the past six successive months t – *j* (for *j* = 2 to *j* = 7 to allow for skipping a month between formation and holding periods). The portfolios formed in month t – *j* to the month t return can be obtained by estimating the following regression:

$$R_{i,t} = b_{0,j,t} + b_{1,j,t}R_{i,t-1} + b_{2,j,t}Size_{i,t-1} + b_{3,j,t}JH_{i,t-j} + b_{4,j,t}JL_{i,t-j} + \varepsilon_{i,t}, \quad (1)$$

where $JH_{i,t-j}$ equals one if stock *i*'s past performance over the 6-month period (*t* – *j* – 6, t – *j*) is in the top 30% when measured by JT's performance criterion, and is zero otherwise; $JL_{i,t-j}$ equals one if stock *i*'s past performance over the period (t – *j* – 6, t – *j*) is in the bottom 30% when measured by JT's performance criterion, and is zero otherwise. The coefficient estimate $b_{0,j,t}$ can be interpreted as the return to a neutral portfolio that has zeroed (hedged) out the effects of size, bid-ask bounce, and momentum (Fama and MacBeth, 1973); and $b_{3,j,t}$ can be interpreted as the month t return to a zero investment portfolio that is long on

[1]Recently, the firms listed on TWSE are gradually increasing. There are 558 firms in 2000 and 1564 firms in 2015 listed on TWSE.

[2]George and Hwang (2004) point out that cells are not evenly balanced in the conventional method. Specifically, a loser has a small number of stocks in it and in some months has none. However, both winner and loser portfolios must be nonempty for at least one month in order to be included in the winner-minus-loser cell. Accordingly, the average is not the difference.

[3]George and Hwang (2004) describe that the results are not sensitive to whether a month is skipped and whether $R_{i,t-1}$ is included or not.

JT winner stocks but that has also hedged out all other effects. In other words, $b_{3,j,t}$ can be viewed as the return in excess of $b_{0,j,t}$ that can be earned by taking a long position in a pure JT winner portfolio. Other estimated coefficients have similar interpretations.

Therefore, for returns to (6, 6) strategies, which involve portfolios formed over prior 6 months, the total return in month t (as a monthly return) of the set of pure winner or pure loser portfolios can be expressed as sums $\frac{1}{6}\sum_{j=1}^{6} b_{3,j,t}$, $\frac{1}{6}\sum_{j=1}^{6} b_{4,j,t}$, where the individual coefficients are computed from separate cross-sectional regressions for each *j* = 1, . . . , 6. Further, in order to avoid microstructure biases, we delete all stocks with prices below NT$10 at the beginning of the holding periods.

We obtain monthly total net assets and returns to construct aggregate mutual fund flow. Following Huang et al. (2011), we select only mutual funds with a code of "equity objective". Our measure of monthly aggregate mutual fund flow is computed as follows:

$$AGGFLOW = \frac{\sum_{i=1}^{N}[TNA_{i,t} - TNA_{i,t-1}(1+MRET_{i,t})]}{\sum_{i=1}^{N} TNA_{i,t-1}}, \quad (2)$$

where $TNA_{i,t}$ is the total net assets of mutual fund *i* at time t and $MRET_{i,t}$ is the period return of mutual fund *i* at time t, net of fees. Monthly total net assets are available from January 2000. Figure 1 plots the time series of aggregate mutual fund flows and momentum profits. We also present the time-series averages of the month-by-month estimates of these sums, and associated t-statistics are reported in Table 1.

Table 1 reports the properties of monthly variables across all months and the average monthly returns over the holding-period month 1. Panel A provides univariate statistics for our sample. Winner represents the returns to the portfolio constructed using the highest cumulative returns for the past 6 months and Loser represents the returns to the portfolio constructed using the lowest cumulative returns. As can be seen in Panel A of Table 1, the average monthly excess returns on the Winner and Loser stocks are 0.132% and 0.277% respectively. The monthly return to the momentum strategy is −0.144%, which is constructed on buying winner stocks and shorting loser stocks. Also shown in Panel A are the measures of aggregate mutual fund flow (AGGFLOW), and the result indicates that, on average, mutual funds in Taiwan tended to have an inflow in our full sample period.

Panel B of Table 1 provides correlations measured over the full sample period. AGGFLOW is positively correlated with momentum profit ($\rho = -0.044$) and is statistically significant. AGGFLOW is insignificant negatively correlated with market return (MKT) ($\rho = -0.085$). The average excess returns for winner stocks are negatively correlated with momentum profit with statistical significance. In contrast, the average excess return for loser stocks is significantly negatively correlated with momentum profit. The average excess returns for loser stocks and winner stocks are highly correlated with statistical significance. These results provide a preliminary profile indicating that momentum profit is highly correlated with aggregate mutual fund flows, particularly for loser stocks. Further, we provide Figure 1 to depict that the aggregate mutual fund flow is negatively correlated with momentum return (Momentum). In short, the above results suggest that flows to mutual funds may play the role of dumb money in affecting short-term momentum profit.

4. Empirical results

4. 1 Momentum profits in the Taiwan stock market

Since the seminal work of Jegadeesh and Titman (1993), there has been increasing more research on the simple strategy of momentum trading. Over intermedi investment horizons of 3 to 12 months, buying recent winners and selling recent losers generates approximately 1% per month. However, there is still an uncovered whether existmomentum effect in Taiwan stock market. Accordingly, we provide evidence for momentum profitability in the Taiwan stock market. Following the method of George and Hwang (2004), the total return in month t (as a monthly return) for the set of pure winner or pure loser portfolios can be expressed as the sum of individual coefficients that are computed from separate cross-sectional regressions.

Table 2 reports the performance over various holding-period months for winner and loser stocks, which are identified using 30% cutoffs. Panel A of Table 2 presents the returns for a momentum strategy with skipping a month and without skipping a month.[4] Panel A shows that the momentum profit leads to a short-term reversal. The average monthly return (Raw returns) for the loser portfolio earns a return of 0.195% per month with a t-statistic of 1.781 over the holding-period month 1 (K=1), whereas the winner stocks earn a statistically insignificantly −0.007% returns. In addition, the momentum profit for holding-period

[4]Jegadeesh (1990) and Lo and MacKinlay (1990) show that the price momentum exhibits short-term return reversals in the month following portfolio formation, and hence subsequent studies adopt a month skip to avoid this problem.

month 1 is significantly negative. In case of the risk-adjusted returns, similarly, the loser stocks are outperformed by winner stocks, and loser stocks earn 0.158% with a t-statistic of 1.789 for holding-period month 1; the momentum strategy presents significant reversal in holding-period month 1.

After holding-period month 1, the profits for loser stocks gradually increase over holding-period months 3 to 6 on raw returns and risk-adjusted returns. In contrast, the winner stocks earn insignificant returns, and thus the momentum strategy shows poor performance in subsequent holding-period months 3 to 6.

Panel B of Table 2, without a month skip, shows that the momentum profit is insignificant in cases of raw returns and risk-adjusted returns. This is because the average excess return for winner portfolio exhibits short-term return reversal following portfolio formation. Associated with the recent outperformance for winner stocks, retail investors may tend to "chase performance" and then put their money directly into mutual funds with strong recent performance. Accordingly, net money inflows lead fund managers to increase their positions of current stock holding and this, in turn, causes the subsequent return reversal. Table 2 provides a primary concept to understand how cash flows to mutual funds affect momentum.

4.2 The effect of mutual fund flows on momentum

We now consider whether dumb money plays an important role in influencing momentum profit. We start by examining the contemporaneous relation between mutual fund flows and the momentum profit, following an investment strategy based on George and Hwang (2004) method. This notion helps to understand the channels through which mutual fund flows affect momentum and which type of stock type (winner or loser) is viewed as attractive by mutual fund managers.

Following Akbas et al. (2015), we regress the momentum return on aggregate mutual fund flows, and in addition to obtaining Fama–French alphas from the time-series regressions for each of the individual monthly coefficient estimates on the contemporaneous Fama–French factors. We further classify month t as an inflow month when it is in the top 30% for the sample period, and as an outflow month when in the bottom 30% for the sample period. The results are presented in Table 3.

Panel A of Table 3 shows the raw returns of momentum during inflow and outflow periods with various holding-period months. During inflow periods, the momentum profit is negative and significant in holding-period month 1. Extending to holding-period months 3 to 12, the profits of momentum strategy are underperforming during inflow periods. In contrast, the momentum profits in holding-period months 1 to 12 are insignificantly positive during outflow periods.

We then separately investigate the returns of the long position (Winner) and the short position (Loser). During inflow periods, the raw returns (Panel A) and risk-adjusted returns (Panel B) for winner stocks are insignificantly negative, whereas loser stocks earn significantly positive profit in holding-period month 1. However, in the case of raw returns, subsequent performance for loser stocks earns insignificantly positive profit in holding-period months 3 to 6. The risk-adjusted returns for loser stocks are a significantly positive profit from holding-period months 3 to 6. This finding indicates that retail investors tend to "chase performance" and they tend to directly put their money into mutual funds with higher recent performance. Such bias-based inflows force mutual fund managers to increase their positions in current stock holdings. As a result, there is a short-term momentum reversal associated with higher contemporaneous returns for loser stocks.

Observing the performance of momentum strategy during outflows periods, the raw returns of momentum are insignificantly positive in holding-period months 1 to 12. The risk-adjusted returns of momentum earn 0.423% per month with a t-statistic of 1.783 in holding-period month 1. After holding-period months 3 to 12, the results of risk-adjusted profits are insignificantly positive as well as results of raw returns. This finding implies that retail investors tend to redeem their capital due to a mutual fund's recently poor performance.

To test our main purpose, we construct a regression model to examine the relation between mutual fund flows and momentum profit. This model allows us to understand the how dumb money from retail investors affects momentum profit. To accomplish this, we estimate the following regressions:

$$b_{3,kt} - b_{4,kt} = \alpha + \mathrm{c}_1 AGGFLOW_t + \varepsilon_t, \quad (3)$$

and

$$b_{3,kt} - b_{4,kt} = \alpha + \mathrm{c}_1 AGGFLOW_t + c_2 MKT_t + c_3 SMB_t + c_4 HML_t + \varepsilon_t, \quad (4)$$

where $b_{3,kt}$ and $b_{4,kt}$ are excess returns for winner and loser portfolios obtained by using a momentum strategy in holding-period month k on month t based on the model of George and Hwang (2004), respectively. Here, $b_{3,kt} - b_{4,kt}$ indicates momentum profit, which is the difference between winner and loser portfolios. AGGFLOW$_t$ is the

monthly aggregate mutual fund flow in month t. Control variables are the market, size, and value factors constructed by Fama and French (1993): the excess return on the stock market (MKT), the return spread between small and large firms (SMB), and the return spread between stocks with high and low book-to-market ratios (HML).

The results from estimations of the regressions specified above are presented in Table 4. Panel A of Table 4 shows the regressions for excess returns according to the momentum strategy. The coefficient of aggregate fund flows (AGGFLOW) has negative and significant impact on momentum profit in holding-period month 1 (K=1). Considering risk factors (Panel B), the aggregate fund flow negatively significantly impacts momentum profit. Specifically, aggregate mutual fund flows increasing by 1% affects the momentum profit range by −0.327% to −0.243% (controlling risk factors) in holding-period month 1. This finding implies that noise traders are a source of risk for arbitrageurs since their trades can cause greater mispricing, resulting in higher arbitrage risk in the short-term (De Long et al., 1990). We further examine the impact of aggregate mutual fund flows on long (winner) and short (loser) positions. The coefficients of aggregate mutual fund flows have a significantly positive impact on loser stocks in holding-period month 1, the regression after controlling for risk factors. By contrast, in holding-period month 1, aggregate mutual fund flows insignificantly impact winner stocks. This finding suggests that mutual funds are the most likely channel for retail investors to purchase stocks that are overvalued, particularly for loser stocks. Consequently, there is momentum profit reversal in the short-term through increasing short position holdings.

To further investigate persistence of the impact of aggregate mutual fund flows on momentum profit, we extend holding-period month 3 to 12. Intuitively, stocks in a short position (loser stocks) should revert to their fundament values during longer holding-period months when mutual fund flows are overinvesting in their current stock holdings. As shown in Panel A of Table 4, the coefficients of aggregate mutual fund flows have only insignificant impact on momentum profits, except for holding-period month 3. After controlling for risk factors (Panel B), the coefficients of aggregate mutual fund flows have only insignificant impact on momentum profit from holding-period months 3 to 12. Of particular interest are the results obtained from a short position, where the impact of aggregate mutual fund flows on loser stocks is monotonically decreasing across the holding-period of month 3 to 6. In summary of Table 4, we find that mutual fund flows are being disproportionately invested in overvalued stocks, accordingly, creating temporary upward price pressure for loser stocks. And therefore, aggregate fund flows have an insignificant relation with long-term momentum profit.

4.3 Effect of mutual fund flows conditional on market states

Cooper et al.(2004) show that momentum profits are sensitive to market states. Asem and Tian (2010) propose that momentum profits are higher when a market continues in a positive market return state than when it shifts to a negative market return state. Hong and Stein (1999) point out that decreasing risk aversion leads to greater momentum profits. Lin et al. (2016) document significantly positive momentum profits in the Taiwan stock market when the market maintiains the same state. Therefore, investors could alter their behavior as a result of changes in the market state. Specifically, when the market is continuous in a positive market return state, investors optimism grows, as reflected by the increase in sentiment, and this then leads to higher inflows to mutual funds. As a result, the inflow associated with an accumulation of optimism leads mutual fund mutual managers to invest more in their current stock holdings, and thereby leads to an extended period of market overvaluation.

We extend our analysis to examine the role of time-varying market conditions on the relation between dumb money and momentum profit. We begin an analysis of Table 4 by including market state variables to test the interaction with aggregate mutual fund flows. Following Cooper et al. (2004), we classify each holding month t into different market states based on the cumulative market return over a certain period before month t. At the beginning of each month t, we calculate the buy-and-hold return on the TAIEX over the past 12 months ending in month t − 1.[5] If this return is nonnegative (negative), we classify the market state of month t as UP (DOWN). Based on these regressions, we extend the following regressions:

$$b_{3,kt} - b_{4,kt} = \alpha_{DOWN} + \alpha_{UP} + c_1 AGGFFLOW_t \times D_{DOWN} + c_2 AGGFLOW_t \times D_{UP} + \varepsilon_t, \quad (5)$$

[5]Lin et al. (2016) investigate how changes in market conditions influence momentum profits in the Taiwan stock market, and they classify a market as UP (DOWN) if the buy-and hold return on the TAIEX over month t – 12 to month t – 1 is nonnegative (negative). Accordingly, this paper follows their measurement to examine the impact of aggregate mutual fund flows on momentum profit, conditional on market states.

and

$$b_{3,kt} - b_{4,kt} = \alpha_{DOWN} + \alpha_{UP} + c_1 AGGFLOW_t \times D_{DOWN} + c_2 AGGFLOW_t \times D_{UP} + c_3 MKT_t + c_4 SMB_t + c_5 HML_t + \varepsilon_t, \quad (6)$$

where $D_{UP}(D_{DOWN})$ is a dummy variable that equals 1 for an UP (DOWN) market state. The interaction term $\mathrm{AGG}FLOW_t \times D_{UP}$ is the aggregate mutual fund flows conditional on an UP market state and $\mathrm{AGG}FLOW_t \times D_{DOWN}$ is aggregate mutual fund flows conditional on a DOWN market state. We allow for the intercept to change with the regime dummies to control for the effect of market state shifts on the subsequent returns.

Results from the above regression specification are reported in Table 5. Panel A of this table shows the results obtained from the basic regression model combined with market states, and Panel B presents the results of a regression model combined with market states after controlling for risk factors. Conditioned on the UP-market state, the results show that aggregate mutual fund flows have a negative impact on momentum profit. This is stronger in holding-period month 1, either in regression after controlling risk factors (Panel B). In contrast, aggregate mutual fund flows have an insignificant impact on momentum profit after conditioning on DOWN market state.

Further, we examine the persistence of aggregate mutual fund flows impact on momentum profit. The effect of aggregate mutual fund flows on momentum profit insignificantly decreases over holding-period months 3 to 12, either after controlling risk factors. Of particular interest are loser stocks, since the results show that the impacts of aggregate mutual fund flows on loser stocks decrease monotonically over holding-period months 3 to 12. We find mutual fund flows to be disproportionally invested in loser stocks, thus creating a temporary upward price pressure for loser stocks.

The results of Table 5 confirm that aggregate mutual fund flows have a significantly positive contemporaneous relation with loser stocks. Because loser stocks were likely to have been overvalued when purchased by mutual funds at time t, consequently the prices of loser stocks are converging toward fundamental values. With the dumb money overinvesting on loser stocks at time t, this leads to contemporaneous increase in the prices and subsequent price reversal.

In order to confirm our findings from Table 5, we further employ trading volumes to examine the trading behavior of large investors through calculating the averages for each winner and loser portfolios in each month of the formation and holding periods. We measure the net trading volume for each stock to investigate the trading behavior of large investors. In Taiwan, the government requires the TWSE to daily report buy-and-sell volumes from larger investors on each stock.[6] The authority classifies larger investors as foreign investors, mutual funds and foreign investors.[7] The trading volume sample from larger investors over the period from January, 2008 to December, 2015, for a total of 7 years.

We separately sum up daily larger-trade buy and sell trading volumes and then divide by the number of shares outstanding for each stock in each month. Following this procedure, we then find the difference between buy-and sell-initiated trading volume for each stock as a proxy for net trading volume. If the difference between buy-and sell-initiated trading volumes from larger investors is positive (negative) this indicates that larger investors are generally trading on buy (sell)-initiated volumes for a stock within a month. This data can exactly capture the trading behavior of larger investors, and the results are presented in Table 6.

As can be seen in Panel A of Table 6, the mutual fund managers tend to buy loser stocks following an UP-market state over holding-period months 1 to 3. After holding-period month 4, mutual fund managers tend to buy winner stocks. Observing the DOWN-market states, mutual fund managers tend to sell winner stocks as well as loser stocks. In a DOWN market state (Panel B), the mutual fund managers tend to sell both winner and loser stocks because retail investors "chase performance" and thus tend to fail to redeem capital from mutual funds with poor performance. The difference between UP and DOWN-market states (Panel C) for loser stocks is 6.744 with t-statistic 3.465 in holding-period month 1. In contrast, the difference between UP and DOWN-market states for winner stocks is insignificant. Our findings confirm that mutual fund managers during UP market state tend to buy loser stocks, consistent with Akbas et al. (2015).

Taken together, our results support the contention that money flowing into mutual funds has a real allocation impact on momentum, because it can exert the wrong type of price

[6]The statistics cover Regular, Odd-lot, After-hour Fixed Price, and Block trading, but exclude Auction and Tender offers.

[7]The definition for types of larger investors are as following: dealers mean dealers' proprietary accounts; mutual funds indicate domestic mutual funds managed by Securities Investment Trust Companies; foreign investors are defined by the Regulations Governing Investment in Securities by Overseas Chinese and Foreign Nationals as well as the Regulations Governing Securities Investment and Futures Trading in Taiwan by Mainland Area Investors.

pressure on stocks that are already held. In particular, when the market price is increasing, investors' optimism grows, as reflected by the increase in sentiment, and accordingly there are higher flows from retail investors into mutual funds. When dumb money flows directly to mutual funds, fund managers increase their positions in existing stocks, and as a result, net money inflows have a negative impact on short-term momentum profit.

5. Conclusion

There is extensive evidence in th literature evidence for effects of the momentum phenomenon. One explanation for this phenomenon is the dumb money effect, resulting in the momentum anomaly. Motivated the evidence of Akbas et al. (2015) that dumb money (mutual fund flows) exacerbate stock return anomalies in U.S. stock markets, we empirically examine whether mutual fund flows are related to the momentum strategy in the Taiwan stock market.

We employ total net assets of mutual funds and the period return of mutual funds to measure aggregate mutual fund flow. To calculate momentum profit, we follow the measurement technique of George and Hwang (2004), which is based on Fama and MacBeth (1973) cross-sectional regressions, to control for the effects of firm size and bid-ask bounce. Our results indicate that aggregate mutual fund flows have a negative impact on short-term momentum profit. In particular, we find that aggregate mutual fund flows have a significantly positive impact on loser stocks in holding-period month 1. After holding-period month 1, the persistence of aggregate mutual fund flows decreases from significant to insignificant over holding-period months 3 to 12. Furthermore, as argued by Brown and Cliff (2005), investor sentiment increases with the market price, and thus leads to more prevalent overpricing in stock markets. Consistent with this argument, we show that the impact of aggregate mutual fund flows on momentum profit is stronger following an UP market state than a DOWN market state. This asymmetric impact pattern implies that retail investors who have a build-up of optimism tend to direct money to mutual funds. With such a behavioral bias of retail investors, mutual fund managers usually increase positions in their existing stock holdings. Accordingly, net inflows cause momentum profit reversal in the short-term.

To confirm this notion, we use the stock-by-stock net trading volume obtained from TWSE, which reports daily buy-and sell-initial trading volumes of each stock for larger investors, to exhibit the trading behavior of mutual funds. Our findings show that mutual fund managers relatively tend to buy loser stocks during UP market states more than during DOWN market states.

Our findings contribute to the substantial momentum literature in three aspects. First, we demonstrate that dumb money is one of sources that influences momentum profits in the stock market, and explain the insignificant momentum premium. With recent increased in the number of mutual funds, money flowing into mutual funds from retail investors accounts for a considerable proportion of the trading volume, and thus their active money flows are suitable to examine the influence of the dumb money effect on momentum profit. Secondly, our evidence provides an explanation for the cause of unstable momentum profits. Finally, our findings provide the useful suggestion for regulators to monitor the dynamic trading of mutual funds in the stock market.

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Tables and Figures
Figures

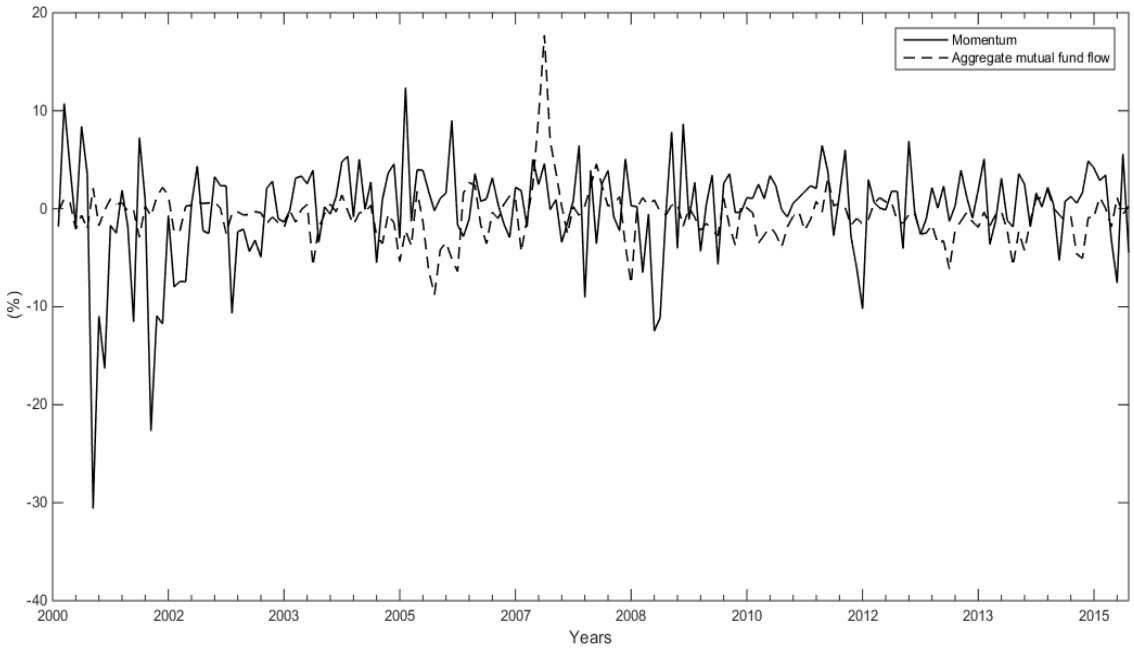

Figure 1. **Aggregate mutual fund flow and momentum profit.**
Notes: This figure plots momentum profit using the George and Hwang (2004) method for holding-period month 1. Aggregate mutual fund flow is measured in Equation (2) to capture mutual fund flows in Taiwan. The dotted line indicates aggregate mutual fund flow, and the solid line indicates momentum profit.

Tables

Table 1. **Summary statistics.**

Panel A. Descriptive statistics

	Mean (%)	Median (%)	Standard deviation	Minimum	0.1th Percentile	0.25th percentile	0.5th Percentile	0.75th percentile	0.95th percentile	Maximum
AGGFLOW	0.723	0.574	0.027	−8.789	−3.633	−1.894	0.574	1.446	2.328	9.425
Winner	0.132	0.345	0.014	-5.813	−1.722	−0.528	0.345	1.001	2.195	3.806
Loser	0.277	-0.368	0.024	−2.965	−1.785	−1.155	−0.368	1.089	5.068	13.471
Momentum	−0.144	0.684	0.035	−19.284	-4.478	−0.935	0.684	1.765	3.820	5.029
MKT	0.574	0.914	0.067	−19.550	−7.269	−3.307	0.914	3.756	11.018	27.504
SML	0.242	0.089	0.037	−10.883	−4.002	−1.964	0.089	2.346	6.998	10.329
HML	0.680	0.093	0.053	−15.115	−4.430	−2.006	0.093	2.274	9.101	34.465

Panel B Pairwise correlations

	AGGFLOW	Winner	Loser	Momentum	MKT	SMB
Winner	−0.566***					
	(0.000)					
Loser	0.839***	−0.923***				
	(0.000)	(0.000)				
Momentum	−0.044**	0.014	−0.030**			
	(0.005)	(0.851)	(0.007)			
MKT	−0.085	0.455***	−0.339***	0.052		
	(0.247)	(0.000)	(0.000)	(0.483)		
SMB	0.039	0.279***	−0.166**	−0.047	0.075	
	(0.594)	(0.000)	(0.024)	(0.528)	(0.307)	
HML	−0.010	0.060	−0.044	−0.039	0.185**	−0.026
	(0.893)	(0.418)	(0.551)	(0.593)	(0.012)	(0.727)

Notes: This table represents summary statistics of key monthly variables measured over the period 2000–2015. Winner represents the returns to the portfolio constructed using highest cumulative returns for the past 6 months, and Loser represents the returns to the portfolio constructed lowest cumulative returns. The momentum strategy is constructed on buying winner stocks and shorting loser stocks. Average monthly returns are over the holding-period month1. AGGFLOW is the average monthly aggregate flow of equity mutual funds. Control variables are monthly excess market returns (MKT), returns to the value strategy (HML), and returns to the size strategy (SMB). Winer, Loser, and Momentum are excess returns to the long, short, and long–short strategy return, respectively. The returns are in percentages. The t statistics are reported in parentheses and are adjusted for autocorrelation using the Newey and West (1987) method. The p-Values are listed below the correlation estimates and are shown in parentheses, where ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% level, respectively.

Table 2. **Profits from momentum strategy.**

	Raw returns			Risk-adjusted returns		
	Winner	**Loser**	**Momentum**	**Winner**	**Loser**	**Momentum**
	Panel A. Momentum profits with skip a month					
K=1	−0.007	0.195*	−0.202*	0.005	0.158*	−0.153*
	(−0.038)	(1.781)	(−1.854)	(0.025)	(1.789)	(−1.762)
K=3	0.001	0.216*	−0.215*	0.018	0.193*	−0.175*
	(0.011)	(1.880)	(−1.894)	(0.122)	(1.877)	(−1.837)
K=6	−0.007	0.226*	−0.233*	−0.007	0.226*	−0.233*
	(−0.079)	(1.778)	(−1.901)	(−0.079)	(1.778)	(−1.901)
K=12	0.017	0.193*	−0.176*	0.018	0.208*	−0.190
	(0.272)	(1.910)	(−1.858)	(0.193)	(1.957)	(−0.876)
	Panel B. Momentum profits					
K=1	0.130	0.266**	−0.136	0.155	0.234	−0.079
	(0.729)	(2.055)	(−0.355)	(0.873)	(0.844)	(−0.188)
K=3	0.132	0.277**	−0.144	0.167	0.262	−0.095
	(1.272)	(2.074)	(−0.565)	(1.585)	(1.021)	(−0.277)
K=6	0.120*	0.284**	−0.164	0.138	0.295	−0.157
	(1.659)	(2.087)	(−1.812)	(1.060)	(1.245)	(−0.447)
K=12	0.127**	0.244**	−0.117	0.134**	0.263*	−0.128
	(2.150)	(2.022)	(−0.727)	(1.980)	(1.714)	(−0.584)

Notes: This table presents average monthly returns and alphas in percentages for momentum strategies involving all common stocks listed on the TWSE for the time period Jan 2000–Dec. 2015. We use cross-sectional regressions of the following form estimated for (6, 6) strategies:

$R_{i,t} = b_{0,j,t} + b_{1,j,t}R_{i,t-1} + b_{2,j,t}Size_{i,t-1} + b_{3,j,t}JH_{i,t-j} + b_{4,j,t}JL_{i,t-j} + \varepsilon_{i,t}$,

where $JH_{i,t-j}$ equals one if stock i's past performance over the 6-month period (t – j – 6, t – j) is in the top 30% when measured by JT's performance criterion, and is zero otherwise; $JL_{i,t-j}$ equals one if stock i's past performance over the period (t – j – 6, t – j) is in the bottom 30% when measured by JT's performance criterion, and is zero otherwise. The coefficient estimates of a given independent variable are averaged over j = 1, . . . ,6 for (6, 6) strategies, and K indicates holding-period months. An inflow month is one in the top 30% for the sample period, and an outflow month is one in the bottom 30% for the sample period. The numbers reported for the raw returns in the tables are the time-series averages of these averages, and risk-adjusted returns are obtained from the time-series regressions of each of the individual monthly coefficient estimates on the contemporaneous Fama–French factors. The t-statistics (in parentheses) are calculated from the times series and adjusted for autocorrelation using the Newey and West (1987) method. $*$, $**$, and $***$ represent significance at the 10%, 5%, and 1% level, respectively.

Table 3. **Aggregate mutual fund flows and momentum profit.**

		K=1	K=3	K=6	K=12
Panel A. Raw returns					
	Winner	−0.170	−0.082	−0.057	−0.139
		(−1.194)	(−0.366)	(−0.325)	(−0.915)
Inflows	Loser	0.351*	0.273	0.495	0.632*
		(1.656)	(1.362)	(1.556)	(1.952)
	Momentum	−0.521*	−0.355*	−0.552*	−0.771*
		(−1.706)	(−1.650)	(−1.758)	(−1.917)
	Winner	0.207*	0.104	0.065	0.228
		(1.866)	(0.450)	(0.328)	(1.521)
Outflows	Loser	−0.097	0.011	-0.023	-0.021
		(−1.270)	(0.032)	-(0.072)	(−0.077)
	Momentum	0.304	0.093	0.088	0.249
		(1.554)	(0.182)	(0.191)	(0.623)
Panel B. Risk-adjusted returns					
	Winner	−0.134	−0.075	−0.039	−0.156
		(−1.536)	(−0.315)	(−0.197)	(−1.027)
Inflows	Loser	0.350*	0.267*	0.465**	0.644**
		(1.886)	(1.653)	(1.966)	(2.016)
	Momentum	−0.483*	−0.342*	−0.504**	−0.799**
		(−1.960)	(−1.850)	(−1.987)	(−2.075)
	Winner	0.238*	0.167	0.083	0.278**
		(1.878)	(0.783)	(0.418)	(2.015)
Outflows	Loser	−0.185*	−0.017	0.027	−0.039
		(−1.754)	(−0.050)	(0.084)	(−0.154)
	Momentum	0.423*	0.184	0.056	0.317
		(1.783)	(0.384)	(0.119)	(0.875)

Notes: This table presents average monthly returns and alphas in percentages for momentum strategies during inflow and outflow periods, which involve all common stocks listed on the TWSE for the time period Jan 2000–Dec. 2015. We use cross-sectional regressions of the following form are estimated for (6, 6) strategies:
$R_{i,t} = b_{0,j,t} + b_{1,j,t}R_{i,t-1} + b_{2,j,t}Size_{i,t-1} + b_{3,j,t}JH_{i,t-j} + b_{4,j,t}JL_{i,t-j} + \varepsilon_{i,t}$,
where $JH_{i,t-j}$ equals one if stock *i*'s past performance over the 6-month period (t – *j* – 6, t – *j*) is in the top 30% when measured by JT's performance criterion, and is zero otherwise; $JL_{i,t-j}$ equals one if stock *i*'s past performance over the period (t – *j* – 6, t – *j*) is in the bottom 30% when measured by JT's performance criterion, and is zero otherwise. The coefficient estimates of a given independent variable are averaged over *j* = 1, . . . ,6 for (6, 6) strategies, and K indicates holding-period months. An inflows month is one in which the top 30% for the sample period, and outflow month is one in which the bottom 30% for the sample period. The numbers reported for the raw returns in the tables are the time-series averages of these averages and risk-adjusted returns are obtained from the time-series regressions of each of the individual monthly coefficient estimates on the contemporaneous Fama–French factors. The t-statistics (in parentheses) are calculated from the times series and adjusted for autocorrelation using the Newey and West (1987) method. ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% level, respectively.

Table 4. **Aggregate mutual fund flows and momentum profit.**

	K=1			K=3			K=6			K=12		
	Winner	**Loser**	**Momentum**	**Winner**	**Loser**	**Momentum**	**Winner**	**Loser**	**Momentum**	**Winner**	**Loser**	**Momentum**
Panel A. Regression model												
Intercept	0.001	0.003	−0.002	0.001	0.003	−0.002	0.001	0.003	−0.002	0.001	0.003	−0.002
	(0.510)	(0.992)	(−0.490)	(0.579)	(0.992)	(−0.490)	(0.608)	(1.071)	(−0.589)	(0.682)	(1.286)	(−0.587)
AGGFLOW	−0.041	0.287**	−0.327**	−0.052	0.087	−0.139*	−0.044	0.047	−0.091	−0.054	0.068	−0.122
	(−0.507)	(2.041)	(−2.083)	(−1.321)	(1.513)	(−1.648)	(−1.624)	(0.737)	(−1.232)	(−1.360)	(1.429)	(−1.607)
Panel B. Regression Model Including risk factors												
Intercept	0.001	0.003	−0.002	0.001	0.003	−0.002	0.001	0.003	−0.002	0.001	0.003	−0.002
	(0.551)	(0.971)	(−0.404)	(0.825)	(0.971)	(−0.404)	(0.892)	(1.531)	(−0.661)	(1.371)	(1.939)	(−0.993)
AGGFLOW	−0.035	0.209**	−0.243**	−0.053	0.072	−0.125	−0.050*	0.050	−0.099	−0.059	0.073	−0.131
	(−0.443)	(2.026)	(−1.967)	(−1.290)	(1.364)	(−1.570)	(−1.938)	(0.868)	(−1.388)	(−1.370)	(1.582)	(−1.621)
MKT	−0.031	0.083*	−0.094	−0.010	0.083	−0.094	0.010	−0.011	0.021	0.016	−0.032	0.048
	(−0.689)	(1.881)	(−1.365)	(−0.412)	(1.881)	(−1.365)	(0.461)	(−0.261)	(0.335)	(1.018)	(−1.108)	(1.126)
HML	0.029	0.066	−0.079	−0.013	0.066	−0.079	−0.014	0.004	−0.018	−0.015	−0.005	−0.010
	(0.496)	(1.180)	(−0.934)	(−0.374)	(1.180)	(−0.934)	(−0.616)	(0.091)	(−0.277)	(−0.777)	(− 0.136)	(−0.166)
SMB	0.003	−0.011	−0.006	−0.017	−0.011	−0.006	−0.036	0.017	−0.052	−0.017	0.003	−0.020
	(0.051)	(−0.217)	(−0.072)	(−0.546)	(−0.217)	(−0.072)	(−1.552)	(0.394)	(−0.819)	(−1.148)	(0.095)	(−0.446)

Notes: This table reports estimates of b in the time series regression in which the dependent variable is the monthly Winner (Loser) or winner minus loser (momentum) return series, in which excess returns are calculated by the George and Hwang (2004) method. Regressions of the following form are estimated for stocks listed on the Taiwan exchange market: $b_{3,kt} - b_{4,kt} = \alpha + \mathrm{c}_1 AGGFLOW_t + \varepsilon_t$ and $b_{3,kt} - b_{4,kt} = \alpha + \mathrm{c}_1 AGGFLOW_t + c_2 MKT_t + c_3 SMB_t + c_4 HML_t + \varepsilon_t$, respectively. Winner (Loser) stock i defines past performance over the 6-month period for which (t – j – 6, t – j) is in the top (bottom) 30%. The independent variables are aggregate mutual fund flows (AGGFLOW), excess market return (MKT), returns to value strategy (HML), and returns to the size strategy (SMB). K indicates the holding-period months. The t-statistics (in parentheses) are calculated from the times series and adjusted for autocorrelation using the Newey and West (1987) method. $*$, $**$, and $***$ represent significance at the 10%, 5%, and 1% level, respective Investigating how aggregate mutual fund flows affect long and short positions respectively conditioned on an UP market state, it is found that aggregate mutual fund flows show a significantly positive impact on loser stocks and a negative impact on winner stocks in holding-period month 1, conditioned on an UP market state. After controlling for risk factors, however, it is found that aggregate mutual fund flows can only influence returns with loser stocks in holding-period month 1.

Table 5. **Aggregate mutual fund flows and momentum profit conditional on market states.**

	K=1			K=3			K=6			K=12		
	Winner	**Loser**	**Momentum**	**Winner**	**Loser**	**Momentum**	**Winner**	**Loser**	**Momentum**	**Winner**	**Loser**	**Momentum**
Panel A. Regression model												
DOWN	0.005**	−0.007***	0.012***	0.004***	−0.006***	0.010***	0.004***	−0.005***	0.008***	0.003**	−0.003**	0.006**
	(2.231)	(−3.514)	(3.671)	(3.887)	(−4.457)	(5.241)	(3.502)	(−3.580)	(4.436)	(3.137)	(−2.330)	(2.906)
UP	−0.006	0.020**	−0.025**	−0.004	0.018**	−0.023**	−0.004	0.016**	−0.020*	−0.003	0.013*	−0.016
	(−1.564)	(2.799)	(−2.487)	(−1.529)	(3.042)	(−2.607)	(−1.223)	(2.320)	(−1.941)	(−0.992)	(1.684)	(−1.472)
AGGFLOW	0.010	−0.066	0.076	−0.037	−0.021	−0.017	−0.040	0.032	−0.072**	−0.038**	0.049	−0.087**
×DOWN	(0.144)	(−1.294)	(1.010)	(−1.374)	(−0.619)	(−0.423)	(−1.619)	(0.858)	(−1.993)	(−2.237)	(1.497)	(−2.182)
AGGFLOW	−0.307*	0.438*	−0.745**	−0.124	0.267	−0.391	−0.059	0.110	−0.169	−0.150	0.194	−0.344
×UP	(−1.787)	(1.866)	(−2.058)	(−1.054)	(1.582)	(−1.594)	(−0.439)	(0.656)	(−0.572)	(−1.614)	(1.456)	(−1.564)
Panel B. Regression model including risk factors												
DOWN	0.005**	−0.008***	0.013***	0.004***	−0.007***	0.011***	0.004***	−0.005***	0.009***	0.003***	−0.003**	0.006**
	(2.169)	(−3.673)	(3.319)	(4.062)	(−4.615)	(5.280)	(3.765)	(−3.567)	(4.475)	(3.283)	(−2.231)	(2.912)
UP	−0.006	0.018***	−0.023**	−0.004	0.018**	−0.022**	−0.004	0.016**	−0.020**	−0.004	0.013*	−0.017
	(−1.604)	(3.611)	(−2.990)	(−1.598)	(3.018)	(−2.620)	(−1.369)	(2.375)	(−2.058)	(−1.131)	(1.805)	(−1.598)
AGGFLOW	0.008	−0.067	0.076	−0.036	−0.020	−0.016	−0.038	0.030	−0.068*	−0.035**	0.047	−0.082**
×DOWN	(0.115)	(−0.912)	(0.585)	(−1.272)	(−0.477)	(−0.292)	(−1.472)	(0.822)	(−1.856)	(−2.328)	(1.445)	(−2.119)
AGGFLOW	−0.274	0.374*	−0.647*	−0.141	0.229	−0.370	−0.115	0.147	−0.262	−0.211	0.253	0.463
×UP	(−1.614)	(1.801)	(−1.956)	(−1.033)	(1.401)	(−1.313)	(−0.801)	(0.863)	(−0.851)	(−1.582)	(1.590)	(−1.637)
MKT	−0.022	0.205***	−0.228**	−0.007	0.075*	−0.082	0.013	−0.015	0.028	0.022**	−0.040**	0.062**
	(−0.533)	(3.535)	(−2.364)	(−0.255)	(1.783)	(−1.178)	(0.658)	(−0.508)	(0.574)	(3.017)	(−2.882)	(3.202)
HML	0.016	0.242***	−0.225*	−0.016	0.074*	−0.090	−0.017	0.008	−0.026	−0.024	0.004	−0.027
	(0.292)	(3.422)	(−1.908)	(−0.463)	(1.869)	(−1.327)	(−1.045)	(0.312)	(−0.650)	(−1.468)	(0.179)	(−0.811)
SMB	−0.006	0.003	−0.009	−0.020	−0.005	−0.015	−0.037*	0.019	−0.056	−0.022*	0.008	−0.030
	(−0.118)	(0.061)	(−0.094)	(−0.814)	(−0.156)	(−0.253)	(−1.708)	(0.889)	(−1.365)	(−1.667)	(0.611)	(−1.153)

Notes: The table reports estimates of b in the time series regression in which the dependent variable is the monthly Winner (Loser) or winner minus loser (momentum) return series, where excess returns are calculated by the George and Hwang (2004) method. Regressions of the following form are estimated for stocks listed on Taiwan exchange market: $b_{3,kt} - b_{4,kt} = \alpha_{DOWN} + \alpha_{UP} + c_1 AGGFLOW_t \times D_{DOWN} + c_2 AGGFLOW_t \times D_{UP} + \varepsilon_t$,and $b_{3,kt} - b_{4,kt} = \alpha_{DOWN} + \alpha_{UP} + c_1 AGGFLOW_t \times D_{DOWN} + c_2 AGGFLOW_t \times D_{UP} + c_3 MKT_t + c_4 SMB_t + c_5 HML_t + \varepsilon_t$, respectively. Here, $b_{3,kt} - b_{4,kt}$ indicates momentum profit, which is the difference between winner and loser portfolios by using the George and Hwang (2004) model. D_{UP} and D_{DOWN} are dummy variables, where D_{UP} equal 1 for UP market state and D_{DOWN} for DOWN market state. The interaction term $\mathrm{AGG}FLOW_t \times D_{UP}$ is the aggregate mutual fund flows conditional on an UP market state and $\mathrm{AGG}FLOW_t \times D_{DOWN}$ is aggregate mutual fund flows conditional on a DOWN market state. Winner (Loser) stock *i* defines past performance over the 6-month period (t – *j* – 6, t – *j*) being in the top (bottom) 30%. The independent variables are aggregate mutual fund flows (AGGFLOW), excess market return (MKT), returns to value strategy (HML), and returns to the size strategy (SMB). K indicates holding-period months. DOWN (UP) indicates the intercept for a DOWN (UP) market state. The t-statistics (in parentheses) are calculated from the times series and adjusted for autocorrelation using the Newey and West (1987) method. ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% level, respectively.

Table 6. **Net trading volumes from large investors on momentum portfolios.**

		Formation-period month							Holding-period month				
		−6	−5	−4	−3	−2	−1	1	2	3	4	5	6
Panel A. UP market state													
Foreign Investors	Winner	3.307	5.123	5.361	5.732	7.042	5.751	1.786	1.267	2.223	−0.271	−0.049	−0.475
	Loser	−1.008	1.029	1.448	1.806	1.575	1.342	−3.152	−4.815	−5.348	−5.288	−4.514	−4.169
Mutual Funds	Winner	−4.181	−6.866	−6.786	−8.403	−9.518	−12.215	−7.658	−2.485	−0.405	−0.683	0.329	1.142
	Loser	−6.059	−7.328	−6.876	−6.719	−5.894	−5.577	−1.970	−1.825	−1.884	−2.206	−2.450	−2.771
Dealers	Winner	−0.833	−0.706	−0.761	−1.012	−1.080	−1.227	−2.107	−2.433	−2.383	−2.433	−2.510	−2.386
	Loser	−2.255	−2.304	−2.388	−2.378	−2.309	−2.268	−1.550	−1.706	−1.862	−1.912	−2.124	−2.017
Panel B. DOWN market state													
Foreign Investors	Winner	3.307	5.123	5.361	5.732	7.042	5.751	1.786	1.267	2.223	−0.271	−0.049	−0.475
	Loser	−4.181	−6.866	−6.786	−8.403	−9.518	−12.215	−7.658	−2.485	−0.405	−0.683	0.329	1.142
Mutual Funds	Winner	−0.823	0.556	0.456	−0.157	−0.344	−0.797	−5.001	−6.700	−7.133	−7.525	−7.710	−7.653
	Loser	−7.899	−8.954	−9.186	−8.961	−9.127	−8.843	−5.209	−3.793	−3.850	−3.593	−3.762	−3.868
Dealers	Winner	−1.257	−1.391	−1.566	−1.514	−1.529	−1.624	−1.648	−1.250	−1.192	−1.147	−1.014	−1.364
	Loser	−2.371	−2.541	−2.161	−2.033	−1.683	−1.528	−1.302	−0.940	−1.154	−1.123	−0.880	−1.017
Panel C. UP−DOWN													
Foreign Investors	Winner	4.948	6.225*	7.876**	8.041**	6.814*	9.281**	8.641**	3.824	0.453	2.173	1.614	1.365
		(1.605)	(1.909)	(2.298)	(2.314)	(1.920)	(2.743)	(2.894)	(1.339)	(0.153)	(0.707)	(0.511)	(0.418)
	Loser	4.744*	4.328*	2.592	3.097	3.345	6.686**	−1.849	−1.885	−1.785	−2.237 *	−3.197**	−3.483**
		(1.867)	(1.726)	(1.011)	(1.163)	(1.191)	(2.347)	(−1.565)	(−1.421)	(−1.347)	(−1.691)	(−2.481)	(−2.847)
Mutual Funds	Winner	0.184	−0.473	−0.992	−1.963**	−1.920**	−2.139**	−0.459	−1.182**	−1.191**	−1.287**	−1.497**	−1.022*
		(0.263)	(−0.706)	(−1.285)	(−2.656)	(−2.332)	(−2.454)	(−0.848)	(−2.206)	(−2.267)	(−2.412)	(−2.811)	(−1.849)
	Loser	−1.840*	−1.625*	−2.310**	−2.242**	−3.232**	−3.266**	6.744***	3.429**	1.818**	3.647**	2.212**	1.830**
		(−1. 903)	(−1.892)	(−2.180)	(−2.056)	(−2.346)	(−2.458)	(3.465)	(2.236)	(1.966)	(2.320)	(2.019)	(1.982)
Dealers	Winner	0.424	0.686*	0.805*	0.502	0.449	0.397	−2.438**	−1.823**	−2.025**	−1.709**	−1.556**	−1.418*
		(1.071)	(1.724)	(1.908)	(1.146)	(1.065)	(0.919)	(−2.657)	(−2.506)	(−2.885)	(−2.500)	(−2.153)	(−1.881)
	Loser	0.116	0.237	−0.227	−0.344	−0.626	−0.740*	−0.249	−0.766*	−0.708*	−0.789*	−1.244**	−1.000**
		(0.236)	(0.474)	(−0.473)	(−0.737)	(−1.414)	(−1.724)	(−0.634)	(−1.900)	(−1.672)	(−1.930)	(−3.150)	(−2.667)

Notes: This table resents average monthly net trading volumes in percentages for each stock in each formation- and holding-period month, for the loser and winner momentum portfolios. The sample period is 2008–2016. The measurement of monthly net trading volumes is calculated as the sum of daily volume divided by the number of shares outstanding and the difference between buy- and sell-initiated trading volumes for each stock in a month. Dealers indicates dealers' proprietary accounts. Foreign investors are defined by the Regulations Governing Investment in Securities by Overseas Chinese and Foreign Nationals as well as the Regulations Governing Securities Investment and Futures Trading in Taiwan by Mainland Area Investors. Net trading volume is the difference between buy- and sell-initiated trading volumes from larger investors. UP−DOWN indicates the difference between UP and DOWN-market states. The t statistics are reported in parentheses. ∗, ∗∗, and ∗∗∗ represent significance at the 10%, 5%, and 1% level, respectively.