State of Market and the Contrarian strategy: Evidence from China's stock market

Qiwei Chen*
Brunel University, United Kingdom

Ying Jiang**
University of Nottingham Ningbo,China

Yuan Li***
China Minzu Securities Co.Ltd.

* School of Social Sciences, Brunel University, Clevand Road, Uxbridge, UK. Tel: +44-(0) 1895 267763, Email: Qiwei.Chen@brunel.ac.uk,
** *(Corresponding author)* Nottingham University Business School China, University of Nottingham Ningbo, 199 Taikang East Road, Ningbo, P.R. China. Tel: +86-(0) 574 88180200, Email: ying.jiang@nottingham.edu.cn,
*** Asset Management Department, China Minzu Securities Co. Ltd. A-606 XinSheng Plaza, Financial Street, Xicheng District, Beijing, P.R.China. Tel:+86-(0) 10 59355922, Email: yfliy@chinans.com.cn

Abstract

Using a most comprehensive weekly dataset of 'A' shares listed on the Chinese stock market, this paper examines short-term contrarian strategies under different market states from 1995-2010. We find statistically significant profits from contrarian strategies, especially during the period after 2007, when China (along with other countries) experienced an economic downturn following the worldwide financial crisis. Our empirical evidence suggests that: (1) no significant profit is generated from either momentum or contrarian strategies in the intermediate horizon. (2) After microstructure effects are adjusted for, contrarian strategies with only one to two months holding periods based on the stocks' previous one to two months performance generate statistically significant profits of around 0.2% per week. (3) The contrarian strategy following a 'down' market generates higher profit than those following an 'up' market, suggesting that a contrarian strategy could be used as a shelter when the market is in decline. The profits following 'down' market are robust after risk adjustment.

1. Introduction

In the recent years, a large number of articles have provided substantial evidence that the return of the assets can be predicted by using historical data. The empirical evidence challenges the paradigm of the weak-form efficient market hypothesis (EMH) and questions the well-accepted capital asset pricing model, which are the two cornerstones of modern financial theory. Our focus is on two types of investment strategies that emerge from this literature: contrarian (De Bondt and Thaler 1985, 1987) and momentum (Jegadeesh and Titman, 1993) strategies. A contrarian strategy takes advantage of the negative autocorrelation of asset returns and is constructed by taking a long position in stocks which perform badly in the past and shorting stocks which perform well in the past.[1] In contrast, a momentum strategy is based on short selling past losers and buying past winners. Empirical evidence suggests that these two strategies mutually co-exist, since the contrarian strategy is supported for very short-term holding period (usually around one month) and long-term period (usually more than 36 months), while the momentum strategy is profitable in short-to-medium horizons. Subsequent studies have demonstrated that the profitability of both contrarian and momentum strategies are international (e.g., Griffin et al, 2003, Clare and Thomas, 1995, Chui et al, 2005, Hameed and Kusnadi, 2002). Although there are sufficient supportive evidence for both strategies, the source and interpretations of the profits is a subject of much debate.

The earliest and most influential evidence that there is long term reversal in the US market was provided by De Bondt and Thaler (1985, 1987). They found that when ranked by the previous cumulated returns in the past three to five years, the losers outperform the previous winners by nearly 25% in the subsequent three to five years.

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[1]Thereafter we use 'losers' and 'winners' respectively and the definitions of the portfolios are stated in the next section.

Three alternative explanations for such an outcome have been proposed. The first is a size effect, with the losers tending to be those stocks with small market value and overreaction being most significant for small firms. Zarowin (1990) and Chopra et al. (1992) examine the size effect and find that when size controlled for, the returns of the losers are reduced. They argue, however, that the efficient market hypothesis still holds for larger firms. Second, Chan (1988) and Ball and Kothari (1989) argue that time-varying risk has been neglected. Ball and Kothari (1989) find that the coefficients of the risk premia of the losers are larger than those of the winners in the period after the formation of the portfolios; therefore the differences in the returns between losers and winners can be explained by the differences in risk premium. Fama and French (1996) examine both contrarian and momentum strategies and show that while contrarian strategies can be explained by their three-factor model, their multi-factor model failed to explain momentum profits in the intermediate term. The third explanation is based on market microstructure related effects, such as bid-ask biases, illiquidity, etc. Conard and Kaul (1998) show that part of the return reversal is due to the bid-ask bounce of the price.

Momentum strategies were first reported by Jegadeesh and Titman (1993) who returned to review and evaluate the subsequent literature using out-of-sample tests Jegadeesh and Titman (2001). They find that momentum profits continue after 1990, which indicates that their original findings were not due to a data snooping bias. Indeed they suggest that the robustness of momentum returns appears to be in conflict with standard asset-pricing models and may be driven by investors' cognitive biases or under-reaction to information, such as earning announcements. Thereafter a large and growing literature has presented a variety of explanations ranging from data issues, such as microstructure and data snooping biases to rational risk-based

explanations (Conard and Kaul, 1998; Grundy and Martin, 2001), as well as to irrational behavioural stories (Barberis et al., 1998; Hong et al., 2000; Grinblatt and Han 2005, etc.).

In this paper, we investigate the profitability of the contrarian strategy in the Chinese stock market. Our work is motivated by the following issues: Firstly, there are a limited number of studies of investment strategies in the Chinese market, despite the fact that China is one of the fastest growing economies in the world. The reason for this is mainly due to both the short history of stock trading and the limited access for the global investors (Kang et al, 2002). In a recent study, Naughton et al (2008) investigate momentum strategies in the Chinese market although their study is hampered by the limited sample period which ranges from 1995 to 2005. A further consideration is that very few studies have focused on the performance of investment strategies in China for the period including the worldwide financial crunch, which starts from 2007, despite that China was the first to recover from the economic downturn (Ji, 2010).

Secondly, the Chinese stock market is unique in respect of divergences from the theory of rationality (Drew et al, 2004), the dominance of individual investors within the market (Kang et al, 2002), different regulatory environment, different trading practices and different behaviour of individual investors (Hu, 1999). It has been pointed out that due to different regulation on stock trading in China, investors may have limited investment products to choose from;[2] therefore the individual investors may behave differently compared to those in other developed countries. Hence, the Chinese stock market may be suitable for different investment strategies to those that are used in developed countries studied in the literature. Moreover, Johansson (2009)

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[2] See Hu (1999) and Kang et al (2002) for detailed background of economic reform in the early 1990s and how the socialist system related to the Chinese stock market.

argues that Chinese equity market has a low average systematic risk and stationary conditional beta when measured against the world market.

Thirdly, although Kang et al. (2002) claim that individual investors are the main composition (99%) of stock market participants, the corporate financial data available to the public is not reliable, resulting in asymmetric information in the market. Under this circumstance investors tend to trade depending on their private information or 'rumours' around the market, causing overreaction to the news and hence causing the stock price to deviate from fundamentals. This raises the possibility of short-term overreaction to information that leads to contrarian profit thereby providing motivation for the current study.

This paper contributes to the literature on the topic of investment strategies in Chinese market in several ways. The data used for this study is the most recent and comprehensive used compared to previous studies on the Chinese market. We include all 'A' shares listed on both the Shanghai stock market and the Shenzhen stock market. The data spans the period from January, 1995 to April, 2010, which covers the period before and after the 2007 financial crisis.[3]

In addition, we investigate the profitability of contrarian strategies following different market states, which to the best of our knowledge has not been studied before using Chinese date. The significance of such research is twofold: Firstly, one of the possible explanations of contrarian profits is that the investors are overconfident about their private information and overreact to it (Daniel et al. 1998). Under different market conditions, investors might overreact to the same piece of information to different extents. If the investors' under-reaction or overreaction to the information is the source of the contrarian profits, then different contrarian profits

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[3] We choose to exclude the years 1993 and 1994 from our study because of the small sample of stocks listed during those years. For example, there are only 48 stocks in the sample for year 1993 in Kang et al (2002)'s study.

across different states of the markets would be expected. Secondly, by evaluating the profits across market states, it enables us to construct different strategies following different conditions, hence to maximize investment profits. As many countries are still suffering from the 2007 financial crisis, investment strategies that can cope with the economic downturn might be highly attractive to professionals and participants.

Our results show significant short term contrarian profits with four to eight weeks holding period based on prior performance of four to eight weeks. This indicates that stock prices in Chinese market reverse during a relatively short time phase. A comparison of the contrarian profits following different market conditions offers interesting insights. Both winner and loser portfolios have positive returns following 'up' market, whereas loser portfolios outperform winner portfolios. Both winner and loser portfolios have negative returns following 'down' market, however winner portfolios lose more value than loser portfolios. In other words, no matter what the market condition during the formation period is, loser stocks outperform winner stocks. This result provides support for Kang et al.'s (2002) argument that investors in the Chinese market have limited investment choices, causing excess demand for winners to push the price too high giving rise to opportunities for contrarian profits as the prices correct. Our results also show that there are significant short term contrarian profits following 'down' markets, but not for the 'up' markets. In addition, the strategy is most profitable during the period of 2007 to 2010. This finding provides practical implications for practitioners and academics, especially for the post-crisis period (down market).

The rest of the paper is organized as follows. Section 2 presents the data and methodology employed. Section 3 discusses the empirical results together with the evaluation of the sources of contrarian profit and Section 4 concludes.

2. Data and Methodology

Data

The sample includes all 'A' shares listed in Shanghai Stock Exchange and Shenzhen Stock Exchange, including those having been delisted . The data is obtained from Wind Information Co. Ltd. and spans the period from January 4th, 1995 to April 14th 2010. We exclude the period from 1993-1994 for the reason that only limited number of stocks are traded during this period in China. At the beginning of the sample period there are 235 securities included. As securities enter and leave the stock market in the following years, 1796 securities are considered over the entire sample period.

Portfolio formation

The test for the profitability of contrarian trading strategies in this paper follows the methodology proposed by De Bondt and Thaler (1985, 1987) and Jegadeesh and Titman (1993). In this paper, an overlapping methodology is adopted. In any given month/week t, the contrarian strategy holds a set of portfolios that are selected in the current month as well as in the previous $K-1$ months/weeks. The strategy closes out the position initiated in month/week $t-K$. Hence, under this trading strategy we revise the weights on $\dfrac{1}{K}$ of the securities in the entire portfolio in any given month/week and carry over the rest from the previous month/week.

The trading strategy consists of three basic steps. First, individual stocks are ranked according to cumulative continuous returns (CCR) for each stock i on past J months/weeks of continuously compounded monthly/weekly returns in the initial portfolio formation period.

$$CCR_i = \sum_{t=1}^{J} R_{it} \tag{1}$$

where R_{it} is the logarithmic return calculated by closing price in month/week t for company i.

Second, in each month/week t, the entire set of securities is divided into ten equal deciles in descending order based on CCR_i s. The top decile and bottom decile stocks are labelled as 'winners' and 'losers' respectively. In month/week t, a loser-minus-winner portfolio is formed which shorts winner portfolio and longs loser portfolio.

The third and final step of the trading rule is to determine the profits of a loser-minus-winner portfolio:

$$\overline{R}_{loser-winner,t} = \overline{R}_{loser,t} - \overline{R}_{winner,t} \tag{2}$$

where $\overline{R}_{loser-winner,t}$ is the average return of the portfolios constructed by the method mentioned in the second step. The trading strategies are replicated for each stated period t and the mean return of the strategy for each horizon is simply the average of all the replications. If the mean return of the loser-minus-winner portfolios is significantly different from zero then the contrarian strategy is profitable. The t-statistics reported have all been adjusted for Newey-West standard error (Newey and West, 1987). For monthly data, the portfolios is formed at the end of each month based on the past cumulative returns; whereas for weekly data, the portfolios is formed on each Wednesday (if the day is a non-trading day, then the next trading day is used) to avoid the weekday seasonalities, e.g. Monday effect or Friday effect.

Market States

To analyse the effect of state of market on the contrarian trading strategy, periods need to be categorised according to appropriate description of bull or bear markets. Cooper et al. (2004) define market conditions by observing past 36 months market

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performance. In this paper, however, we find that investment strategies with short formation/holding periods (4 to 8 weeks) generate greater profits (as shown in next section). As those portfolios are rebalanced very frequently, a short-run market condition might be more appropriate for this study. Hence we modified the market states definition by Cooper et al. (2004) and define an 'up' market period as one in which the market return over three-month prior to the portfolio holding period is non-negative, and a 'down' market period as one in which market return are negative.[4] Then the profits generated by the contrarian strategy constructed just following the 'down' market and 'up' market are estimated. [5]

To test whether the mean returns of contrarian strategies is equal to zero following 'up' market and 'down' market, the time-series of contrarian returns R_{ct} are regressed on 'up' and 'down' dummy variables with no intercept.

$$R_{ct} = \beta_{UP} \times D_{UP} + \varepsilon_t \tag{3}$$

$$R_{ct} = \beta_{DOWN} \times D_{DOWN} + \varepsilon_t \tag{4}$$

where D_{UP} and D_{DOWN} are dummy variables for the 'up' market and the 'down' market respectively.

3. Empirical Results

This section evaluates the profitability of a contrarian investment strategy in the Chinese stock market during the period between January 1995 and April 2010.[6] The results are reported in four parts as follows: 1. The results of overlapping observations with monthly data; 2. The results of overlapping observations with weekly data; 3. The results of the profitability of contrarian strategy following different market states

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[4] We use return of Shanghai Composite Index to represent the market performance.
[5] We also define the market condition based on past 12 months and 24 months market performance, which is suggested in Cooper et al. (2004), the results of profitability of contrarian strategies are consistent.
[6] For monthly data the sample spans the period from January 1995 to December 2009.

and 4. The evaluation of the possible sources of the contrarian strategy profits in the Chinese market.

3.1 *Overlapping monthly observations (January 1995 to December 2009)*

Results for the conventional contrarian strategy for monthly data are reported in Table 1. It is observed that all returns of contrarian strategies are positive; suggesting that contrarian strategies are appropriate for the Chinese market. The most profitable strategy is to construct portfolios based on past three month performance and hold them for one month. This would generate an average monthly contrarian profit of 1.1% (annually 13.2%). The results of J=K=1 strategy, which produces an average monthly return of 0.818%, are comparable to those reported by Kang et al (2002). Results show that the contrarian strategy with three month holding period based on previous one month performance also generates statistically significant profit with monthly return of 0.577%. However for the portfolios with a holding period longer than 3 months produce neither contrarian nor momentum profit.[7] Although our result is different from those of Jegadeesh and Titman (1993) studying the US market, the difference could be explained by Hu (1999)'s argument that the trading practice, composition, behaviour of investors and regulatory environment in China's stock market are very different from other markets.

In addition, our results are different from previous works which studied the Chinese market in terms of that we do not find the evidence of the intermediate-term momentum profit (Naughton et al, 2008, Kang et al, 2002). We attribute this difference to the different data sources, sample sizes and sample periods. With a wider range of sample size and longer sample period, it's not surprised that our study

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[7] We also examine the cases for J=K=12,24 and the profits are not significant.

produces different results. [8]

As the monthly results show that the significant profits only exist for short formation and holding periods (less than 3 months), it suggest that a short-run contrarian strategy is appropriate for the data under study. Hence, we use weekly data to further evaluate the profitability of contrarian strategy. The following section reports the results.

3.2 *Overlapping weekly observations (January 1995 to April 2010)*

Results for contrarian strategies on weekly basis are reported in Table 2. The most profitable strategy is to short the past winners and buy the past losers based on previous one week's performance, then hold the portfolio just for one week. This strategy will generate averagely 0.67% return per week, equivalent to an annual return of 34.84%. Given the same formation period J, the profits decrease gradually as the holding periods increase. Interestingly, the profits fall when J=2, rise again when J=4, then disappear gradually for the cases when J is greater than 16, implying that the stock prices in the Chinese market reverse very quickly and a short term contrarian strategy might be the most suitable investment strategy. This finding may arise from the fact that individual investors are the majority participants in the Chinese market and most of them are interested in short-run speculation (Hu, 1999).

3.3 *Profits of contrarian strategy following different market states*

As the investors tend to be more aggressive and their behaviours are more speculative, the Chinese market is more volatile than other markets in developed countries.[9] We define the market as 'up' market if the cumulated return of the market

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[8] For example, between 1995 and 2000, there are only 268 stocks being examined in the study of Kang et al (2002), while the number of stocks included in our study for the same period is 970. Naughton et al (2008) use the data from Great China Database, which includes only 821 stocks, and the number of stocks studied in this work for the same sample period is 1322. In addition, our entire sample period is much longer than other studies.

[9] For example, the standard deviation of return series of Shanghai Composite Index is 2.2% for the time period from 1994 to 2010, while for Dow Jones and FTSE 100 index, the standard deviation of return series are 1.2%.

is positive for the past 13 weeks[10], and 'down' market is the one with negative cumulated return for the past 13 weeks.

As shown in Table 3, interestingly we find that for the contrarian strategies with same formation period and holding period, the one following 'down' market is relatively more profitable than the one following 'up' market, with exception of J=K=1 case. For instance, the strategies with 4, 8 and 12 weeks formation period, most contrarian strategies are statistically significant only following the 'down' markets, but not the 'up' market. This indicates that the significant contrarian profits reported in last section for overall market conditions are originated from the cases following 'down' market. This finding provides useful and practical implication for investment orientations under different market states. Especially during the post financial crunch period, this result may shed some light on the counter plans to cope with the economic downturn.

However, we also observe some extreme cases, e.g., when portfolios are formed based on 8 and 12 previous weeks' performance in the 'down' market, and held for the following one week, they generate returns as high as around 0.58%, which is equivalent to a massive annual return over 30%. We suspect those high profits are spurious due to microstructure effect, as discussed in the following section. In addition, rebalancing portfolio at one week frequency might not be practical in reality.

3.4 *The evaluation of the possible sources of the profits*

A. *microstructure effect*

According to Lehmann (1990) and Conrad et al (1997), short term contrarian profits maybe magnified because of the bid-ask spread and non-synchronous data. To correct the possible microstructure bias, we leave one week between the formation

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[10] This is consistent with the formation period of 3 months.

and holding periods, and re-examine the profits from the contrarian strategies.

After microstructure adjustment, some of the profits become statistically insignificant, which indicates that the microstructure effect do magnify contrarian profits[11]. However, there are still about one third of the cases remain statistically significant, even though less profitable. Interestingly, for very short-run strategies, e.g. J=K=1,2, the contrarian profits become significantly negative. This confirms our conjecture in last section that the extremely high profits in some cases when K=1 are spurious. After the bid-ask spread adjustment, there are no contrarian profits for any formation periods with one week holding period. Nevertheless, as J and K increases, the contrarian strategy becomes significantly profitable. The returns of the strategies with 4 and 8 weeks formation period and over 4 and 8 weeks holding period are statistically significant at 5% significant level with weekly returns around 0.2%.

The results for the whole sample period after microstructure adjustment are consistent with those without adjustment[12]. Contrarian strategies with two to twelve weeks' holding periods based on past four to sixteen formation periods following 'down' market have averagely around 0.3% weekly returns. Although for the same formation and holding periods some strategies are not significantly profitable for the whole period, the profits are statistically significant following the 'down' market.

Table 4 shows profitability of the contrarian strategy for sub-sample period, i.e. from 2007 to 2010 after microstructure adjustment, the same strategies produce greater profit than those for the entire sample period. For example, the contrarian strategy which is constructed based on the performance of past 12 weeks and held for 4 weeks produces significantly positive return of 0.57% per week, which is much higher than 0.22% per week for the whole sample period with the same formation

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[11] Results are not reported here and available upon request.
[12] Results for the whole sample period are not reported here and available upon request.

period and holding period. This implies that contrarian strategy could be used as an alternative solution for the investors to cope with the worldwide financial crisis.

B .Investors' overreaction to information

In Table 5 and 6 we report the returns of winner and loser portfolios separately following different market states after the microstructure adjustment. The results are quite interesting. For each contrarian strategy following 'up' market, both winner and loser portfolios have positive returns (which is in line with the finding of Muga and Santamaria, 2009), however the returns of losers are higher than those of winners, with the exception of the cases for J=1,2 and K=1. For contrarian strategy following 'down' market, both winners and losers have negative returns, whereas winner portfolios perform worse than loser portfolios. This result implies that the investors overreact to news at different extent not only under different market condition, but also to loser and winner stocks. In the 'up'/'down' market the loser/winner's price deviate too far from the fundamental due to the overreaction to the bad/good news, result in greater extent of correction process in the holding periods. These results imply that one of the possible sources of contrarian strategies in the Chinese market following 'down' market is from shorting winner portfolios. Another point worth mentioning is that we find when separating winner and loser portfolios, the returns of winners are not significant either following 'up' market or 'down' market, with the exception of J=1,2 cases following 'up' market. However the returns of losers are positively statistically significant following 'up' market for most of the cases, suggesting that following 'up' market only buying past losers will also make significant profit.

C. Common risk factors (Fama-French three factor model adjustment)

Fama and French (1996) explained contrarian profits in the UK market with their

three-factor model, they show that when adjusted by market risk premium, size effect and book-to-market ratio, the returns of contrarian strategies become statistically insignificant. We hereby use Fama-French multi-factor model to investigate whether these three factors play an important role in explaining contrarian profits in the Chinese market. To this end, we estimate the following equation with Fama MacBeth two step approach (Fama and MacBeth, 1973):

$$R_{ct} - r_{ft} = \alpha + \beta (r_{mt} - r_{ft}) + \gamma SMB_t + \lambda HML_t + \varepsilon_{ct} \tag{5}$$

where R_{ct} is the return from contrarian strategy in week t after the microstructure adjustment; r_{ft} is the proxy of risk free rate for week t, here we use one-year deposit rate; r_{mt} is the return of the within-sample value weighted market return in week t; SMB_t is return of the "small minus big" portfolio (which stands for the size effect) and HML_t is return of the "high minus low" portfolio in week t (which stands for the book to market ratio).[13] The constant α is the adjusted return of the portfolio. If the Fama and French three factor model can explain the contrarian return, α should not be significantly different from zero.

We find that both for the whole sample period and sub-period of 2007 to 2010, after risk adjustment, some of the contrarian strategies' profits are still statistically significant, suggesting that the Fama-French three-factor model cannot fully explain contrarian profits.[14] In addition, Table 7 reports the risk adjusted contrarian returns following different market states[15]. Interestingly, although after adjusted by Fama-French three factors the contrarian profits are no longer significant for the whole sample period, the three factors still cannot fully explain the profit following the

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[13] We construct the SMB and HML factors following the methodology proposed by Fama and French (1993). See detailed construction description in Appendix.

[14] Results are not reported here and available upon request.

[15] Results for holding period longer than 8 weeks are not reported here and available upon request.

'down' market (for example, the cases of 4 and 8 weeks formation period). Given the fact that the profits following the 'down' market generate the overall profitability, we conclude that the risk premium, size and book-to-market value are not of all the sources of the contrarian profit.

4   Conclusions

In this paper, we investigate contrarian strategies in the Chinese market, which include all domestic stocks listed on both Shanghai and Shenzhen Stock Exchange. We find significant short term contrarian profit, especially with four to sixteen weeks' holding period based on previous four to sixteen weeks' performance when using overlapping method. The results indicate that the Chinese stock market does have unique features comparing to developed markets. The return reversal incurs in short period and therefore portfolios need rebalancing frequently. The findings may be explained by the short-termism and highly speculative behaviour of Chinese investors.

In addition, we examine the performance of contrarian strategies following different market states. Evidence shows that short term contrarian strategies are more profitable following 'down' market. In other words, the market condition could be used as a predictor of the magnitude of the contrarian profit. The result not only provides practical implications for both practitioners and investors, especially during the post-crisis period when most of the countries are still struggling with the gloomy economy, but also indicates the possible source of the contrarian profits given that the investors react to information differently under different market states. Furthermore, we find that for most of the cases past losers outperforms past winners following both 'up' market and 'down' market, although both winners and losers have negative returns following the 'down' market and positive returns following the 'up' market.

This agrees with the literature that investors' overreaction to information is one of the sources of the contrarian/momentum profits.

The effect of bid-ask bias has also been examined. The results show that the bid-ask spread do magnify the profitability of the contrarian strategy, however, the profits remain significant after the adjustment. In addition, the strategy is more profitable from 2007 to 2010 (financial crunch period), providing supplementary evidence that the short term contrarian strategy could be used as a 'shelter' for the 'down' market. In addition, the Fama-French three factor model cannot fully explain contrarian profit, as well as for cases following the 'down' market.

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Table 1: Monthly contrarian profits for overlapping observations

J		K=1	K=3	K=6	K=9
1	L-W	0.00818**	0.005773**	0.002242	0.001397
		(2.26)	(2.31)	(1.36)	(0.99)
3	L-W	0.01097**	0.00462	0.0013	0.00047
		(2.25)	(1.17)	(0.46)	(0.19)
6	L-W	0.0061	0.00157	0.00058	0.000095
		(1.29)	(0.38)	(0.16)	(0.03)

Table 1 presents average monthly returns for contrarian strategies for the time period from January 1995 to December 2009. L-W represents the loser-minus-winner portfolio. J and K represent monthly formation and holding periods. The numbers in the parentheses are t-values based on Newey-West autocorrelation consistent standard errors. The symbols ***, ** and * indicate, respectively, significance at 1%, 5% and 10% levels.

Table 2: Weekly winners, losers and contrarian portfolios and stock returns for overlapping observations

J		K=1	K=2	K=4	K=8	K=12	K=16
	L-W	0.006718***	0.001062	0.000552	0.001021**	0.00079**	0.000532*
		(6.42)	(1.53)	(1.03)	(2.55)	(2.32)	(1.72)
1	Losers	0.004333**	0.001767	0.001803	0.002222	0.002163	0.002364
		(2.19)	(0.93)	(0.96)	(1.16)	(1.12)	(1.21)
	Winners	-0.002400	0.000728	0.001233	0.001212	0.001364	0.001808
		(-1.19)	(0.37)	(0.63)	(0.62)	(0.70)	(0.92)
	L-W	0.0024**	-0.00099	0.000207	0.00101*	0.00091*	0.000627
		(2.40)	(-1.25)	(0.29)	(1.82)	(1.83)	(1.40)
2	Losers	0.002362	0.00090	0.00180	0.00216	0.00226	0.002397
		(1.24)	(0.48)	(0.96)	(1.14)	(1.19)	(1.24)
	Winners	-3.82E-05	0.00189	0.00159	0.00115	0.00135	0.00177
		(-0.02)	(0.97)	(0.81)	(0.59)	(0.69)	(0.90)
	L-W	0.00256**	0.000942**	0.001872	0.001833**	0.00155**	0.001108*
		(2.33)	(0.93)	(2.01)	(2.39)	(2.25)	(1.82)
4	Losers	0.003176*	0.002454	0.002724	0.002677	0.002606	0.002580
		(1.68)	(1.30)	(1.44)	(1.40)	(1.35)	(1.33)
	Winners	0.000616	0.001512	0.000852	0.000844	0.001056	0.001472
		(0.31)	(0.76)	(0.43)	(0.43)	(0.54)	(0.75)
	L-W	0.004874***	0.002908**	0.002854**	0.00234**	0.001611*	0.001267
		(3.84)	(2.45)	(2.50)	(2.22)	(1.67)	(1.53)
8	Losers	0.004659**	0.003441*	0.003207	0.002871	0.002615	0.002239
		(2.31)	(1.75)	(1.64)	(1.47)	(1.33)	(1.14)
	Winners	-0.000215	0.000533	0.000353	0.000532	0.001004	0.000972
		(-0.11)	(0.27)	(0.18)	(0.27)	(0.50)	(0.50)
	L-W	0.004841***	0.003414***	0.00302**	0.002068*	0.001331	0.000765
		(3.61)	(2.66)	(2.41)	(1.78)	(1.26)	(0.80)
12	Losers	0.004547**	0.003602*	0.003283*	0.002804	0.002136	0.001872
		(2.25)	(1.80)	(1.66)	(1.41)	(1.07)	(0.94)
	Winners	-0.000294	0.000188	0.000263	0.000735	0.000805	0.001107
		(-0.14)	(0.09)	(0.13)	(0.36)	(0.40)	(0.56)
	L-W	0.004411***	0.002894*	0.002517*	0.001624	0.000808	0.000317
		(3.09)	(2.12)	(1.93)	(1.35)	(0.72)	(0.31)
16	Losers	0.004492**	0.003662*	0.003164	0.002145	0.001753	0.001387
		(2.20)	(1.81)	(1.57)	(1.07)	(0.87)	(0.69)
	Winners	8.02E-05	0.000768	0.000647	0.000521	0.000945	0.001070
		(0.04)	(0.38)	(0.32)	(0.26)	(0.47)	(0.54)
	L-W	0.002785*	0.001693	0.001435	0.000759	0.000392	0.000258
		(1.95)	(1.23)	(1.06)	(0.60)	(0.33)	(0.24)
24	Losers	0.002949	0.002213	0.001832	0.001317	0.001152	0.001230
		(1.45)	(1.10)	(0.91)	(0.65)	(0.57)	(0.61)
	Winners	0.000164	0.000520	0.000397	0.000558	0.000761	0.000964
		(0.08)	(0.26)	(0.20)	(0.28)	(0.38)	(0.48)

Table 2 presents average weekly returns for contrarian strategies for the time period January 1995 to April 2010. L-W, losers and winners represents the loser-minus-winner portfolio, loser and winner portfolios. J and K represent weekly formation and holding periods. The numbers in the parentheses are t-values based on Newey-West autocorrelation consistent standard errors. The symbols ***, ** and * indicate, respectively, significance at 1%, 5% and 10% levels.

Table 3: Weekly contrarian profits following different market states for overlapping observations

J		K=1	K=2	K=4	K=8	K=12	K=16
1	Whole period	0.006718***	0.001062	0.000552	0.001021**	0.00079**	0.000532*
		(6.42)	(1.53)	(1.03)	(2.55)	(2.32)	(1.72)
	Up market	0.007081***	0.001151	0.000174	0.000544	0.000511	0.000189
		(4.62)	(1.14)	(0.21)	(0.86)	(0.94)	(0.39)
	Down market	0.006311***	0.000953	0.001013	0.001601***	0.001138***	0.001959***
		(4.41)	(0.96)	(1.75)	(3.06)	(2.76)	(2.59)
2	Whole period	0.0024**	-0.00099	0.000207	0.00101*	0.00091*	0.000627
		(2.40)	(-1.25)	(0.29)	(1.82)	(1.83)	(1.40)
	Up market	0.002348	0.001904	0.000316	0.000353	0.000415	0.00016
		(1.63)	(1.64)	(0.29)	(0.40)	(0.52)	(0.23)
	Down market	0.002463*	-0.000112	0.000844	0.001827**	0.001529**	0.001206**
		(1.70)	(0.09)	(1.74)	(2.51)	(2.55)	(2.25)
4	Whole period	0.00256**	0.000942**	0.001872	0.001833**	0.00155**	0.001108*
		(2.33)	(0.93)	(2.01)	(2.39)	(2.25)	(1.82)
	Up market	0.001085	0.000178	0.00114	0.001111	0.000928	0.00063
		(1.11)	(0.12)	(0.82)	(0.92)	(0.86)	(0.66)
	Down market	0.003479**	-0.001873	0.002769**	0.002729***	0.002328**	0.0017**
		(2.19)	(1.28)	(2.14)	(2.79)	(2.68)	(2.20)
8	Whole period	0.004874***	0.002908***	0.002854***	0.00234**	0.001611***	0.001267***
		(3.84)	(2.45)	(2.50)	(2.22)	(1.67)	(1.53)
	Up market	0.004218**	0.002032	0.00207	0.001414	0.001417	0.000835
		(2.17)	(1.10)	(1.17)	(0.86)	(0.58)	(0.66)
	Down market	0.005681***	0.003989***	0.003826***	0.003496***	0.002553**	0.001796*
		(3.52)	(2.60)	(2.62)	(2.65)	(2.13)	(1.66)
12	Whole period	0.004841***	0.003414***	0.00302**	0.002068*	0.001331	0.000765
		(3.61)	(2.66)	(2.41)	(1.78)	(1.26)	(0.80)
	Up market	0.00407**	0.002345	0.001765	0.000854	0.000448	0.000122
		(1.96)	(1.18)	(0.91)	(0.48)	(0.28)	(0.09)
	Down market	0.005801***	0.004749***	0.004589***	0.00357**	0.002413*	0.00155
		(3.37)	(2.81)	(2.81)	(2.36)	(1.73)	(1.19)
16	Whole period	0.004411***	0.002894*	0.002517*	0.001624	0.000808	0.000317
		(3.09)	(2.12)	(1.93)	(1.35)	(0.72)	(0.31)
	Up market	0.00306	0.00146	0.001322	0.000555	-0.00000997	-0.0002
		(1.39)	(0.70)	(0.66)	(0.30)	0.01	0.14
	Down market	0.006096	0.004677	0.003994	0.002934	0.001806	0.000942
		(3.34)	(2.68)	(2.41)	(1.88)	(1.22)	(0.67)
24	Whole period	0.002785*	0.001693	0.001435	0.000759	0.000392	0.000258
		(1.95)	(1.23)	(1.06)	(0.60)	(0.33)	(0.24)
	Up market	0.002299	0.001039	0.000861	0.000323	0.000181	0.000216
		(1.06)	(0.51)	(0.43)	(0.18)	(0.11)	(0.14)
	Down market	0.003378	0.00249	0.002134	0.001286	0.000645	0.000309
		(1.81)	(1.36)	(1.18)	(0.74)	(0.38)	(0.19)

Table 3 presents average weekly returns for contrarian strategies following different market states for the time period from January 1995 to April 2010. J and K represent weekly formation and holding periods. The numbers in the parentheses are t-values based on Newey-West autocorrelation consistent standard errors. The symbols ***, ** and * indicate, respectively, significance at 1%, 5% and 10% levels.

Table 4: Weekly contrarian profits after microstructure effect adjustment for period from 2007 to 2010

J		K=1	K=2	K=4	K=8	K=12	K=16
1	L-W	-0.004447**	-0.002502**	0.000144	0.000378	0.000798	0.000759
		(-2.47)	(-2.09)	(0.16)	(0.52)	(1.15)	(1.17)
2	L-W	-0.002655	-3.23E-05	0.001981	0.001448	0.001917	0.001699*
		(-1.45)	(-0.02)	(1.43)	(1.28)	(1.75)	(1.65)
4	L-W	0.002297	0.003516*	0.004018**	0.002726*	0.003236**	0.002572*
		(1.10)	(1.84)	(2.20)	(1.73)	(2.06)	(1.81)
8	L-W	0.004367**	0.004489**	0.004299*	0.004039*	0.003771*	0.003224*
		(1.98)	(2.07)	(1.97)	(1.87)	(1.81)	(1.78)
12	L-W	0.006093**	0.006001**	0.005709**	-0.004474*	0.004166*	0.003559*
		(2.50)	(2.45)	(2.27)	(-1.86)	(-1.86)	(-1.92)
16	L-W	0.005408**	0.005439**	0.004886*	0.004207*	0.004005*	0.003592**
		(2.05)	(2.10)	(1.84)	(1.69)	(1.82)	1.98)
24	L-W	0.005122**	0.006161**	0.005980**	0.005137**	0.004977**	0.004516**
		(2.12)	(2.58)	(2.59)	(2.47)	(2.59)	(2.53)

Table 4 presents average weekly returns for contrarian strategies after the microstructure effect adjustment (skipping one week between the formation and holding periods) for the time period from January 2007 to April 2010. L-W represents the loser-minus-winner portfolio. J and K represent weekly formation and holding periods. The numbers in the parentheses are t-values based on Newey-West autocorrelation consistent standard errors. The symbols ***, ** and * indicate, respectively, significance at 1%, 5% and 10% levels.

Table 5: Weekly winner and loser portfolios' returns (after microstructure adjustment) following the 'up' market

J		K=1	K=2	K=4	K=8	K=12	K=16
1	Winners	0.006631**	0.006236**	0.005030**	0.005018**	0.005078**	0.005559**
		(2.54)	(2.48)	(1.97)	(1.98)	(2.01)	(2.21)
	Losers	0.001767	0.002126	0.004018*	0.004739**	0.005009**	0.005310**
		(0.78)	(0.89)	(1.72)	(2.00)	(2.12)	(2.20)
2	Winners	0.007230***	0.006073**	0.004747*	0.004768*	0.004897*	0.005454**
		(2.87)	(2.38)	(1.85)	(1.87)	(1.93	(2.15)
	Losers	0.001031	0.002681	0.004421**	0.004875**	0.005140**	0.005481**
		(0.43)	(1.15)	(1.91)	(2.10)	(2.20)	(2.30)
4	Winners	0.005216*	0.004438*	0.003835	0.004155	0.004581*	0.004243*
		(1.95)	(1.68)	(1.47)	(1.60)	(1.78)	(1.68)
	Losers	0.003747	0.004537*	0.005011**	0.005067**	0.005371**	0.004960**
		(1.64)	(1.96)	(2.16)	(2.20)	(2.31)	(2.09)
8	Winners	0.004289	0.003837	0.003503	0.004036	0.003789	0.004265*
		(1.56)	(1.40)	(1.30)	(1.50)	(1.45)	(1.69)
	Losers	0.004127*	0.004430*	0.004725**	0.004833**	0.004390*	0.004806**
		(1.78)	(1.91)	(2.06)	(2.09)	(1.86)	(2.02)
12	Winners	0.003760	0.003708	0.003817	0.003762	0.004163	0.004269*
		(1.35)	(1.34)	(1.38)	(1.39)	(1.59)	(1.68)
	Losers	0.004343*	0.004576**	0.004617**	0.003919*	0.004190*	0.004120*
		(1.89)	(1.99)	(1.99)	(1.65)	(1.75)	(1.70)
16	Winners	0.004803*	0.004354	0.003573	0.003848	0.004066	0.003963
		(1.74)	(1.58)	(1.29)	(1.42)	(1.53)	(1.54)
	Losers	0.004517*	0.004795*	0.004040*	0.003884	0.003737	0.003530
		(1.85)	(1.96)	(1.68)	(1.60)	(1.52	(1.42)
24	Winners	0.003438	0.003423	0.003125	0.003345	0.003528	0.003730
		(1.29)	(1.28)	(1.18)	(1.26)	(1.36)	(1.46)
	Losers	0.003245	0.003616	0.003411	0.003323	0.003525	0.003918
		(1.36)	(1.48)	(1.40)	(1.35)	(1.41)	(1.56)

Table 5 presents average weekly returns for loser and winner portfolios following 'up' market, after the microstructure effect adjustment (skipping one week between the formation and holding periods), for the time period from January 1995 to April 2010. J and K represent weekly formation and holding periods. The numbers in the parentheses are t-values based on Newey-West autocorrelation consistent standard errors. The symbols ***, ** and * indicate, respectively, significance at 1%, 5% and 10% levels.

Table 6: Weekly winner and loser portfolios' return (after microstructure adjustment) following the 'down' market

J		K=1	K=2	K=4	K=8	K=12	K=16
1	Winners	0.000485 (0.17)	-0.000553 (-0.19)	-0.001762 (-0.61)	-0.002438 (-0.85)	-0.002405 (-0.83)	-0.002197 (-0.76)
	Losers	-0.004151 (-1.37)	-0.002420 (-0.83)	-0.002218 (-0.76)	-0.001626 (-0.55)	-0.001692 (-0.56)	-0.001700 (-0.57)
2	Winners	-0.000346 (-0.12)	-0.00114 (-0.39)	-0.002049 (-0.70)	-0.002518 (-0.88)	-0.002694 (-0.94)	-0.002355 (-0.81)
	Losers	-0.002623 (-0.89)	-0.001742 (-0.60)	-0.000953 (-0.32)	-0.000883 (-0.29)	-0.001254 (-0.41)	-0.001369 (-0.45)
4	Winners	-0.000961 (-0.33)	-0.002064 (-0.70)	-0.002828 (-0.97)	-0.003079 (-1.08)	-0.002884 (-1.00)	-0.002563 (-0.89)
	Losers	-0.000924 (-0.30)	-6.50E-05 (-0.02)	2.08E-05 (0.01)	-0.000611 (-0.20)	-0.000783 (-0.25)	-0.001092 (-0.36)
8	Winners	-0.002206 (-0.77)	-0.002557 (-0.89)	-0.003170 (-1.12)	-0.003137 (-1.10)	-0.002839 (-0.99)	-0.002520 (-0.88)
	Losers	0.000303 (0.10)	0.000721 (0.23)	0.000194 (0.06)	-0.000233 (-0.07)	-0.000726 (-0.23)	-0.001211 (-0.39)
12	Winners	-0.003148 (-1.11)	-0.003497 (-1.23)	-0.003401 (-1.19)	-0.003169 (-1.10)	-0.002752 (-0.95)	-0.002519 (-0.87)
	Losers	0.000572 (0.17)	0.000788 (0.24)	0.000613 (0.19)	-0.000219 (-0.07)	-0.000819 (-0.26)	-0.001498 (-0.48)
16	Winners	-0.002693 (-0.94)	-0.002950 (-1.03)	-0.003251 (-1.12)	-0.002952 (-1.02)	-0.002558 (-0.88)	-0.002328 (-0.80)
	Losers	0.000569 (0.17)	0.000411 (0.13)	-2.45E-06 (-0.00)	-0.000785 (-0.24)	-0.001406 (-0.44)	-0.001874 (-0.60)
24	Winners	-0.002255 (-0.79)	-0.002721 (-0.94)	-0.002732 (-0.94)	-0.002617 (-0.89)	-0.002306 (-0.78)	-0.002102 (-0.70)
	Losers	-0.000665 (-0.21)	-0.000721 (-0.22)	-0.001335 (-0.41)	-0.001850 (-0.58)	-0.001976 (-0.63)	-0.002115 (-0.68)

Table 6 presents average weekly returns for loser and winner portfolios following 'down' market, after the microstructure effect adjustment (skipping one week between the formation and holding periods), for the time period from January 1995 to April 2010. J and K represent weekly formation and holding periods. The numbers in the parentheses are t-values based on Newey-West autocorrelation consistent standard errors. The symbols ***, ** and * indicate, respectively, significance at 1%, 5% and 10% levels.

Table 7: Weekly contrarian profits following different market states after microstructure effect and risk adjustment

JxK		Risk adjusted return	Rm-rf	SMB	HML	R^2
1x1	Up	-0.005273*** (-4.89)	-0.093*** (-2.70)	0.188 (1.53)	-0.025 (-0.24)	0.05
	Down	-0.005530*** (-4.73)	0.091*** (3.23)	0.213** (2.05)	-0.053 (-0.41)	0.07
1x2	Up	-0.005086*** (-6.01)	-0.040 (-1.35)	0.272** (2.82)	0.014 (0.16)	0.09
	Down	-0.002730*** (-3.14)	0.070*** (3.09)	0.160** (2.02)	0.039 (0.29)	0.07
1x4	Up	-0.001612** (-2.25)	-0.051** (-2.01)	0.166* (2.22)	-0.067 (-0.81)	0.07
	Down	-0.001228* (-1.66)	0.053** (2.27)	0.092 (1.22)	0.095 (0.71)	0.06
1x8	Up	-0.000573 (-0.98)	-0.071*** (-3.99)	0.091 (1.43)	-0.095 (-1.44)	0.12
	Down	0.000112 (0.23)	0.054*** (3.31)	0.040 (0.74)	0.109 (1.22)	0.10
1x12	Up	-0.000269 (-0.47)	-0.070*** (-4.45)	0.039 (0.52)	-0.103* (-1.74)	0.13
	Down	2.93E-05 (0.07)	0.055*** (4.01)	0.041 (0.78)	0.102* (1.70)	0.14
1x16	Up	-0.000561 (-1.07)	-0.053*** (-4.50)	0.035 (0.55)	-0.081* (-1.72)	0.11
	Down	-0.000212 (-0.62)	0.039*** (3.27)	0.055 (1.09)	0.078* (1.90)	0.12
2x1	Up	-0.007217*** (-5.31)	-0.060 (-1.32)	0.423** (2.57)	-0.034 (-0.25)	0.10
	Down	-0.003162** (-2.51)	0.113*** (3.31)	0.237** (2.09)	0.107 (0.53)	0.08
2x2	Up	-0.004337*** (-3.41)	-0.061 (-1.29)	0.398** (2.55)	-0.053 (-0.38)	0.10
	Down	-0.001412 (-1.24)	0.096** (2.52)	0.141 (1.24)	0.134 (0.58)	0.06
2x4	Up	-0.000734 (-0.68)	-0.084** (-2.49)	0.216** (2.07)	-0.101 (-0.88)	0.08
	Down	0.000339 (0.33)	0.090** (2.79)	0.078 (0.65)	0.150 (0.79)	0.07
2x8	Up	4.05E-05 (0.04)	-0.103*** (-4.16)	0.118 (1.24)	-0.131 (-1.41)	0.12
	Down	0.000921 (1.34)	0.083*** (3.40)	0.063 (0.76)	0.178 (1.37)	0.12
2x12	Up	0.000225 (0.25)	-0.096*** (-4.29)	0.056 (0.53)	-0.128 (-1.51)	0.11
	Down	0.000762 (1.33)	0.084*** (4.06)	0.064 (0.77)	0.185** (2.08)	0.16
2x16	Up	-0.000137 (-0.17)	-0.076*** (-4.09)	0.053 (0.55)	-0.092 (-1.31)	0.10
	Down	0.000257 (0.52)	0.057*** (3.28)	0.090 (1.12)	0.137** (2.27)	0.13

Table 7 continues:

JxK		Risk adjusted return	Rm-rf	SMB	HML	R^2
4x1	Up	-0.001653 (-1.07)	-0.136*** (-2.82)	0.374** (2.24)	-0.192 (-1.17)	0.09
	Down	-0.000849 (-0.54)	0.115** (2.41)	0.202 (1.24)	0.231 (0.80)	0.06
4x2	Up	-7.01E-05 (-0.05)	-0.135*** (-2.93)	0.311** (2.09)	-0.133 (-0.84)	0.08
	Down	0.001207 (0.84)	0.111** (2.41)	0.120 (0.68)	0.217 (0.81)	0.05
4x4	Up	0.001291 (0.95)	-0.145*** (-3.79)	0.205 (1.59)	-0.158 (-1.13)	0.09
	Down	0.002106 (1.64)	0.115*** (2.71)	0.099 (0.59)	0.219 (0.95)	0.07
4x8	Up	0.001319 (0.99)	-0.161*** (-4.45)	0.092 (0.58)	-0.151 (-1.18)	0.11
	Down	0.001777* (1.93)	0.115*** (3.73)	0.097 (0.76)	0.282** (1.98)	0.13
4x12	Up	0.001085 (0.88)	-0.131*** (-4.40)	0.063 (0.41)	-0.163 (-1.52)	0.11
	Down	0.001382* (1.68)	0.102*** (3.74)	0.118 (0.91)	0.244** (2.50)	0.14
4x16	Up	0.000663 (0.62)	-0.089*** (-3.68)	0.078 (0.57)	-0.137 (-1.61)	0.08
	Down	0.000704 (0.99)	0.078*** (3.29)	0.147 (1.22)	0.217*** (2.96)	0.14
8x1	Up	0.000632 (0.34)	-0.243*** (-5.07)	0.268 (1.31)	-0.229 (-1.33)	0.12
	Down	0.001758 (1.15)	0.208*** (4.09)	0.223 (1.19)	0.381 (1.39)	0.15
8x2	Up	0.001363 (0.73)	-0.231*** (-4.85)	0.255 (1.21)	-0.257 (-1.45)	0.12
	Down	0.002510* (1.70)	0.193*** (3.76)	0.188 (0.95)	0.403 (1.57)	0.13
8x4	Up	0.002149 (1.13)	-0.233*** (-4.74)	0.166 (0.73)	-0.254 (-1.51)	0.12
	Down	0.002649* (1.92)	0.184*** (3.97)	0.185 (0.94)	0.454** (2.14)	0.15
8x8	Up	0.001655 (0.87)	-0.203*** (-4.45)	0.103 (0.43)	-0.245 (-1.61)	0.11
	Down	0.002162* (1.76)	0.166*** (4.26)	0.194 (1.06)	0.402** (2.84)	0.17

Table 7 presents average weekly returns for contrarian strategies following different market conditions, after microstructure effect adjustment and after the risk adjustment by a Fama-French three factor model, for the time period from January 1995 to April 2010. The risk adjusted returns are reported in the second column. Rm-rf, SMB and HML represent the coefficients of market, size and value factors defined in the Fama-French model. J and K represent weekly formation and holding periods. The numbers in the parentheses are t-values based on Newey-West autocorrelation consistent standard errors. The symbols ***, ** and * indicate, respectively, significance at 1%, 5% and 10% levels.