

# Market States and Contrarian strategy: Evidence from Chinese stock market

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***This Draft: June 2010***

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## **Abstract**

Using the most comprehensive weekly data of ‘A’ shares in Chinese stock market, this paper examines short-term contrarian strategy 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) is experiencing the economic downturn from the worldwide financial crisis. Our empirical evidence suggests that: (1) There is no significant profit generated from either momentum or contrarian strategy in the intermediate horizon. (2) After the microstructure effect adjustment, the contrarian strategies with only one to two months holding period based on the stocks’ previous one to two months performance generate statistically significant profit of around 0.2% per week. (3) The contrarian strategy following ‘down’ market generates higher profit than that following the ‘up’ market, suggesting that contrarian strategy could be used as a shelter when the market is in downturn. The profits following ‘down’ market are robust after risk adjustment.

**JEL classification:** G11; G14

**Key Words:** contrarian and momentum; market states; China stock market; overreaction; common factor

## 1. Introduction

In the recent years, a surge of articles have provided substantial evidence that on the basis of historical data the return of the assets can be predicted. The empirical evidences challenge the paradigm of the weak-form efficient market hypothesis (EMH) and question the well-accepted capital asset pricing model, which are the two cornerstones of modern financial theory. There are two types of investment strategies that co-exist in the recent literature, the contrarian (De Bondt and Thaler 1985, 1987) and momentum (Jegadeesh and Titman, 1993) strategies. The contrarian strategy, which takes advantage of the negative autocorrelation of the asset returns, is constructed by longing the stocks which perform badly in the past and shorting the stocks which perform well in the past;<sup>1</sup> while on the contrary, momentum strategy is based on short selling past losers and buying past winners. Empirical evidences suggest that 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 often profitable in short-to-medium period. Subsequently researchers contribute to the literature supporting the profitability of both contrarian and momentum strategies international wide (e.g., Griffin et al, 2003, Clare and Thomas, 1995, Chui et al, 2005, Hameed and Kusnadi, 2002). Although there are sufficient supportive evidences for both strategies, the source and interpretations of the profits are widely debated. As the two strategies provide important implications on investment strategies to both participants and academics, it is understandable why the debate of momentum and contrarian, which falls into the field of behaviour finance, becomes hot topic among the academics.

De Bondt and Thaler (1985, 1987) propose the earliest and most influential

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<sup>1</sup>Thereafter we use 'losers' and 'winners' respectively and the definitions of the portfolios are stated in the next section.

evidence that in US market there is long term reversal. They find 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. There are three alternative explanations for contrarian profit in the recent literature. The first is the size effect, i.e., the losers tend to be those stocks with small market value and that the overreaction effect tends to be significant for the small firms. Zarowin (1990) and Chopra et al. (1992) examine the size effect and find that when size effect is controlled, the returns of the losers do reduce. Therefore they argue that the efficient market hypothesis is still held for the larger firms. Second, Chan (1988) and Ball and Kothari (1989) argue that the time-varying risk has been neglected. Ball and Kothari (1989) find that the coefficients of the risk premium 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 profit in intermediate term. The third explanation is the market microstructure related effects, such as bid-ask biases, illiquidity etc. Avramov et al(2006) show that weekly reversals are stronger for those stocks with low liquidity and high turnovers. Conard and Kaul (1998) show that part of the return reversal is due to bid-ask bounce of the price.

Momentum strategies were first reported by Jegadeesh and Titman (1993). Jegadeesh and Titman (2001) further evaluate alternative explanations for the momentum profit with the out-of-sample data. They find that the momentum profit continues after 1990, which indicates that the original conclusion made does not relate to 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 many financial academic practitioners have brought forward 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 Chinese stock market. Our work is motivated by the following issues: Firstly, the research of practical investment strategies in the Chinese market is limited, despite the fact that China is one of the fastest growing economies in the world. The reason 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 very recent study, Naughton et al (2008) investigate momentum strategies in the Chinese market with limited sample covering the period from 1995 to 2005. However, inadequate 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 plays a very important role in the world economic stage, especially during and after the period of the crunch. Secondly, Chinese stock market is unique, in respect of the divergence with the theory of rationality (Drew et al, 2004), individual investor dominated stock market (Kang et al, 2002), different regulatory environment, different trading practice 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;<sup>2</sup> therefore the individual investors may behave differently

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<sup>2</sup> See Hu (1999) and Kang et al (2002) for detailed background of economy reform in early 1990s and socialist system related to the Chinese stock market.

compared to those in other developed countries. Hence, the Chinese stock market may be suitable for different investment strategies to those developed countries studied in the literature. Thirdly, Kang et al(2002) claim that individual investors are the main composition (99%) of stock market participants. However the corporate financial data available to the public are not reliable, resulting in asymmetric information in the market. Under this circumstances investors tend to trade depending on their private information or ‘rumours’ around the market, causing overreaction to the news and hence driving the stock price deviating from the fundamental. Whether there is short-term overreaction to information hence leading to contrarian profit provides motivation of empirical 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 compared to previous studies on the Chinese market (e.g., Naughton et al, 2005, Wang and Chin, 2004, Griffin et al., 2003, Kang et al., 2002). We include all ‘A’ shares listed on both Shanghai stock market and Shenzhen stock market in our sample. The data spans the period from January, 1995 to April, 2010, which covers the period before and after the 2007 financial crunch. Naughton et al (2008) use the sample of 821 stocks in their study, which accounts for only 57% of all firms in China. We try to include as many companies as possible in our sample, however we also avoid using the limited sample size in 1993 and 1994.<sup>3</sup>

In addition, we investigate the profitability of contrarian strategies following different market states, which has not been studied before, to the best of our knowledge. The significance of such research is twofold: Firstly, one of the possible explanations of contrarian profits is that the investors are overconfident about their

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<sup>3</sup> For example, there are only 48 stocks in the sample for year 1993 in Kang et al (2002)’s work.

private information and overreact to it (Daniel et al. 1998). Under different market conditions, investors might overreact to the same piece of information at different extent. If the investors' under-reaction or overreaction to the information is the source of the contrarian profits, then different contrarian profits across 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 profit with four to eight weeks holding period based on prior performance in four to eight weeks, suggesting a strategy that requires very frequent rebalance. This indicates that the stock prices in Chinese market reverse in a short time phase. The results of the contrarian profits following different market conditions are quite interesting. 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 lost more value than loser portfolios. In other words, no matter what market condition is in the formation period, loser stocks outperform winner stocks. This result provides support for Kang et al (2002)'s argument that the investors in the Chinese market have too limited investment choices, therefore excess demand for the winner pushes the price too high. Then taking advantage of the process of the correction to the fundamental price, contrarian strategies are significantly profitable. Our results also show that there is significant short term contrarian profits following 'down' market, but not for the 'up' market. In addition, during the period of 2007 to 2010, the strategy is more profitable.

This finding provides practical implication to practitioners and academics, especially for the post-crisis period (down market). The Fama-French three factor model could not explain the contrarian profit following the ‘down’ market, which is the source of the profits for whole period. In addition, the results after 2007 are also robust after the risk adjustment.

The rest of the paper is organized as follows. Section 2 present 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 4<sup>th</sup>, 1995 to April 14<sup>th</sup> 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). These papers assess the profitability of  $J \times K$  trading strategies, where securities are assigned to portfolios according to a ranking in period  $t$  based on the previous  $J$  month/week’s performance. In month/week  $t$ , a loser-minus-winner



portfolio is constructed, where an investor takes a long position in the loser portfolio, which consists of stocks in the bottom decile of past performers according to cumulated returns during the past  $J$  months/weeks, and a short position in the winner portfolio, which consists of the top decile of performers during the past  $J$  months/weeks, and then holding the loser-minus-winner portfolio for  $K$  months/weeks.

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. The holding period for each of the monthly/weekly strategies starts from the beginning of the month/Thursdays and ends at the end of the month/Wednesdays (if the day is a non-trading day, then the next trading day is used).

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  $\frac{1}{K}$  of the securities in the entire portfolio in any given month/week and carry over the rest from the previous month/week.

In summary, 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.

$$CCR_i = \sum_{t=1}^J R_{it} \quad (1)$$

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:

$$\bar{R}_{loser-winner,t} = \bar{R}_{loser,t} - \bar{R}_{winner,t} \quad (2)$$

where  $\bar{R}_{loser-winner,t}$  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).

### ***Market States***

To analyse the effect of market state on 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 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.<sup>4</sup> Then the profits generated by the contrarian strategy constructed just following the ‘down’ market and ‘up’ market are estimated. 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.

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.

$$R_{ct} = \beta_{UP} \times D_{UP} + \varepsilon_t \quad (3)$$

$$R_{ct} = \beta_{DOWN} \times D_{DOWN} + \varepsilon_t \quad (4)$$

where  $D_{UP}$  and  $D_{DOWN}$  are dummy variables for ‘up’ market and ‘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.<sup>5</sup> 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 and 4. The evaluation of the possible sources of the contrarian strategy profits in the Chinese market.

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<sup>4</sup> We use return of Shanghai Composite Index to represent the market performance.

<sup>5</sup> For monthly data the sample spans the period from January 1995 to December 2009.

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

Results for the conventional contrarian strategy for monthly data are reported in Table 1 based on overlapping observations from January 1995 to December 2009 with a  $J$  month formation period where the  $J$  ranges from 1 to 6 month and with the  $K$  month holding period, which varies from 1 to 9 month. It is observed that all returns of contrarian strategies are positive; suggesting that contrarian strategies are appropriate for Chinese market, e.g. longing loser portfolio and shorting winner portfolio. The most profitable strategy is that 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 holding period longer than 3 months produce neither contrarian nor momentum profit.<sup>6</sup> The result is in line with that of Kang et al (2002), in which reports the contrarian strategy with the portfolio formed based on previous 12-week returns and being held over following 4 weeks generates averagely 0.88% monthly return. Although our result is different from those of Jegadeesh and Titman (1993) who study 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 stock market are very different from those in other markets.

In addition, our results are different from previous works which study the Chinese market in terms of that we do not find the evidence of the intermediate-term

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<sup>6</sup> We also examine the cases for  $J=K=12,24$  and the profits are not significant.

momentum profit. Naughton et al (2008) reported significant momentum profit for different holding periods varying from 1 month to 4 years. Kang et al (2002) show short-term contrarian profit and intermediate momentum profit with same formation period and holding period. 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 produces different results.<sup>7</sup>

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. First glance of the table shows that the results are consistent with what has been found for monthly data that contrarian strategies with short formation period and short holding period generate significant profit. 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

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<sup>7</sup> 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.

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 mentioned in the last section, we make modification to the definition of market states proposed by Cooper et al(2004). 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.<sup>8</sup> We define the market as ‘up’ market if the cumulated return of the market is positive for the past 13 weeks, and ‘down’ market is the one with negative cumulated return for the past 13 weeks.

As shown in Table 3, interestingly we find the results suggesting that in general the contrarian strategies are more competent following the ‘down’ market. For almost all the cases, 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

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<sup>8</sup> 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%.

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 follow Jegadeesh and Titman (1993)'s method, which is to skip one period, in our case, one week between the formation and holding periods, and re-examine the profits from the contrarian strategies.

Table 4 shows that some of the profits become statistically insignificant after the adjustment, which indicates that the microstructure effect do magnify contrarian profits. 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%.

Table 5 reports the contrarian profits after the microstructure effect adjustment following different market states. The results are consistent with those without adjustment, i.e. the strategy is more profitable following the 'down' market than the

‘up’ market. 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.

We also evaluate the contrarian strategy for sub-sample period, i.e. from 2007 to 2010. Table 6 shows that during 2007 to 2010, 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 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 7 and 8 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 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 profit 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 Chinese market. To this end, we estimate the following equation:

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

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 and  $HML_t$  is return of the “high minus low” portfolio in week  $t$ .<sup>9</sup> The constant  $\alpha$  is the adjusted return of the portfolio. If the Fama and French three factor model can explain the contrarian return,  $\alpha$  should not be significantly different from zero.

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<sup>9</sup> We construct the SMB and HML factors following the methodology proposed by Fama and French (1993).

For the whole sample period we find that after risk adjustment almost all contrarian strategies become statistically insignificant.<sup>10</sup> This result is consistent with the literature that the risk factors could explain the profits of contrarian strategy (e.g Fama and French, 1996, Dissanaik, 1997, Brouwer et al, 1997). However, when we only examine the period of 2007 to 2010, the results are different. Table 9 shows that the Fama-French three-factor model cannot fully explain contrarian profit for the sub-sample period, as most of the contrarian profits are still statistically significant after risk adjustment. In addition, Table 10 reports the risk adjusted contrarian returns following different market states. 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 ‘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

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<sup>10</sup> Results are not reported here and available upon request.

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 for the sub-sample period (from 2007-2010), 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** (2.26)	0.005773** (2.31)	0.002242 (1.36)	0.001397 (0.99)
3	L-W	0.01097** (2.25)	0.00462 (1.17)	0.0013 (0.46)	0.00047 (0.19)
6	L-W	0.0061 (1.29)	0.00157 (0.38)	0.00058 (0.16)	0.000095 (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
1	L-W	0.006718*** (6.42)	0.001062 (1.53)	0.000552 (1.03)	0.001021** (2.55)	0.00079** (2.32)	0.000532* (1.72)
	Losers	0.004333** (2.19)	0.001767 (0.93)	0.001803 (0.96)	0.002222 (1.16)	0.002163 (1.12)	0.002364 (1.21)
	Winners	-0.002400 (-1.19)	0.000728 (0.37)	0.001233 (0.63)	0.001212 (0.62)	0.001364 (0.70)	0.001808 (0.92)
2	L-W	0.0024** (2.40)	-0.00099 (-1.25)	0.000207 (0.29)	0.00101* (1.82)	0.00091* (1.83)	0.000627 (1.40)
	Losers	0.002362 (1.24)	0.00090 (0.48)	0.00180 (0.96)	0.00216 (1.14)	0.00226 (1.19)	0.002397 (1.24)
	Winners	-3.82E-05 (-0.02)	0.00189 (0.97)	0.00159 (0.81)	0.00115 (0.59)	0.00135 (0.69)	0.00177 (0.90)
4	L-W	0.00256** (2.33)	0.000942** (0.93)	0.001872 (2.01)	0.001833** (2.39)	0.00155** (2.25)	0.001108* (1.82)
	Losers	0.003176* (1.68)	0.002454 (1.30)	0.002724 (1.44)	0.002677 (1.40)	0.002606 (1.35)	0.002580 (1.33)
	Winners	0.000616 (0.31)	0.001512 (0.76)	0.000852 (0.43)	0.000844 (0.43)	0.001056 (0.54)	0.001472 (0.75)
8	L-W	0.004874*** (3.84)	0.002908** (2.45)	0.002854** (2.50)	0.00234** (2.22)	0.001611* (1.67)	0.001267 (1.53)
	Losers	0.004659** (2.31)	0.003441* (1.75)	0.003207 (1.64)	0.002871 (1.47)	0.002615 (1.33)	0.002239 (1.14)
	Winners	-0.000215 (-0.11)	0.000533 (0.27)	0.000353 (0.18)	0.000532 (0.27)	0.001004 (0.50)	0.000972 (0.50)
12	L-W	0.004841*** (3.61)	0.003414*** (2.66)	0.00302** (2.41)	0.002068* (1.78)	0.001331 (1.26)	0.000765 (0.80)
	Losers	0.004547** (2.25)	0.003602* (1.80)	0.003283* (1.66)	0.002804 (1.41)	0.002136 (1.07)	0.001872 (0.94)
	Winners	-0.000294 (-0.14)	0.000188 (0.09)	0.000263 (0.13)	0.000735 (0.36)	0.000805 (0.40)	0.001107 (0.56)
16	L-W	0.004411*** (3.09)	0.002894* (2.12)	0.002517* (1.93)	0.001624 (1.35)	0.000808 (0.72)	0.000317 (0.31)
	Losers	0.004492** (2.20)	0.003662* (1.81)	0.003164 (1.57)	0.002145 (1.07)	0.001753 (0.87)	0.001387 (0.69)
	Winners	8.02E-05 (0.04)	0.000768 (0.38)	0.000647 (0.32)	0.000521 (0.26)	0.000945 (0.47)	0.001070 (0.54)
24	L-W	0.002785* (1.95)	0.001693 (1.23)	0.001435 (1.06)	0.000759 (0.60)	0.000392 (0.33)	0.000258 (0.24)
	Losers	0.002949 (1.45)	0.002213 (1.10)	0.001832 (0.91)	0.001317 (0.65)	0.001152 (0.57)	0.001230 (0.61)
	Winners	0.000164 (0.08)	0.000520 (0.26)	0.000397 (0.20)	0.000558 (0.28)	0.000761 (0.38)	0.000964 (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*** (6.42)	0.001062 (1.53)	0.000552 (1.03)	0.001021** (2.55)	0.00079** (2.32)	0.000532* (1.72)
	Up market	0.007081*** (4.62)	0.001151 (1.14)	0.000174 (0.21)	0.000544 (0.86)	0.000511 (0.94)	0.000189 (0.39)
	Down market	0.006311*** (4.41)	0.000953 (0.96)	0.001013 (1.75)	0.001601*** (3.06)	0.001138*** (2.76)	0.001959*** (2.59)
2	Whole period	0.0024** (2.40)	-0.00099 (-1.25)	0.000207 (0.29)	0.00101* (1.82)	0.00091* (1.83)	0.000627 (1.40)
	Up market	0.002348 (1.63)	0.001904 (1.64)	0.000316 (0.29)	0.000353 (0.40)	0.000415 (0.52)	0.00016 (0.23)
	Down market	0.002463* (1.70)	-0.000112 (0.09)	0.000844 (1.74)	0.001827** (2.51)	0.001529** (2.55)	0.001206** (2.25)
4	Whole period	0.00256** (2.33)	0.000942** (0.93)	0.001872 (2.01)	0.001833** (2.39)	0.00155** (2.25)	0.001108* (1.82)
	Up market	0.001085 (1.11)	0.000178 (0.12)	0.00114 (0.82)	0.001111 (0.92)	0.000928 (0.86)	0.00063 (0.66)
	Down market	0.003479** (2.19)	-0.001873 (1.28)	0.002769** (2.14)	0.002729*** (2.79)	0.002328** (2.68)	0.0017** (2.20)
8	Whole period	0.004874*** (3.84)	0.002908*** (2.45)	0.002854*** (2.50)	0.00234** (2.22)	0.001611*** (1.67)	0.001267*** (1.53)
	Up market	0.004218** (2.17)	0.002032 (1.10)	0.00207 (1.17)	0.001414 (0.86)	0.001417 (0.58)	0.000835 (0.66)
	Down market	0.005681*** (3.52)	0.003989*** (2.60)	0.003826*** (2.62)	0.003496*** (2.65)	0.002553** (2.13)	0.001796* (1.66)
12	Whole period	0.004841*** (3.61)	0.003414*** (2.66)	0.00302** (2.41)	0.002068* (1.78)	0.001331 (1.26)	0.000765 (0.80)
	Up market	0.00407** (1.96)	0.002345 (1.18)	0.001765 (0.91)	0.000854 (0.48)	0.000448 (0.28)	0.000122 (0.09)
	Down market	0.005801*** (3.37)	0.004749*** (2.81)	0.004589*** (2.81)	0.00357** (2.36)	0.002413* (1.73)	0.00155 (1.19)
16	Whole period	0.004411*** (3.09)	0.002894* (2.12)	0.002517* (1.93)	0.001624 (1.35)	0.000808 (0.72)	0.000317 (0.31)
	Up market	0.00306 (1.39)	0.00146 (0.70)	0.001322 (0.66)	0.000555 (0.30)	-0.00000997 0.01	-0.0002 0.14
	Down market	0.006096 (3.34)	0.004677 (2.68)	0.003994 (2.41)	0.002934 (1.88)	0.001806 (1.22)	0.000942 (0.67)
24	Whole period	0.002785* (1.95)	0.001693 (1.23)	0.001435 (1.06)	0.000759 (0.60)	0.000392 (0.33)	0.000258 (0.24)
	Up market	0.002299 (1.06)	0.001039 (0.51)	0.000861 (0.43)	0.000323 (0.18)	0.000181 (0.11)	0.000216 (0.14)
	Down market	0.003378 (1.81)	0.00249 (1.36)	0.002134 (1.18)	0.001286 (0.74)	0.000645 (0.38)	0.000309 (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 winners, losers and contrarian portfolios and stock returns after microstructure effect adjustment

J		K=1	K=2	K=4	K=8	K=12	K=16
1	L-W	-0.00476*** (-6.51)	-0.0031*** (-5.85)	-0.000762 (-1.59)	0.000207 (0.56)	0.000279 (0.85)	8.64-E5 (0.30)
	Losers	-0.000905 (-0.48)	7.72E-05 (0.04)	0.001217 (0.65)	0.001899 (0.10)	0.002030 (1.05)	0.002177 (1.12)
	Winners	0.003857** (2.00)	0.003177 (1.64)	0.001979 (1.01)	0.001691 (0.87)	0.001751 (0.90)	0.002092 (1.06)
2	L-W	-0.004426*** (-5.56)	-0.002129*** (-2.71)	0.000314 (0.45)	0.00079 (1.44)	0.000775 (1.58)	0.000455 (1.07)
	Losers	-0.000621 (-0.33)	0.000685 (0.37)	0.002413 (1.27)	0.002301 (1.20)	0.002292 (1.19)	0.002423 (1.24)
	Winners	0.003805* (1.96)	0.002813 (1.43)	0.001575 (0.81)	0.001511 (0.77)	0.001517 (0.78)	0.001968 (1.00)
4	L-W	-0.00079 (-0.76)	0.000954 (0.96)	0.001926** (2.14)	0.001605** (2.12)	0.001374** (2.00)	0.001054* (1.79)
	Losers	0.001642 (0.87)	0.002466 (1.30)	0.002773 (1.45)	0.002538 (1.32)	0.002631 (1.36)	0.002251 (1.15)
	Winners	0.002432 (1.22)	0.001513 (0.76)	0.000847 (0.43)	0.000932 (0.48)	0.001257 (0.64)	0.001197 (0.61)
8	L-W	0.001034 (0.89)	0.001793 (1.53)	0.002176** (1.96)	0.001735* (1.67)	0.001278 (1.39)	0.000887 (1.11)
	Losers	0.002415 (1.25)	0.002772 (1.43)	0.002706 (1.39)	0.002578 (1.32)	0.002100 (1.07)	0.002098 (1.07)
	Winners	0.001381 (0.69)	0.000979 (0.49)	0.000530 (0.27)	0.000842 (0.42)	0.000822 (0.42)	0.001211 (0.62)
12	L-W	0.001978 (1.55)	0.00239* (1.91)	0.002231* (1.80)	0.001407 (1.24)	0.000885 (0.86)	0.000379 (0.42)
	Losers	0.002666 (1.34)	0.002889 (1.47)	0.002835 (1.44)	0.002067 (1.04)	0.001935 (0.98)	0.001585 (0.80)
	Winners	0.000688 (0.34)	0.000499 (0.25)	0.000603 (0.30)	0.000659 (0.33)	0.001051 (0.53)	0.001206 (0.62)
16	L-W	0.001296 (0.96)	0.001745 (1.34)	0.001712 (1.36)	0.000995 (0.85)	0.00034 (0.31)	-0.000304 (-0.03)
	Losers	0.002757 (1.37)	0.002838 (1.40)	0.002230 (1.11)	0.001783 (0.89)	0.001417 (0.71)	0.001078 (0.54)
	Winners	0.001461 (0.72)	0.001093 (0.54)	0.000518 (0.25)	0.000788 (0.39)	0.001077 (0.54)	0.001109 (0.56)
24	L-W	0.00061 (0.45)	0.001009 (0.74)	0.000787 (0.60)	0.000336 (0.27)	0.000149 (0.13)	9.58-E05 (0.09)
	Losers	0.001483 (0.75)	0.001659 (0.82)	0.001270 (0.63)	0.000976 (0.48)	0.001023 (0.50)	0.001159 (0.57)
	Winners	0.000872 (0.44)	0.00065 (0.33)	0.000483 (0.24)	0.00064 (0.32)	0.000875 (0.44)	0.001063 (0.54)

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 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 5: Weekly contrarian profits after microstructure effect adjustment following different market states

J		K=1	K=2	K=4	K=8	K=12	K=16
1	Whole period	-0.00476*** (-6.51)	-0.0031*** (-5.85)	-0.000762 (-1.59)	0.000207 (0.56)	0.000279 (0.85)	8.64-E5 (0.30)
	Up market	-0.00486*** (-4.75)	-0.00411*** (-5.26)	-0.00101 (-1.41)	-0.00028 (-0.48)	-6.8E-05 (-0.13)	-0.00025 (-0.55)
	Down market	-0.00464*** (-3.97)	-0.00187** (-2.26)	-0.00046 (-0.66)	0.000811 (1.64)	0.000713* (1.73)	0.000497 (1.41)
	Whole period	-0.004426*** (-5.56)	-0.002129*** (-2.71)	0.000314 (0.45)	0.00079 (1.44)	0.000775 (1.58)	0.000455 (1.07)
2	Up market	-0.00062*** (-5.26)	-0.00339*** (-2.81)	-0.00033 (-0.31)	0.000107 (0.12)	0.000242 (0.31)	2.64E-05 (0.04)
	Down market	-0.00228* (-1.90)	-0.00059 (-0.56)	0.001097 (1.14)	0.001635** (2.36)	0.001439** (2.38)	0.000908* (1.88)
	Whole period	-0.00079 (-0.76)	0.000954 (0.96)	0.001926** (2.14)	0.001605** (2.12)	0.001374** (2.00)	0.001054* (1.79)
	Up market	-0.00147 (-0.94)	9.82E-05 (0.07)	0.001176 (0.87)	0.000913 (0.76)	0.00079 (0.74)	0.000716 (0.79)
4	Down market	0.000037 (0.03)	0.001999 (1.47)	0.002848 (2.30)	0.002461*** (2.58)	0.002101** (2.40)	0.001471* (1.92)
	Whole period	0.001034 (0.89)	0.001793 (1.53)	0.002176** (1.96)	0.001735* (1.67)	0.001278 (1.39)	0.000887 (1.11)
	Up market	-0.00016 (-0.09)	0.000593 (0.33)	0.001222 (0.71)	0.000798 (0.49)	0.000601 (0.42)	0.000542 (0.45)
	Down market	0.002509 (1.63)	0.003277** (2.19)	0.003363** (2.34)	0.002904** (2.20)	-0.00211* (1.77)	0.001309 (1.22)
8	Whole period	0.001978 (1.55)	0.00239* (1.91)	0.002231* (1.80)	0.001407 (1.24)	0.000885 (0.86)	0.000379 (0.42)
	Up market	0.000583 (0.29)	0.000868 (0.45)	0.000801 (0.42)	0.000158 (0.09)	2.68E-05 (0.02)	-0.00015 (-0.11)
	Down market	0.00372 (2.18)	0.004285** (2.55)	0.004014** (2.48)	0.00295** (1.98)	0.001933 (1.41)	0.001022 (0.8)
	Whole period	0.001296 (0.96)	0.001745 (1.34)	0.001712 (1.36)	0.000995 (0.85)	0.00034 (0.31)	-0.0000304 (-0.03)
16	Up market	0.000286 (0.14)	0.000441 (0.22)	0.000467 (0.24)	-3.6E-05 (0.02)	-0.00033 (-0.20)	0.000432 (0.31)
	Down market	0.003263* (1.92)	0.003361** (2.02)	0.003249** (2.00)	0.002167 (1.42)	0.001153 (0.79)	0.000453 (0.33)
	Whole period	0.00061 (0.45)	0.001009 (0.74)	0.000787 (0.60)	0.000336 (0.27)	0.000149 (0.13)	9.58-E05 (0.09)
	Up market	-0.00019 (-0.1)	0.000193 (0.10)	0.000286 (0.15)	-2.2E-05 (-0.01)	-3E-06 (0.00)	0.000187 (0.13)
24	Down market	0.00159 (0.86)	0.002 (1.11)	0.001397 (0.79)	0.000767 (0.45)	0.00033 (0.20)	-1.3E-05 (-0.01)

Table 5 presents average weekly returns for contrarian strategies following different market states, 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 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** (-2.47)	-0.002502** (-2.09)	0.000144 (0.16)	0.000378 (0.52)	0.000798 (1.15)	0.000759 (1.17)
2	L-W	-0.002655 (-1.45)	-3.23E-05 (-0.02)	0.001981 (1.43)	0.001448 (1.28)	0.001917 (1.75)	0.001699* (1.65)
4	L-W	0.002297 (1.10)	0.003516* (1.84)	0.004018** (2.20)	0.002726* (1.73)	0.003236** (2.06)	0.002572* (1.81)
8	L-W	0.004367** (1.98)	0.004489** (2.07)	0.004299* (1.97)	0.004039* (1.87)	0.003771* (1.81)	0.003224* (1.78)
12	L-W	0.006093** (2.50)	0.006001** (2.45)	0.005709** (2.27)	-0.004474* (-1.86)	0.004166* (-1.86)	0.003559* (-1.92)
16	L-W	0.005408** (2.05)	0.005439** (2.10)	0.004886* (1.84)	0.004207* (1.69)	0.004005* (1.82)	0.003592** (1.98)
24	L-W	0.005122** (2.12)	0.006161** (2.58)	0.005980** (2.59)	0.005137** (2.47)	0.004977** (2.59)	0.004516** (2.53)

Table 6 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 7: 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** (2.54)	0.006236** (2.48)	0.005030** (1.97)	0.005018** (1.98)	0.005078** (2.01)	0.005559** (2.21)
	Losers	0.001767 (0.78)	0.002126 (0.89)	0.004018* (1.72)	0.004739** (2.00)	0.005009** (2.12)	0.005310** (2.20)
2	Winners	0.007230*** (2.87)	0.006073** (2.38)	0.004747* (1.85)	0.004768* (1.87)	0.004897* (1.93)	0.005454** (2.15)
	Losers	0.001031 (0.43)	0.002681 (1.15)	0.004421** (1.91)	0.004875** (2.10)	0.005140** (2.20)	0.005481** (2.30)
4	Winners	0.005216* (1.95)	0.004438* (1.68)	0.003835 (1.47)	0.004155 (1.60)	0.004581* (1.78)	0.004243* (1.68)
	Losers	0.003747 (1.64)	0.004537* (1.96)	0.005011** (2.16)	0.005067** (2.20)	0.005371** (2.31)	0.004960** (2.09)
8	Winners	0.004289 (1.56)	0.003837 (1.40)	0.003503 (1.30)	0.004036 (1.50)	0.003789 (1.45)	0.004265* (1.69)
	Losers	0.004127* (1.78)	0.004430* (1.91)	0.004725** (2.06)	0.004833** (2.09)	0.004390* (1.86)	0.004806** (2.02)
12	Winners	0.003760 (1.35)	0.003708 (1.34)	0.003817 (1.38)	0.003762 (1.39)	0.004163 (1.59)	0.004269* (1.68)
	Losers	0.004343* (1.89)	0.004576** (1.99)	0.004617** (1.99)	0.003919* (1.65)	0.004190* (1.75)	0.004120* (1.70)
16	Winners	0.004803* (1.74)	0.004354 (1.58)	0.003573 (1.29)	0.003848 (1.42)	0.004066 (1.53)	0.003963 (1.54)
	Losers	0.004517* (1.85)	0.004795* (1.96)	0.004040* (1.68)	0.003884 (1.60)	0.003737 (1.52)	0.003530 (1.42)
24	Winners	0.003438 (1.29)	0.003423 (1.28)	0.003125 (1.18)	0.003345 (1.26)	0.003528 (1.36)	0.003730 (1.46)
	Losers	0.003245 (1.36)	0.003616 (1.48)	0.003411 (1.40)	0.003323 (1.35)	0.003525 (1.41)	0.003918 (1.56)

Table 7 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 8: 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 8 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 9: Weekly contrarian profits after microstructure effect and risk adjustment for the period from 2007 to 2010

JxK	Risk adjusted return	Rm-rf	SMB	HML	R <sup>2</sup>
1x1	-0.005275*** (-2.78)	0.015 (0.46)	-0.059 (-0.39)	-0.438*** (-2.62)	0.06
1x2	-0.003516*** (-2.93)	0.016 (0.73)	0.036 (0.40)	-0.167 (-1.39)	0.02
1x4	-0.000278 (-0.29)	0.014 (0.68)	-0.071 (-0.98)	-0.099 (-1.22)	0.02
1x8	5.54E-05 (0.07)	0.007 (0.39)	-0.083 (-1.35)	-0.091 (-1.40)	0.05
1x12	0.000619 (0.75)	0.004 (0.24)	-0.107 (-1.27)	-0.077 (-0.95)	0.08
1x16	0.000595 (0.75)	-0.004 (-0.25)	-0.094 (-1.17)	-0.047 (-0.59)	0.09
2x1	-0.003760** (-2.05)	0.028 (0.79)	0.017 (0.12)	-0.281 (-1.52)	0.02
2x2	-0.000730 (-0.43)	0.029 (0.90)	-0.039 (-0.31)	-0.136 (-0.83)	0.01
2x4	0.001919 (1.27)	0.027 (0.90)	-0.167 (-1.44)	-0.116 (-0.98)	0.05
2x8	0.001320 (1.10)	0.014 (0.45)	-0.132 (-1.32)	-0.091 (-0.85)	0.05
2x12	0.001976 (1.54)	0.012 (0.40)	-0.166 (-1.29)	-0.078 (-0.63)	0.08
2x16	0.001788 (1.42)	-0.003 (-0.14)	-0.147 (-1.18)	-0.044 (-0.36)	0.09
4x1	0.002172 (0.94)	0.038 (0.86)	-0.174 (-1.03)	-0.150 (-0.81)	0.02
4x2	0.003706* (1.71)	0.032 (0.75)	-0.228 (-1.31)	-0.123 (-0.74)	0.04
4x4	0.004277** (2.20)	0.033 (0.74)	-0.240 (-1.59)	-0.107 (-0.72)	0.06
4x8	0.003000* (1.75)	0.016 (0.38)	-0.215 (-1.34)	-0.067 (-0.39)	0.06
4x12	0.003702** (2.01)	0.006 (0.16)	-0.241 (-1.29)	-0.057 (-0.31)	0.09
4x16	0.002909* (1.67)	-0.008 (-0.22)	-0.187 (-1.06)	-0.006 (-0.03)	0.07
8x1	0.004513* (1.89)	0.042 (0.68)	-0.238 (-1.15)	-0.158 (-0.69)	0.03
8x2	0.004704** (1.98)	0.037 (0.60)	-0.228 (-1.11)	-0.071 (-0.32)	0.03
8x4	0.004770** (1.98)	0.030 (0.49)	-0.265 (-1.20)	-0.030 (-0.13)	0.05
8x8	0.004712* (1.88)	0.009 (0.16)	-0.276 (-1.11)	0.002 (0.01)	0.06
8x12	0.004451* (1.74)	-0.006 (-0.12)	-0.251 (-0.97)	0.040 (0.16)	0.06
8x16	0.003560 (1.60)	-0.012 (-0.26)	-0.161 (-0.72)	0.092 (0.41)	0.04

Table 9 continues on the next page

Table 9 continues:

JxK	Risk adjusted return	Rm-rf	SMB	HML	R <sup>2</sup>
12x1	0.006453** (2.28)	0.047 (0.70)	-0.276 (-1.01)	-0.076 (-0.28)	0.04
12x2	0.006515** (2.26)	0.042 (0.61)	-0.283 (-1.01)	-0.002 (-0.01)	0.04
12x4	0.006538** (2.21)	0.018 (0.27)	-0.308 (-1.07)	0.059 (0.21)	0.05
12x8	0.005294* (1.82)	-0.0060 (-0.10)	-0.267 (-0.91)	0.107 (0.36)	0.05
12x12	0.004752* (1.74)	-0.014 (-0.25)	-0.198 (-0.73)	0.149 (0.55)	0.04
12x16	0.003737* (1.70)	-0.024 (-0.47)	-0.086 (-0.40)	0.220 (0.99)	0.03
16x1	0.006058* (1.92)	-0.002 (-0.03)	-0.233 (-0.76)	0.119 (0.39)	0.03
16x2	0.006149* (1.95)	-0.012 (-0.17)	-0.228 (-0.73)	0.144 (0.46)	0.03
16x4	0.005624* (1.75)	-0.014 (-0.19)	-0.224 (-0.71)	0.178 (0.57)	0.04
16x8	0.004675 (1.55)	-0.023 (-0.34)	-0.156 (-0.52)	0.183 (0.60)	0.03
16x12	0.004179 (1.61)	-0.029 (-0.48)	-0.078 (-0.31)	0.221 (0.83)	0.02
16x16	0.003356* (1.70)	-0.033 (-0.59)	0.027 (0.15)	0.291 (1.40)	0.03
24x1	0.004979* (1.81)	-0.008 (-0.11)	-0.051 (-0.20)	0.151 (0.55)	0.01
24x2	0.006020** (2.26)	-0.015 (-0.19)	-0.036 (-0.14)	0.192 (0.72)	0.01
24x4	0.005809** (2.27)	-0.016 (-0.22)	-0.025 (-0.10)	0.204 (0.77)	0.01
24x8	0.004573** (2.14)	-0.021 (-0.30)	0.079 (0.42)	0.279 (1.22)	0.02
24x12	0.004163** (2.30)	-0.024 (-0.37)	0.152 (1.04)	0.353* (1.81)	0.05
24x16	0.003374** (2.21)	-0.028 (-0.47)	0.237** (2.24)	0.408** (2.51)	0.10

Table 9 presents average weekly returns for contrarian strategies, after the microstructure effect adjustment and after the risk adjustment by the Fama-French three factor model, for the time period from January 2007 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.



Table 10: Weekly contrarian profits following different market states after microstructure effect and risk adjustment

JxK		Risk adjusted return	Rm-rf	SMB	HML	R <sup>2</sup>
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 10 continues on the next page

Table 10 continues:

JxK		Risk adjusted return	Rm-rf	SMB	HML	R <sup>2</sup>
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
8x12	Up	0.001032 (0.61)	-0.147*** (-3.71)	0.113 (0.51)	-0.229 (-1.80)	0.09
	Down	0.001313 (1.19)	0.130*** (3.67)	0.226 (1.27)	0.332*** (3.22)	0.15
8x16	Up	0.000639 (0.44)	-0.110*** (-3.24)	0.140 (0.74)	-0.173 (-1.49)	0.07
	Down	0.000457 (0.47)	0.103*** (3.51)	0.257 (1.70)	0.330*** (3.72)	0.17

Table 10 continues on the next page

Table 10 continues:

JxK		Risk adjusted return	Rm-rf	SMB	HML	R <sup>2</sup>
12x1	Up	0.001453 (0.67)	-0.263*** (-4.94)	0.343 (1.29)	-0.275 (-1.51)	0.13
	Down	0.003022* (1.87)	0.259*** (4.80)	0.252 (1.10)	0.412* (1.79)	0.18
12x2	Up	0.001585 (0.73)	-0.236*** (-4.61)	0.309 (1.16)	-0.262 (-1.49)	0.12
	Down	0.003572** (2.25)	0.236*** (4.31)	0.247 (1.03)	0.461** (2.07)	0.17
12x4	Up	0.001499 (0.69)	-0.204*** (-4.16)	0.250 (0.92)	-0.303* (-1.82)	0.10
	Down	0.003235** (2.11)	0.197*** (3.84)	0.262 (1.09)	0.449** (2.47)	0.15
12x8	Up	0.000649 (0.32)	-0.165*** (-3.53)	0.199 (0.76)	-0.273* (-1.77)	0.08
	Down	0.002106 (1.52)	0.160*** (3.56)	0.298 (1.31)	0.401*** (3.16)	0.15
12x12	Up	0.000191 (0.11)	-0.122*** (-2.93)	0.197 (0.85)	-0.219 (-1.55)	0.07
	Down	0.001032 (0.82)	0.127*** (3.24)	0.329 (1.64)	0.376*** (3.49)	0.16
12x16	Up	-0.000387 (-0.25)	-0.087** (-2.32)	0.226 (1.13)	-0.148 (-1.10)	0.06
	Down	7.03E-05 (0.06)	0.096*** (2.85)	0.367** (2.11)	0.372*** (3.68)	0.17
16x1	Up	0.000125 (0.06)	-0.184*** (-3.65)	0.426 (1.58)	-0.399** (-2.10)	0.12
	Down	0.002362 (1.47)	0.198*** (3.48)	0.392 (1.53)	0.427** (2.35)	0.15
16x2	Up	0.000680 (0.31)	-0.161*** (-3.21)	0.403 (1.46)	-0.358* (-1.88)	0.11
	Down	0.002457 (1.56)	0.181*** (3.23)	0.379 (1.46)	0.450** (2.49)	0.15
16x4	Up	0.000838 (0.39)	-0.167*** (-3.52)	0.319 (1.16)	-0.305* (-1.77)	0.09
	Down	0.002355 (1.55)	0.172*** (3.31)	0.361 (1.40)	0.473*** (3.15)	0.15
16x8	Up	0.000307 (0.15)	-0.140*** (-2.95)	0.262 (0.98)	-0.267 (-1.60)	0.08
	Down	0.001224 (0.89)	0.148*** (3.33)	0.391 (1.81)	0.433*** (3.41)	0.17
16x12	Up	-0.000454 (-0.25)	-0.101** (-2.27)	0.265 (1.10)	-0.195 (-1.21)	0.07
	Down	0.000160 (0.12)	0.115*** (2.89)	0.428** (2.21)	0.402*** (3.46)	0.18
16x16	Up	-0.000958 (-0.64)	-0.074* (-1.86)	0.309 (1.59)	-0.145 (-0.99)	0.08
	Down	-0.000592 (-0.48)	0.088** (2.40)	0.457*** (2.62)	0.402*** (3.43)	0.19

Table 10 continues on the next page

Table 10 continues:

JxK		Risk adjusted return	Rm-rf	SMB	HML	R <sup>2</sup>
24x1	Up	0.000361 (0.17)	-0.176*** (-3.27)	0.388 (1.44)	-0.404** (-2.25)	0.12
	Down	0.000538 (0.32)	0.176*** (3.44)	0.531* (2.49)	0.521** (2.90)	0.19
24x2	Up	0.000542 (0.25)	-0.150*** (-2.82)	0.389 (1.43)	-0.376** (-2.00)	0.10
	Down	0.000945 (0.57)	0.165*** (3.25)	0.523** (2.34)	0.522*** (3.04)	0.19
24x4	Up	0.000401 (0.19)	-0.129** (-2.50)	0.361 (1.36)	-0.320* (-1.77)	0.09
	Down	0.000338 (0.21)	0.151*** (3.12)	0.531** (2.43)	0.503*** (3.08)	0.19
24x8	Up	-0.000365 (-0.20)	-0.106** (-2.18)	0.383 (1.61)	-0.209 (-1.19)	0.09
	Down	-0.000344 (-0.23)	0.127*** (2.75)	0.563*** (2.86)	0.465*** (3.00)	0.20
24x12	Up	-0.000683 (-0.44)	-0.073 (-1.64)	0.399** (2.08)	-0.147 (-0.90)	0.10
	Down	-0.000887 (-0.61)	0.094** (2.07)	0.599*** (3.27)	0.448*** (2.80)	0.22
24x16	Up	-0.000695 (-0.50)	-0.054 (-1.28)	0.414** (2.52)	-0.103 (-0.66)	0.11
	Down	-0.001291 (-0.94)	0.063 (1.47)	0.634*** (3.92)	0.463*** (2.77)	0.24

Table 10 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.