Pacific-Basin Finance Journal 37 (2016) 1–22

Contents lists available at ScienceDirect

Pacific-Basin Finance Journal

journal homepage: www.elsevier.com/locate/pacfin

Information discreteness, price limits and earnings momentum☆

Chaonan Lin [a], Kuan-Cheng Ko [b,*], Yu-Lin Chen [b], Hsiang-Hui Chu [b]

[a] School of Management, Xiamen University, Xiamen, China
[b] Department of Banking and Finance, National Chi Nan University, Puli, Taiwan

ARTICLE INFO

Article history:
Received 19 October 2015
Received in revised form 27 January 2016
Accepted 18 February 2016
Available online 22 February 2016

JEL Classification:
G11
G12
G14

Keywords:
Information discreteness
Earnings momentum
Price limits
Limited investor attention
Taiwan stock market

ABSTRACT

The earnings momentum generates remarkably high profits in Taiwan, a market that has been widely documented to exhibit no momentum premium for conventional momentum strategies. Using the measure of information discreteness (ID) to identify the information flows of stock prices, we find that higher magnitudes of earnings surprises tend to occur in firms that attract less investor attention. Taking advantage of this observation, we confirm the prediction of the underreaction hypothesis by showing that earnings momentum profits are higher among stocks with more continuous information that is ignored by investors. Further, we propose that price limits are related to ID because they represent attention-grabbing events. We examine a modification of ID by considering the effect of price limits to explicitly isolate the continuous information from the discrete information. The evidence based on this modification provides more robust support for the underreaction hypothesis and rejects the overreaction hypothesis in explaining the profitability of the earnings momentum in Taiwan.

1. Introduction

Despite its unprofitability for conventional momentum strategies (Chui et al., 2003, 2010; Du et al., 2009a; Hameed and Kusnadi, 2002), the Taiwan stock market displays a remarkably high profit for the earnings momentum. Over the period from 1989 to 2014, this strategy constructed based on a 6-month holding horizon yields an average return of 0.946% per month. Because the momentum premium is one of the important anomalies documented in the literature, this phenomenon is intriguing and deserves further investigations to understand the nature behind this profitability.

The earnings momentum, or the post-earnings announcement drift (PEAD), is initiated by Ball and Brown's (1968) observation that stock returns continue to drift in the same direction of earnings surprises for several months after the announcements of earnings. This anomaly is commonly interpreted as the evidence of investors' underreaction to earnings surprises (Ball and Bartov, 1996; Barberis et al., 1998; Bernard and Thomas, 1989, 1990; Chan et al., 1996). Chordia and Shivakumar (2005) further attribute this underreaction to the inflation illusion hypothesis of Modigliani and Cohn (1979). They show that the PEAD arises partly from investors' underreaction to the impact of inflation on future earnings. A common feature of these studies is that

☆ We appreciate the helpful comments and suggestions from Robin K. Chou, Keng-Yu Ho, and Chih-Chiang Hsu. We are especially indebted to the anonymous referee and S. Ghon Rhee (the editor) for their valuable comments that significantly enrich the content of the paper. Chaonan Lin acknowledges the financial support from the Fundamental Research Funds for the Central Universities of China (Grant no: 20720151186). Kuan-Cheng Ko acknowledges the financial support from the Ministry of Science and Technology of Taiwan (grant number: MOST 104-2410-H-260-004-MY2).

* Corresponding author at: No. 1, Daxue Rd., Puli 54561, Taiwan.
E-mail address: kcko@ncnu.edu.tw (K.-C. Ko).

http://dx.doi.org/10.1016/j.pacfin.2016.02.003
0927-538X/

they all focus on the evidence of the U.S. market. Whether the underreaction hypothesis is applied to the earnings momentum in Taiwan is yet unclear and still remains an unsolved issue in the literature.

We propose that the investigation based on the Taiwan stock market fits into this line of research because of Taiwan's culture and the features of participants in this market. This is motivated by the evidence that investors in the Taiwan stock market are in general viewed as conservative (Wu et al., 2009) and collectivistic (Hofstede, 2001), thus they are supposed to exhibit less overconfident trading. Indeed, based on Daniel et al.'s (1998) theory of overconfidence and self-attribution biases, Chui et al. (2010) show that cross-country momentum profits are positively associated with the individualism of country. According to Hofstede (2001) and Hofstede et al. (2010), Taiwan has a low score of 17 on the individualism index, which is only higher than Indonesia and Pakistan (both are 14) among the 41 countries examined in Chui et al. (2010).[1] This evidence implies the rejection to the overreaction hypothesis and provides plausible room for the underreaction hypothesis in explaining the momentum phenomenon in Taiwan.

To test the underreaction hypothesis, it is important to identify the flow of information and justify how investors perceive and react to it. In this channel, investor attention plays a dual role in establishing the linkage between information and investors' reaction (Hou et al., 2009). On the one hand, underreaction arises because limited attention causes investors to ignore useful information. On the other hand, attention is a necessary condition for overconfidence, since investors can only overreact to a stock's information when they pay attention to it. Extending this line of research, Da et al. (2014) propose the measure of information discreteness (ID) to isolate the information flows associated with continuous information from those associated with discrete information. The ID measure is constructed based on the notion that stocks with a stream of frequent gradual changes attract less attention than those with infrequent dramatic changes. As a result, continuous information induces strong momentum profits because investors underreact to such information.

Taking these observations together, this paper contributes to the literature by providing a direct test for the underreaction hypothesis based on the ID measure to explain earnings momentum profits in Taiwan. We hypothesize that if the profitability of the earnings momentum in Taiwan is driven by investors' underreaction, it would be stronger among stocks with more continuous information that is ignored by investors.

To explore this issue, it is important to first establish the linkage between ID and standardized unexpected earnings (SUE). We find that the magnitude of SUE in absolute value is negatively correlated with ID, suggesting that extreme earnings surprises tend to occur in firms that attract less investor attention. Because low-ID stocks attract less attention, investors are more likely to underreact to their information about earnings at announcement, leading to subsequent momentum phenomenon. We verify this conjecture by showing that earnings momentum profits decrease with ID. For the 6-month holding period, the return to the earnings momentum decreases monotonically from 1.128% in the continuous information portfolio to 0.814% in the discrete information portfolio, with a significant difference of 0.314% between the two portfolios. This pattern is also robust to the risk adjustment using Fama and French's (1993) three-factor model.

In Da et al.'s (2014) model, the identification of investor attention requires a specific threshold to isolate continuous information from discrete information. They assume that signals with magnitudes below the threshold are processed with a delay by investors. As the threshold of investor attention varies over time and across stocks, it is always difficult to be explicitly identified. We propose that the Taiwan stock market serves as a natural experiment to resolve this issue because of the imposition of price limits in this market. This argument is motivated by Seasholes and Wu's (2007) evidence that price limits are attention-grabbing events. They show that when stocks hit their up limit prices, the event catches individual investors' attention and further induces them to buy those stocks they have not previously owned. During our sample period, the limit prices of individual stocks are set to be $\pm 7\%$ of the previous day's closing price. Hence up and down limit prices serve as the best candidates for the threshold in the Taiwan stock market.

Taking advantage of this notion, we develop two modified ID measures by considering the impacts of price limit events. The idea of this separation is to independently consider the continuous information that is related to underreaction and the discrete information that is related to overreaction. The former (denoted as ID_{non_hit}) is constructed by counting the relative proportions of negative and positive non-limit-hit days, while the latter (denoted as ID_{hit}) is constructed by counting the relative proportions of negative and positive limit-hit days. As ID_{non_hit} is constructed based on the information flow of non-limit-hit days only, we propose that it is a more powerful measure to capture continuous information that investors tend to underact to. The information flow related to investor overreaction, if any, would be better captured by ID_{hit}.

We show that the ID_{non_hit} measure produces higher spread of momentum profits between groups of continuous and discrete information than the standard ID measure. The earnings momentum profit based on the 6-month holding period increases monotonically from 0.776% in the high ID_{non_hit} portfolio to 1.201% in the low ID_{non_hit} portfolio, with a significant difference of 0.424% between the two portfolios. The ID_{hit} measure, however, has no discriminatory ability to distinguish the predictability of earnings surprises across stocks. This evidence not only strengthens our finding that the profitability of the earnings momentum is driven by investor underreaction but also rejects the overreaction hypothesis as the source to underpin the earnings momentum profits.

An advantage of the ID_{non_hit} measure is that its explanatory ability for the earnings momentum is less prone to other firm characteristics that have been documented to be related to momentum. We show that the relation between ID_{non_hit} and earnings momentum profits remains significant when we extract the residual information of ID_{non_hit} from the cross-sectional regression on a set of firm characteristics. The predictability of the standard ID measure on earnings momentum profits, however, is weakened when the information of other firm characteristics is excluded. This evidence suggests that the information contained in the ID_{non_hit}

[1] By construction, the value of the individualism index is restricted to be between 0 and 100. Among the 41 sample countries in Chui et al. (2010), the U.S. market exhibits the highest score of 91, followed by the Australia market with a score of 90.