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The Study on the Relationship between Momentum Profits and Psychological Factors: Evidence from Taiwan

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***Abstract*—**This study provides insight into the effects of investor sentiment, excess optimism, overconfidence, the disposition effect, and herding formation on momentum profits. This study contributes to the field by providing a further examination of the relationship between psychological factors and momentum profits. The empirical results show that there is no evidence of significant momentum profits in Taiwan's stock market. Additionally, investor sentiment in Taiwan's stock market significantly influences its momentum profits.

***Keywords*—**Momentum profits, psychological factors, herding formation, investor sentiment.

I. Introduction

INVESTIGATING investment strategy performance is a topic attracting research interest. Earlier studies such as Jegadeesh and Titman [1], Chan et al. [2], and Asness et al. [3] studied the predictability of stock returns and investment strategy performance and discovered that in addition to the tendency of stock prices to show short-term continuations, adopting momentum strategies for short-term investments can achieve substantially higher risk-adjusted excess returns, or momentum profits. Momentum profits are earned from momentum strategies: purchasing stocks that have a recently high-performing share prices (recent winners) and short selling stocks that are under-performing (recent losers). However, earlier studies reached inconsistent conclusions in terms of the sources of momentum profits and factors that affect the performance of momentum strategies. Jegadeesh and Titman [1] argued that investors under reaction to information shocks is the major cause of momentum profits. Chordia and Shivakumar [4] found that business cycles and macroeconomic factors can affect the performance of momentum strategies. Chui et al. [5] claimed that collectivist cultures, such as those among in East Asian countries, lead to higher momentum profits compared to European and American countries, which emphasize an individualist culture. Galariots et al. [6] believed that changes in investor sentiment influences momentum profits. Mao and Wei [7] pointed out that the market's slow reaction towards information about companies' cash flow drives momentum profits. Bohl et al. [8] discovered that market cycles dominate the performance of momentum strategies, and momentum strategies seem to perform better in bear markets.

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From a behavioral finance perspective, momentum profits may contribute to the irrational behavior of investors or investors' psychological factors. Behavioral psychology argues that people tend to make mistakes through behavioral pitfalls, which could be one possible factor influencing investors' trading decisions and momentum profits. Daniel et al. [9] revealed that behavioral pitfalls, such as overconfidence and the investors' self-contribution bias, can create a situation where stock prices fail to convey accurate information. Vallelado et al. [10] pointed out that the interaction among investors' cognitive biases towards certain information, and the availability of financial information, can affect their decisions. Hsu and Chow [11] found that the house money effect tends to dominate retail investors' risk-taking behaviors in the Taiwanese stock market. Chang and Lin [12] claimed that behavioral pitfalls have a noticeable influence on investors' trading activities and stock price performance. Cremers and Pareek [13] discovered that the tendency toward over confidence significantly affects investors' trading behavior and, therefore, momentum profits. Chang et al. [14] pointed out that investors are quite slow to learn how to correct behavioral pitfalls, which also tend to have a continuous impact on investors' behavior. These studies argued that investors' innate disposition to make mistakes is likely to dominate their investment decisions, and thus affect share price performance and investors' trading activities. Moreover, behavioral pitfalls have rather slow learning and correction processes, and continuously affect investment results. In other words, past research seems to imply the necessity to investigate the relationship between investors' behavioral pitfalls and momentum profits from the view that behavioral pitfalls affect the future trend of share prices.

In addition to the major impacts of behavioral pitfalls on investors' decisions, previous studies also found that investor sentiment plays an important role in the behavioral pattern of decision-making. Brown and Cliff [15] claimed that investor sentiment has a high degree of predictive power in short-term stock returns. Schmeling [16] showed that when investors have more obvious tendencies toward herding behavior or to overreact to a situation, investor sentiment tends to have a greater influence on stock returns. Kumar et al. [17] discovered a close relationship between trading behavior and retail investor sentiment. Danbolt et al. [18] concluded that the level of bidder announcement abnormal returns is influenced by investor sentiment. Yang et al. [19] found that changes in investor sentiment are likely to cause the herding behavior in

the Taiwanese options market. In summary, past studies found an apparent impact of investor sentiment on their behaviors, decisions, and share price performance. However, few prior studies examined the interaction between investor sentiment and momentum profits. Therefore, exploring whether investor sentiment is a key influential element in momentum strategy performance will contribute more knowledge to the study of momentum profits.

Since investor behavior affects share price performance and influences momentum profits, the processes of the psychological factors that govern investor behavior, there is likely to be an impact on momentum profits if investors show herding behavior throughout the process. On that account, investors' trading activities and investment decision-making processes affect share prices. Additionally, when the majority of investors adopt the same or similar investment decisions, the share price of a stock that is bought or sold by these investors is likely to fluctuate greatly. Based on these arguments, when most investors show unplanned herding behavior by cluster buying or selling the same stock during a certain period, there will likely be an effect on share price performance and investors' trading activities during the same period. Chang [20] suggested that herding behavior is a potential destabilizing factor that leads to out-of-control of prices. Venezia et al. [21] discovered that retail investors' herding behavior is the primary cause of share price volatility. Chang and Lin [12] believed that investors' herding tendency affects their trading behaviors and investment decisions. When herding behavior directly affects share price performance and investors' trading activities, we may reasonably infer that herding behavior may indirectly affect momentum profits. For example, notable herding behavior among investors who buy or sell certain stocks during the same period could lead to a continued rise or decline of the share prices of these stocks in the short term, and thus create more apparent momentum profits. Grinblatt et al. [22], Choi and Sias [23], Yan et al. [24], and Demirer et al. [25] demonstrated that herding behavior and the performance of momentum strategies have significant interdependence. Therefore, investigating whether herding formations of investors in Taiwan's stock market can result in significant momentum profits, and exploring the relationship between herding formations and momentum profits should extend the coverage of research in this area.

This study investigates the relationship between momentum profits and psychological factors in the Taiwanese stock market. Compared to earlier studies, this study is unique in that it offers an extensive investigation of the relationship between psychological factors and profits earned through momentum strategies.

II. Data and Methodologies

A. Research Period and Data Sources

This study investigates whether excessive optimism, overconfidence, the disposition effect, herding formation, and investor sentiment affect momentum profits on the Taiwanese stock market. The research period was from March 1993 to January 2015 and uses monthly data from the stock market.

This study extracted statistics from Datastream database for the empirical analyses, including monthly returns on market index, returns on individual stocks, closing prices of the market index, closing prices of individual stocks, market trading volumes, individual stock trading volumes, price-earnings ratio of the market, price-earnings ratio of individual stocks, turnover rates of the market, turnover rates of individual stocks, price-book ratio of the market, and price-book ratio of individual stocks.

B. Method of Investigating Momentum Profits

This study adopts the methods proposed by Asness et al. [3] and calculated the momentum profits of Taiwan's stock market from March 1993 to January 2015. Specifically, given that Jegadeesh and Titman [1], Fama and French [26], and Asness et al. [3] pointed out that the returns from the most recent month tend to reverse due to liquidity or market microstructures, we refer to the methods of Asness et al. [3] to calculate the momentum profits in month t. First, we omitted the returns of the most recent months and calculated the cumulative raw returns of listed stocks from month t-12 to month t-2. Next, we ranked the stocks based on calculated cumulative raw returns, in descending order, and defined the top 30% of stocks as recent winners, the bottom 30% of stocks as recent losers, and middle 40% of stocks as "others." Then, we calculated the value-weighted raw excess returns in month *t* across all recent winners (Win_t) and the value-weighted raw excess returns in month *t* across all recent losers (Los_t) (the raw excess returns in month *t* equal the raw returns in month *t* less the returns on the 30-day Treasury bills in month *t*). Finally, the momentum profits in month *t* (Mom_t) were calculated by deducting the value-weighted raw excess returns of the recent losers in month *t* from the value-weighted raw excess returns of the recent winner in month *t*, or $Mom_t = Win_t - Los_t$. Moreover, we also calculated average monthly momentum profits in Taiwan's stock market during the research period.

C. Method of Investigating Herding Formation

Similar to most previous studies of herding behavior (e.g., Chiang and Zheng [27]; Chang [28]; Chang and Lin [12]), this study also adopted the cross-sectional standard deviation (CSSD) of Christie and Huang [29] and the cross-sectional absolute deviation (CSAD) of Chang et al. [30] to examine investors' herding behavior in the Taiwanese stock market. Moreover, referring to the Chiang and Zheng's [27] suggestion, we defined CSSD and CSAD as indicators of investors' herding formation. The detailed description is as:

$$CSSD_t = \sqrt{\sum_{i=1}^{n} (R_{i,t} - R_{m,t})^2 \Big/ (n-1)}, \quad (1)$$

$$CSAD_t = \frac{1}{n} \sum_{i=1}^{n} \left| R_{i,t} - R_{m,t} \right|, \quad (2)$$

where $CSSD_t$ is the CSSD of Taiwan's stock market in month *t* and $CSAD_t$ is the CSAD of Taiwan's stock market in month *t*; $R_{i,t}$ is the returns on stock *i* in month *t*, $R_{m,t}$ is the returns on market index in month *t*; and *n* is the number of the sample stocks.

D.Proxies of Investors' Behavioral Pitfalls

Past studies, such as that by Chui et al. [5], found that more obvious investors' behavioral pitfalls, such as excessive optimism, overconfidence, and the self-contribution bias, tend to yield higher momentum profits in national stock markets. Chang [28] explained that the disposition effect tends to influence investors' trading decisions. Since there seems to be a significant interaction between investors' behavioral pitfalls and momentum profits in the Taiwanese stock market, this study introduced the proxies of behavioral pitfalls from Chang [28], Chang and Lin [12], and Chang et al. [14] to investigate the interdependence of three common behavioral pitfalls in behavioral finance and momentum profits. The proxies of the three behavioral pitfalls are as follows:

(1) Excessive optimism: excessive optimism refers to investors' optimistic expectations of a good outcome in the future. In other words, they believe that the probability of a favorable outcome is higher than the probability of unfavorable outcomes. Therefore, when investors assume that the probability of a favorable outcome (increased share price) is quite high, even if the actual price of the stock has dropped in the current month, the price-book ratio of the stock is still relatively high. Hence, we used average price-book ratio for the stocks with a decreasing price throughout the month to measure investors' excessive optimism. Specifically, we adopted PB_t^- as the proxy of investors' excessive optimism in month *t*. Where $PB_t^- = \sum_{j=1}^{k} PB_{j,t}^- / k$, $PB_{j,t}^- = pb_{j,t}^- / (\sum_{z=1}^{q} pb_{z,t} / q)$, $pb_{j,t}^-$ refers to the price-book ratio of the dropping stock *j* in month *t*, $pb_{z,t}$ refers to the price-book ratio of stock *z* in month *t*, *q* is the number of observations in the study, and *k* is the number of stocks that have decreased in price in month *t*. It is worth noting that in order to reduce the influence of differences among companies, we adopted $PB_{j,t}^-$ instead of $pb_{j,t}^-$.

(2) Overconfidence: overconfidence refers to a tendency for investors to maintain too much confidence in their abilities, and beliefs in their abilities to achieve above-average results. In other words, their perceived likelihood of making a mistake is less than the actual chance of making a mistake. Thus, when investors are overly confident in their abilities, they are not willing to sell stocks with declining prices, leading to a low trading volume in these stocks. Hence, we used the average trading volume of the stocks with decreasing prices in the month to measure investor overconfidence. Specifically, we used V_t^- to represent investor overconfidence in month *t*. Where $V_t^- = \sum_{j=1}^{k} V_{j,t}^- / k$, $V_{j,t}^- = v_{j,t}^- / (\sum_{z=1}^{q} v_{z,t} / q)$, $v_{j,t}^-$ refers to the trading volume of declining stock *j* in month *t*, and $v_{z,t}$ refers to the trading volume of stock z in month *t*. Similar to method used to measure investors' excessive optimism, we adopted $V_{j,t}^-$ instead of $v_{j,t}^-$ to reduce the influence of differences among companies.

(3) Disposition effect: disposition effect refers to the violation of rational behavior, in this case, investors' behavior, in handling winning or losing stocks. Specifically, when investors sell winning stocks too early or hold on to losing stocks too long. When investors show the disposition effect, there seems to be a noticeable deference in their willingness to sell recent winners (stocks with a recent price increase) and recent losers (stocks with a recent price decline). Therefore, we used the average trading volume of stocks that increased in price in the current month divided by the average trading volume of stocks that decreased in price in the current month to measure the degree of the disposition effect. Specifically, we used (V_t^+ / V_t^-) to represent the disposition effect for investors in month *t*. Where $V_t^+ = \sum_{j=1}^{h} V_{j,t}^+ / h$, $V_{j,t}^+ = v_{j,t}^+ / (\sum_{z=1}^{q} v_{z,t} / q)$, $v_{j,t}^+$ refers to the trading volume of the stock *j* with the price increase in month *t*, *h* refers to the number of stocks that increased in price in month *t*. Similar to the methods described above, we adopted $V_{j,t}^+$ instead of $v_{j,t}^+$ to reduce the effects of differences among companies.

E. Proxies of Investor Sentiment

This study mainly used the proxies adopted by Chang *et al.* [14] to measure investor sentiment, including turnover rate ($TURN_t$ represents the turnover rate in month *t*), price-earnings ratio (PE_t signifies the price-earnings ratio in month *t*), price-book ratio (PB_t indicates the price-book ratio in month *t*), the returns of market index of the previous month ($R_{m,t-1}$ is the returns of market index in month *t-1*), and trading volume (V_t refers to the trading volume in month *t*).

F. Method of Investigating the Relationship between Psychological Factors and Momentum Profits

The study's empirical analysis is based on the following regression analysis model to investigate the relationship between psychological factors and momentum profits:

$$Mom_t = \alpha_0 + \alpha_1 CSSD_{t-1} + \alpha_2 CSAD_{t-1} + \varepsilon_t , \quad (3)$$

$$Mom_t = \beta_0 + \beta_1 PB_{t-1}^- + \beta_2 V_{t-1}^- + \beta_3 \left(V_{t-1}^- / V_{t-1}^+ \right) + \xi_t , \quad (4)$$

$$Mom_t = \lambda_0 + \lambda_1 TURN_{t-1}^{-} + \lambda_2 PE_{t-1} + \lambda_3 PB_{t-1} + \lambda_4 R_{t-2} + \lambda_5 V_{t-1} + \varsigma_t \,, \quad (5)$$

where $\alpha_0, \alpha_1, \alpha_2, \beta_0, \beta_1, \beta_2, \beta_3, \lambda_0, \lambda_1, \lambda_2, \lambda_3, \lambda_4$, and λ_5 are the regression coefficients, and ε_t, ξ_t, and ς_t are the residuals in month *t*.

III. Empirical Results

This study used the method of Asness et al. [3] to calculate the average monthly returns of recent winners and recent losers, and average momentum profits in Taiwan's stock market from March 1993 to January 2015. Table I presents the empirical results.

TABLE I
MOMENT PROFITS IN TAIWAN'S STOCK MARKET

Market	Recent Winners	Recent Losers	Momentum Profits
Taiwan	0.0039 (0.66)	0.0025 (0.37)	0.0014 (0.38)

Note: the numbers in parentheses are *t*-statistics.

As Table I shows, although the average monthly returns of the recent winners and losers and average momentum profits were greater than zero, the returns on momentum strategies in Taiwan's stock market were a positive and insignificant value. The results suggest that executing momentum strategies in Taiwan's stock market do not achieve better short-term investment performance. In other words, the short-term positive autocorrelation among Taiwanese stocks is not substantial, and the stock returns are unpredictable. Moreover, these results are in line with Chui et al. [5] findings.

This study used the Taiwanese stock market as its research subject and analyzed the data using (3)-(5) to clarify the influence of herding formations, investor sentiment, and behavioral pitfalls on momentum profits, respectively. Table II summarizes the related results.

TABLE II
INFLUENCE OF PSYCHOLOGICAL FACTORS ON MOMENTUM PROFITS

Market	Positive regression coefficient at the 5% level of significance	Negative regression coefficient at the 5% level of significance
Panel A: Influence of Herding Formation on Momentum Profits		
Taiwan		
Panel B: Influence of Behavioral Pitfalls on Momentum Profits		
Taiwan		
Panel C: Influence of Investor Sentiment on Momentum Profits		
Taiwan		λ_3

Note: Panels A, B, and C report the regression analysis results for (3)-(5), respectively.

Panel A in Table II shows that regardless of using CSSD or CSAD as proxies for herding formations, herding formation does not have any predictive power for momentum profits in the Taiwanese stock market. Panel B reveals that the regression coefficients of all three behavioral pitfalls did not reach statistical significance, indicating that there are no noticeable correlations between the three behavioral pitfalls (excess optimism, overconfidence, and the disposition effect) and the returns on momentum strategies. Panel C shows a statistically significant regression coefficient (λ_3) on the price-book ratio, suggesting a significant effect from investor sentiment on momentum strategy profits.

To summarize the results in Table I and II, there seems to be little or no apparent capability to generate momentum profits in the Taiwanese stock market. In addition, among the psychological factors, only investor sentiment has a clear predicative power for momentum profits. Prior studies showed that when managing stock portfolios, there is relatively little predictability for returns in the Taiwanese stock market, and adopting momentum strategies cannot improve the short-term performance of portfolios. However, investor sentiment seems to have certain degree of influence on investors' decision-making.

IV. Conclusions

This study examined momentum profits in the Taiwanese stock market from March 1993 to January 2015 considering the influence of psychological factors (herding formation, excessive optimism, overconfidence, the disposition effect, and investor sentiment). Compared to prior studies, this study is unique because it offers an extensive exploration of the relationship between various psychological factors and the returns on momentum strategies.

Our empirical results revealed insignificant returns on momentum strategies in the Taiwanese stock market and that stock returns are unpredictable. In addition, among the psychological factors, only investor sentiment had a considerable impact on momentum profits. The findings suggest that considering the influence of investors' sentiment on their decisions can improve the performance of momentum investment strategies.

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