The Research on the Momentum and Contrarian Effects: Based on the Application in the Stock Market

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Abstract: In this paper, we study the momentum and reversal effects, which are caused by market sentiment. Based on the empirical analysis of 12 years on the domestic stock market, considering the influence of selection period and holding period, we draw some conclusions. The results show that the domestic stock market displays obvious momentum effect and contrarian phenomena. When the stock selection period is medium-term (6 months) and short (or medium) holding period, it easily conducts momentum effect. And when the stock selection period is short-term (1 month) and short (or medium) holding period, it easily conducts reverse phenomenon. When the stock selection period is long-term (12 months) and short (or medium) holding period, the reverse phenomenon is also prone to happen. If securities are permitted to be long and short, long-short portfolio could earn greater excess return.

Key words: Momentum Effects; Contrarian Effects; Statistical Arbitrage

Introduction

As reported by journalists, psychologists, and economists, the individual in society tends to be overreaction to the information achieved. Unfortunately, the same thing is expected to happen in the stock market, that is to say investors prone to overreact in front of public of private information. As obvious evidence showed, the stock price only partly depends on the fundamental aspect; on the other hand, it is the emotion of investors in the stock market that leaves an influence on the share price.

Let's observe an extreme case, one stock whose price is 60 Yuan before one month is sold as the price of 20 Yuan at present. During this month none fundamental issue is suffering changes, such as the macroeconomic environment and the profitability of listed companies. When the market shares the optimistic emotions, the bull news will be expected to be exaggerated and at the same time the bear news will be lessened. As the result, the stock price is going to be over-estimated compared to the price supported by normal performance. When the market shares the pessimistic emotions, the bear news will be expected to be exaggerated and at the same time the bull news will be lessened. As the result, the stock price is going to be

under-estimated compared to the price supported by normal performance. Even if their performance turns up, the price is still just so so.

In fact, as long as the market participants are human beings, all the character flaws are represent in the market price. Overreaction and under reaction are two aspects of this kind of flaws.

If this kind of flaw exactly exists, as a rational investor, dose he or she can achieve excess returns by making use of this flaw? The answer is “Yes”! Because as the findings show some strategies can be used by investors to achieve excess returns. Even in the most lasting bear market like the period from 2001.6 to 2005.6, these strategies are also applicable.

According to the performance of shares, we can order them in terms of holding period returns, and then we can formulate the “Winner” portfolio and “Looser” portfolio. The “Winner” portfolio is the set of top 10 percent of the stock pool, while the “Looser” portfolio is the set of bottom 10 percent of the stock pool. Why do we pay much attention to the “Winner” portfolio and “Looser” portfolio? It is because these portfolios express the extreme emotions of market investors. What’s more, we observe the portfolio rather than individual stock is because we can exclude the effect of non system risk.

A plenty of empirical studies show that “Momentum Effect” and “Contrarian Effect” are ubiquitous. In finance, momentum is the empirically observed tendency for rising asset prices to rise further, and falling prices to keep falling. While the contrarian is the empirically observed tendency for rising asset prices’ reverse. In the case of “Momentum Effect”, the performance of “Winner” portfolio is better than the “Looser” portfolio in the future, while In the case of “Contrarian Effect”, the performance of “Winner” portfolio is worse than the “Looser” portfolio in the future. Evidently, in the market with “Momentum Effect”, “Relative Strength” strategy should be used; while in the market with “Contrarian Effect”, “Contrarian Strategy” should be used. “Relative Strength” strategy means that we should sell the “Looser” portfolio and buy the “Winner” portfolio; while “Contrarian Strategy“means that we should sell the “Winner” portfolio and buy the “Looser” portfolio.

“Momentum Effect” can be explained in terms of “Underreaction”, while the “Contrarian Effect” can be explained in terms of “Overreaction” in the area of behavioral finance. In general, “Momentum Effect” indicates that the increased stock is far from the intrinsic value, and “Contrarian Effect” indicates that the increased stock is over estimated while the bad stock is under estimated. More attention, in the case of “Contrarian Effect”, two different situations are taken place at the same time. It is due to the identification of observation period and holding period.

Literature Review

Jegadeesh and Titman (1993) analyse the profitability of the momentum strategies over three-to twelve-month horizons, in which investors buy past winning stocks and sell past losing stocks to obtain momentum profits. The authors argue that

the systematic risk of the momentum strategies and the delayed stock price reactions to common factors (Lo and MacKinlay, 1990) cannot explain the profitability of these strategies. They point out that the profitability of the momentum strategies is due to the delayed price reactions to firm-specific information.

Their first observation is that betas of past winning portfolios are larger than betas of past losing portfolios, meanwhile both best and worst past performing portfolios consists stocks with size smaller than average size. Secondly, the author finds that the second factor, which is the serial covariance of factor portfolios returns in their sample to be negative. Lastly, they find the estimated value for the third term to be positive and not explained by the lead-lag effect. The authors conclude that the profitability of momentum strategies is explained by market under-reaction to firm-specific information.

Hong, Lim, and Stein (2000) examine the profitability of momentum strategies based on the analysis of firms' size and analyst coverage. In the first step, they run cross-sectional regressions, using monthly data for 1980-1996 periods, for stocks that are larger than 20th percentile NYSE/AMEX firms. The reason for excluding the smallest firms is that there is almost no analyst coverage for them. The dependent variable for the regression model is log(1+Analyst Coverage). For the first model, the explanatory variables are log(Size) and a NASDAG dummy. The R-Square is highly significant, for example for the month December of 1988, the R-Square is 0.61. When collectively and individually adding more explanatory variables such as firms' year-end book-to-market ratio, market beta, 1/ price per share, variance of stock returns, rates of return lagged 0, 1, 2,and 3 years, stock turnover ratio, a multiplication of NASDAQ dummy and turnover ratio, a options dummy, a CRSP industry dummy, the R-Squares only increase marginally. Therefore, the authors use the first model to find the residual analyst coverage for stocks in the sample.

In the second step, based on the past performance of six months, they sort stocks into three groups: 30 percent of worst past performers, 30 percent of best past performers, and 40 percent of average performers. In each performance category, the authors sort comprised stocks based on their mean (and median) size into 10 deciles. The momentum profits can be obtained buying top-winners and shorting losers, and by buying small-size stocks and shorting large-size stocks. The reason is that smaller (but not smallest) firms have slower information diffusion (may be due to less investor participation), and the contrary is true for larger firms.

In the alternative procedure, the authors exclude stocks in the lowest 20th percentile NYSE/AMEX breakpoint, and in each past performance group they sort stocks based on the 6-months prior residual analyst coverage obtained from model 1. They find that by buying subgroups with the lowest residual analyst coverage and shorting subgroups with the highest residual analyst coverage, momentum profits can be achieved. Especially, profits are largest when apply this strategy on stocks comprised in the worst performing portfolio. The intuition is that the worst performer with least analyst coverage diffuses information most slowly to the investing public. The role of analysts in extracting and spreading information is thus proved significant.

In brief, Hong et al. (2000)'s study supports the findings of Jegadeesh and

Titman (1993) that the profitability of momentum strategies is obtainable and that the profitability is explained by the delay of price reaction to firm-specific information.

Cooper et al. (2003) examine the predictability in the cross-section of bank stock returns in the U.S. from June 1986 to December 1999. They find that fundamental variables such as non-interest income, loan-loss reserves, earnings, leverage, and standby letters of credit play significant role in predicting bank stock returns. Meanwhile, the book-to-market ratio and size are found insignificant factors. The authors state that the under-reaction of investors upon changes of banks' fundamental variables leads to the predictability of bank stock returns.

To test the sources of the predictability, the authors perform a two-way sorting approach in which stocks are sorted based on lagged monthly returns into terciles, and then sorted independently based on percentage changes of each significant fundamental variable (earnings per share, non-interest income to net income, and book value of equity divided by total assets).They find that in good states of the fundamental variables, stock returns increase, and especially increase more for past winning stocks. This finding implies the under-reaction of investors in response to the changes of these fundamental values.

The authors also examine the cumulative returns for combined portfolios that are sorted independently based on the earnings-per-share, non-interest income to net income, and book value of equity to total assets. For the first two factors, the cumulative returns increase for the first 18 months after the news shocks and then decline for the rest 12 months. For the last factor, the cumulative returns decrease after 5 months. The reversal of profits in the long-run confirms that investors' under-reaction leads to momentum profitability (Daniel, Hirshleifer, and Subrahmanyam, 1998).

Bessler and Nohel (2000) state that due to banks' role as an intermediary of information, managerial decisions in banks' structure are highly sensitive to investors' reaction. Investors interpret that banks' decisions are made based on their special access and priority to private information. Externalities that one bank may cause to other banks due to its announcement is the contagion effect created based on the spread of information.

The authors test the effect of the contagion effect on banks' stock returns in the events of dividend reduction announcements. Using the abnormal returns extracted from CAPM model, upon the dividend reduction announcement of one set of money center banks, the authors find the cumulative abnormal returns for the three-day announcement period (including days -1, 0, and +1)of the set of non-announcing money center banks to be statistically and significantly negative at -1.521% on average. The implication is that the announcement of one money center bank tends to highly affect the stock returns of other money center banks that have similar asset composition. The similar effect is found, although weaker, for regional banks which have stocks traded on major exchanges and substantial asset size.

Elyasiani and Mansur (1998) study the impact of interest rate and its volatility on the bank stock returns by employing the generalized autoregressive conditionally heteroskedasticity in the mean methodology (Engle et al., 1987). Firstly, they find a

significant and negative inter relation between risk and bank stocks 'returns.The explanation is that during risky periods, investors incline to invest in bank stocks, given that banks are less affected by adverse events of the periods (Fama and Schwert, 1977; Campbell, 1987; Glosten et al., 1993). The increase demand of bank stocks during market downturn drives banks' stock price upward, and thus banks' stock returns downward. Moreover, shocks to the banking sector tend to persist longer, and large and regional banks absorb shock effects slower than money center banks.

Given the sensitivity of bank stock performance under different macroeconomic factors, it is essential to understand the bank stock volatility under the impact of news and asymmetric information. Crouzille, Lepetit, and Tarazi (2004)examine the issue of asymmetric information in banking based on the volatility of bank stock prices in response to news. The authors construct a earnings prediction model which estimate performance of returns on assets based on bank specific variables and macroeconomic variables. The residual plays a role in indicating the existence of asymmetric information between insiders and outsiders of banks. The authors examine the relationship between the proxies of asymmetric information and the volatility of bank stock returns. They conclude that the public information is not sufficient to predict the volatility of bank stock returns and confirm the strong asymmetric information in banking.

Data and Strategy

We choose to sample the data from 1998 to 2008 and use the monthly closing price to test the profitability of different strategies. And then apply the optimal parameters in the out-of-sample data (2008.11~2011.2) to test the stability of previous result. One more attention, only in the circumstance allowing short sell can the "Momentum Strategy" and "Contrarian Strategy" be applied. "Momentum Strategy" and "Contrarian Strategy" are manipulated by the way of "Long-Short" theory which is like the "Dollar Neutral Strategy" of "Equity Market Neutral Strategy". The most important difference is that "Long-Short" theory need the consistence of the market price of long position and short position at the initial period, while the "Dollar Neutral Strategy" must keep this consistence during the whole process.

The momentum strategies are set up as following. Firstly, at the beginning of each month stocks are ranked based on their past J-month performance into ten deciles, in which the highest decilecomprises best performing stocks and the lowest decilecomprises worst performing stocksof the last J-months. The ten portfolios are thus constructed and have equal weights. Secondly, stocks grouped in these portfolios are held for K months following the date of the portfolios formation and are rebalanced monthly to maintain equal weights. The authors generate thirty-two buy and sell trading strategies based on the average returns of these portfolios. They choose to report the representative strategy in which J and K are both six months.

To examine whether the momentum profits are due to systematic risk of the strategy or due to firm-specific factors, we construct the expected profits from the

momentum trading strategy based on the one-factor model as following $E\{(r_{it}-\overline{r}_t)(r_{it-1}-\overline{r}_{t-1})\}>0$, which is also positive the positive cross-sectional covariance of past and current stock returns (Jegadeesh, 1987).We decompose the expected profits from the momentum strategy into three factors: $E\{(r_{it}-\overline{r}_t)(r_{it-1}-\overline{r}_{t-1})\}=\sigma_\mu^2+\sigma_b^2 COV(f_t,f_{t-1})+\mathrm{cov}_i(e_{it},e_{it-1})$,where and are the cross-sectional variances of unconditional expected returns and factor sensitivities.is the serial covariance of unconditional unexpected returns on a factor-mimicking portfolio of the previous and current time t. is the average serial covariance of the idiosyncratic factors of security returns.

Data

Within our sample pool, we choose 623 stocks from Shanghai Stock Exchange and Shenzhen Stock Exchange. The data we analyze is their monthly closing price from 1998.5 to 2008.5 (120 months), based on which we calculate 119 monthly returns (logarithmic return).

Strategy Illustration

Order the stocks ascending according to the logarithmic returns of past L months. If we choose “Chase Strategy” the top 63 stocks with highest returns are included in the portfolio; if we choose “Hunters Strategy” the last 63 stocks with lowest returns are included in the portfolio; if we choose “Momentum Strategy” we will buy the top 63 stocks with highest returns and sell the last 63 stocks with lowest returns; if we choose “Contrarian Strategy” we will sell the top 63 stocks with highest returns and buy the last 63 stocks with lowest returns. As an assumption, the weights put on different stocks in the portfolio are equal. Then the final portfolio return is the mean of all stock returns.

If we hold the portfolio formulated above for H months, the strategy can be identified as L×H strategy. For example, if we choose “Chase Strategy” with the observation period of L and holding period of H, we call this strategy as “L×H Chase Strategy”. If we choose “Momentum Strategy” with the observation period of L and holding period of H, we call this strategy as “L×H Momentum Strategy”.

Except to the initial period, there are H stock portfolios in every month, and that is to say we need to adjust the portfolio every month. Some portfolios have been held to the maturity should be reconstructed, and the members of new portfolios should be chosen according to their performance. For the observation period is L months, we can hold the portfolio from L+1 month. After one month, half of the portfolio should be adjusted and all of capital should be invested in new portfolio. Then after another month, we adjust 1/6 from two old portfolios to formulate the new portfolio. With this kind of adjustment can we make sure all of the capital gained in every month is permitted to invest to the market. And each portfolio of different month is sharing identical quota.

Empirical Test

In sample test

In this paper we treat the observation period (L) as 1、3、6、9 and 12 months and set up the holding period as 1、3、6、9、12、18、24、36 months respectively. That is to say we formulate 40 categories (120 portfolios) in this paper and test their returns and risks. Take different strategies with different risks into consideration, we should do an adjustment as follows:

$$\hat{R}_i = R_i \frac{V_0}{V_i}$$

Where, V_i stands for the stand deviation of strategy i, and V_0 stands for the stand deviation of index strategy, and R_i stands for the logarithmic return of strategy i, and $\hat{R}_i$ stands for the logarithmic return of strategy i after adjustment.

Though the observation and analysis of data, and compare with the performance of index return, we can draw conclusions as follows:

1. Most of strategies do a worse job compared to SSE Composite Index, especially when the return is adjusted in terms of risk.

Table 1: Chase Strategy vs Indexation Strategy

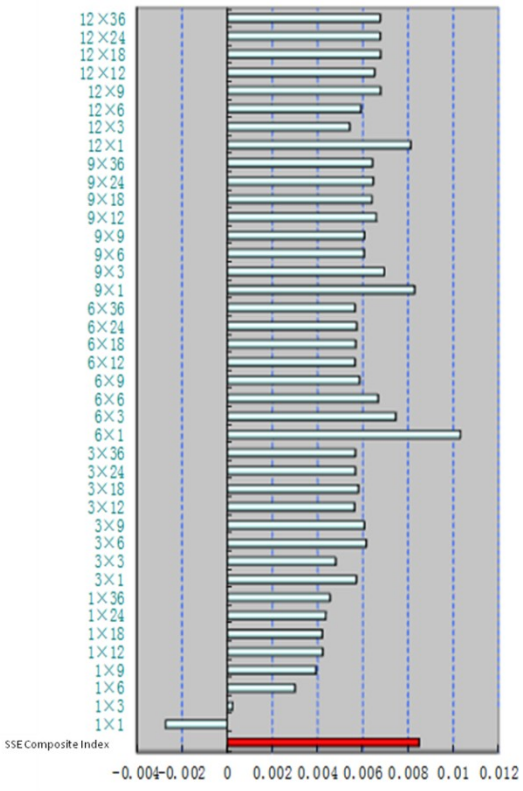
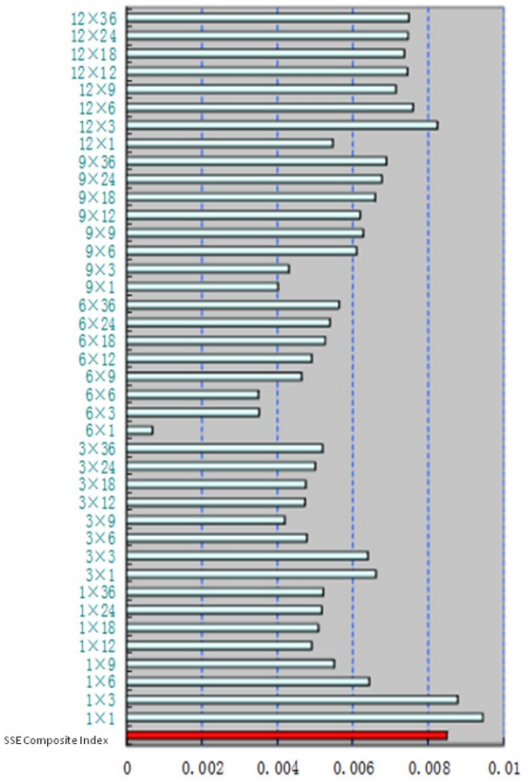


Table 2: Hunters Strategy vs Indexation Strategy



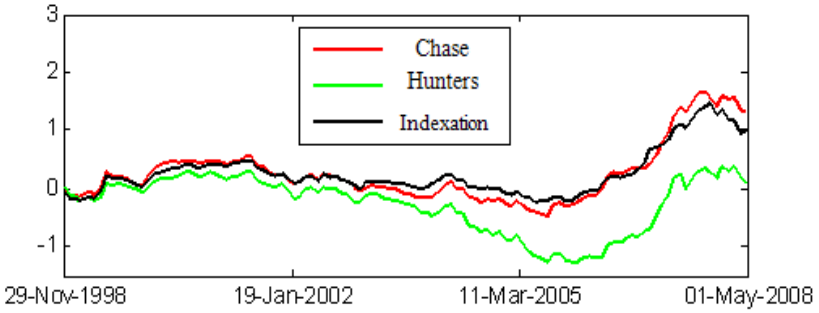
2. Only a few strategies (Chase Strategy and Hunters Strategy) gain an achievement more than SSE Composite Index. Keep the influence of risk out of consideration; Only 4 kinds of Chase Strategies out of 40 categories perform better

than that of SSE Composite Index, and they are like 6×1, 12×1,9×1 and 6×3 Chase Strategy; Only 8 kinds of Hunters Strategies out of 40 categories perform better than that of SSE Composite Index, and they are like 1×1,1×3,12×3,12×6,12×36,12×24,12×12 and 12×18 Hunters Strategy. If we take the effect of risk into consideration, only 3 kinds of strategies out of 40 categories achieve a better result than that of SSE Composite Index. They are ordered in terms of return, and like 6×1 Chase Strategy, 1×1 Hunters Strategy and 1×3 Hunters Strategy.

3. Taking the influence of risk into consideration, the most successful Momentum Strategies are 6×1 momentum strategy, 6×6 momentum strategy and 6×3 momentum strategy in turn. The most successful Contrarian Strategies are 1×3 contrarian strategy, 1×1 contrarian strategy and 12×3 contrarian strategy in turn.

During the adjustment process, every strategy will absolutely take some transaction cost. Suppose that as long as there is a portfolio adjustment, there are 30 percent of constituent stocks suffering a change. Further assume that the transaction fee can be measured as five in thousand. Every adjustment scale is about 1/H of the whole scale (H stands for the holding period). Then we can treat the monthly transaction cost as 0.0015/H. In the case of H=1, the monthly transaction cost is 0.0015; In the case of H=3, the monthly transaction cost is 0.0005. Where there is a longer holding period, there is a lower the monthly transaction cost.

Table 3: 6×1 Investment Strategies



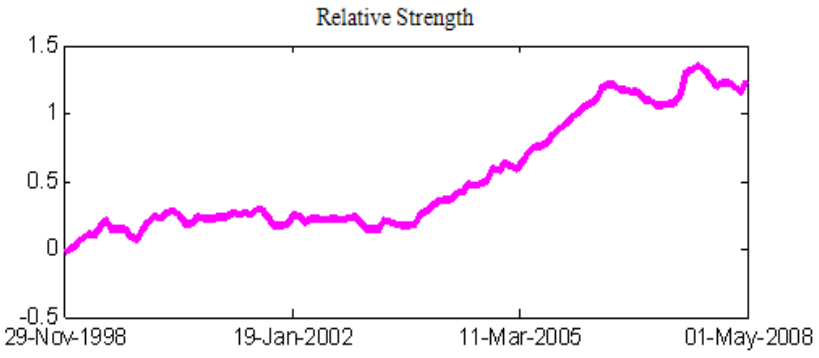


Table 4: 1×1 Investment Strategies

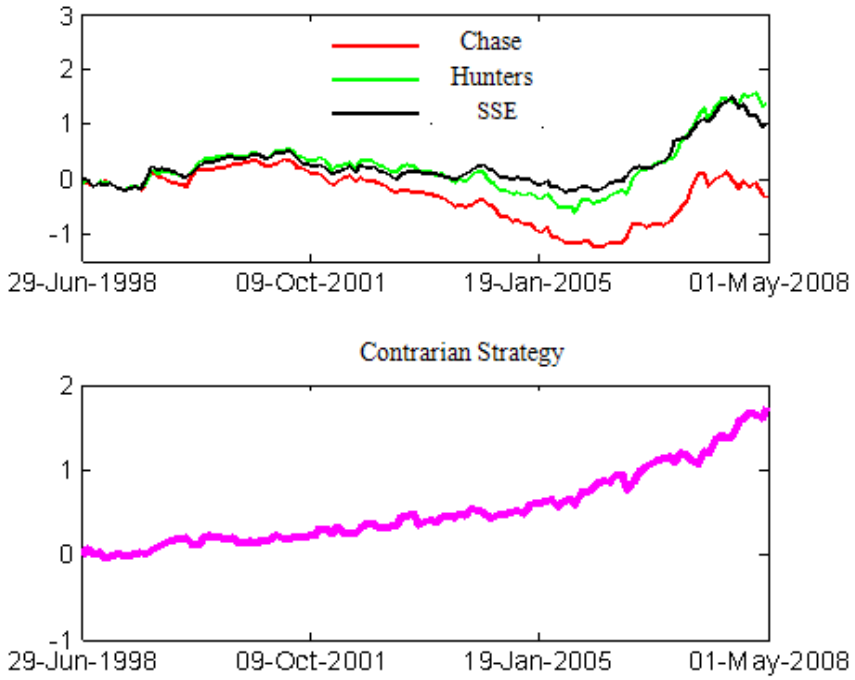
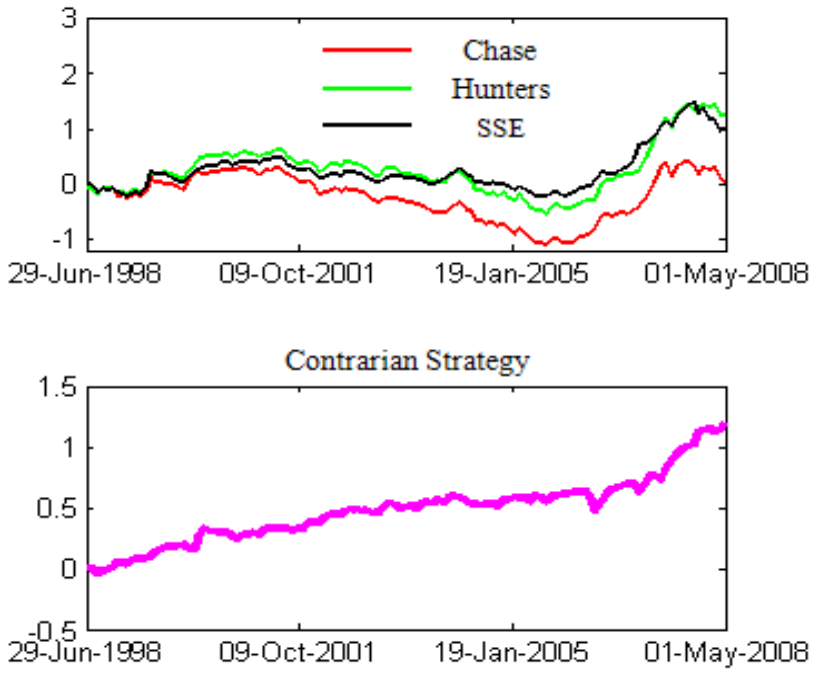


Table 5: 1×3 Investment Strategies



Out-of-Sample Test

We take the most successful momentum strategy (6×1) and the most successful contrarian strategies (1×3 and 1×1) into out-of-sample test. The test period is from 2008.11 to 2011.2. The sample set is including constituent stocks of Shanghai and Shenzhen 300 index. Exclude the stocks listed after2008.5 and we achieve 271 stocks in sample set. In every transaction, we sell 27 stocks and buy 27 stocks with same weight.

6×1 momentum strategy: Buy the 27 stocks with best performance in past 6 months and sell 27 stocks with lowest returns in past 6 months and then hold this portfolio for 1 month.

1×1 contrarian strategy: Buy the 27 stocks with best performance in past 1 month and sell 27 stocks with lowest returns in past 1 month and then hold this portfolio for 1 month.

1×3 contrarian strategy: Buy the 27 stocks with best performance in past 1 month and sell 27 stocks with lowest returns in past 1 month and then hold this portfolio for 3 month.

Portfolio strategy: Carry out the 6×1 momentum strategy and 1×1 contrarian strategy at the same time.

The statistic results of above four kinds of strategies are as below:

Figure 1: Strategies' Returns

L×H	Accumulated Return（%）（without the consideration of risk）	The return of Shanghai and Shenzhen 300（%）	The stand deviation of logarithmic return	The return after adjustment of risk（%）
6×1	9.00	94.72	0.0787	11.34
1×1	64.10	94.72	0.0807	82.59
1×3	13.18	94.72	0.1532	11.37
Portfolio strategy	33.74	94.72	0.0406	101.88

As the above results indicate, according to the test result achieved from in-sample data, we formulate the investment portfolio making use of the out of sample data. 6×1 momentum strategy, 1×1 contrarian strategy and 1×3 contrarian strategy are all achieve positive returns but the returns fluctuate greatly. Because the market suffers a significant increase (measured in terms of Shanghai and Shenzhen 300 index) during the test period, the absolute returns of these three strategies are lower than that of returns after indexation. What's more, even if we take the effect of risk into consideration, the returns we gain from strategies share no expectation to be higher than that of investment after indexation. Among these three strategies 6×1 momentum strategy and 1×3 contrarian strategy can not achieve a pretty well absolute return. Pay more attention, when it comes to 6×1 momentum strategy and 1×3 contrarian strategy, their yield curves fluctuate intensely, and their returns after adjustment in terms of risk are higher than that of returns after indexation.

Table 6: Monthly Returns of Three Strategies

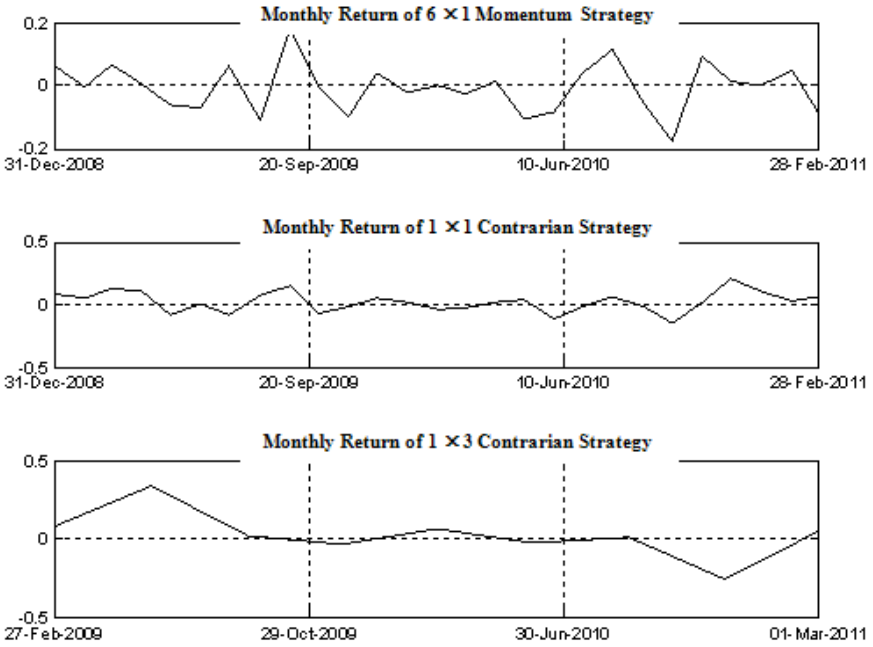


Table 7: Accumulated Returns of Three Strategies

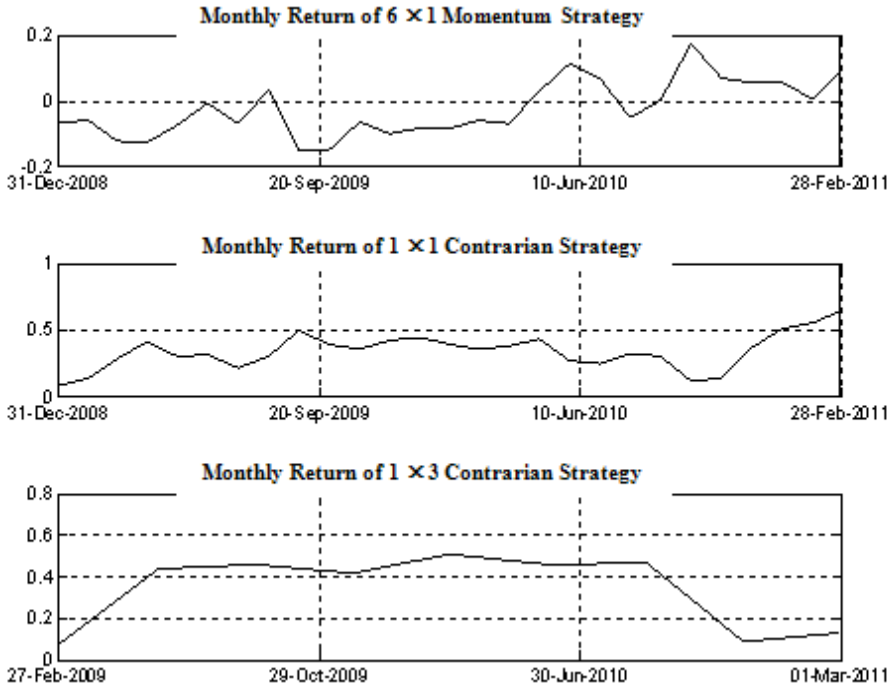
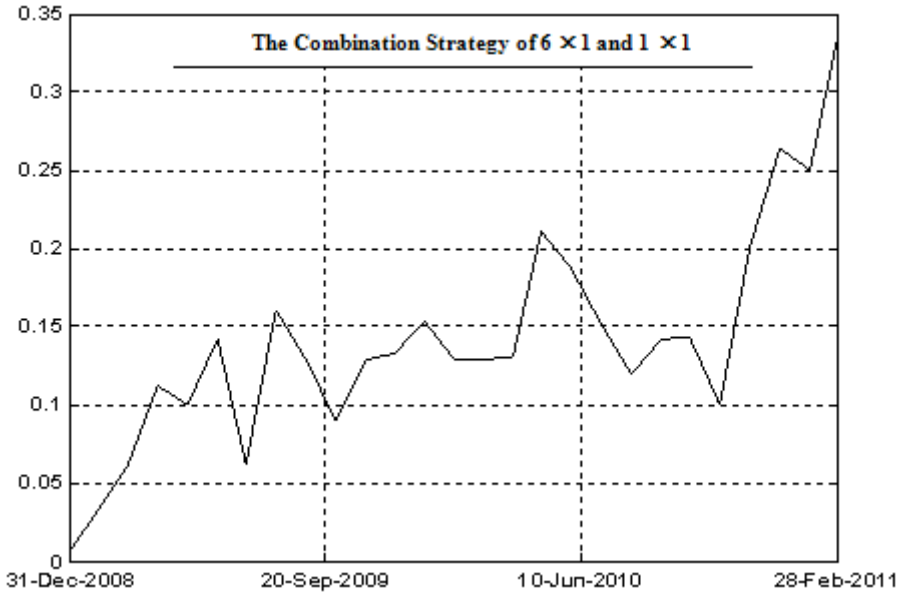


Table 8: The Return of Combination Strategy



Finally, more attention should be paid to one issue that, the so-called return of momentum strategy or contrarian strategy is concerned as normal position. Because these two kinds of strategies are Long-Short strategies, theoretically they have an infinite leverage ratio. What's more, both momentum strategy and contrarian strategy pay more attention to the absolute returns, so there is little sense to compare this kind of return with index return. From our perspective, it is nothing but the possibility of securities lending and the transaction of margin financing that should play a key role in analysis.

Conclusion

After the empirical test, we can draw conclusions as follows:

Firstly, indexation investment strategy is pretty efficient, 80 kinds of categories (including 40 Chase strategies and 40 Hunters strategies) almost perform worse than that of indexation investment strategy. Especially, it is much more significant after risk adjustment.

Secondly, there are several strategies perform better than that of SSE Composite Index after adjustment of risk (logarithmic return is 1.0112 and arithmetic average rate of return is 174.89%). These strategies are 6×1Chase strategy, 1×1Hunters strategy and 1×3 Hunters strategy. Their accumulated logarithmic returns are 1.3320, 1.3748 and 1.2301; while their arithmetic average rate of returns are 278.86%, 295.43% and 242.16%. These returns are higher than SSE Composite Index by 59.45%, 68.92% and 38.46% respectively.

Thirdly, the influence from transaction cost on long-short strategy is significant. When it comes to the 40 categories strategies on the bases of long-short strategy, in the case without considering the risk effect and transaction cost the momentum effect

can be figured out for 17 times and contrarian effect can be figured out for 23 times; while in the case considering the risk issue and transaction cost the momentum effect can be figured out for 6 times and contrarian effect can be figured out for 12 times.

Fourthly, when it comes to the momentum and contrarian effect, it is nothing but the observation period and holding period that leaves a significant influence on the final return. Specifically, in the case of medium term observation period and medium or short term holding period, the very thing expected to happen is momentum effect; in the case of short term observation period and medium term holding period, the very thing expected to happen is contrarian effect; in the case of long term observation period and medium or short term holding period, the very thing expected to happen is contrarian effect.

Fifthly, under the assumption of margin financing, long-short portfolio achieves a pretty significant excess return. Taking the issue of transaction cost into consideration, 6×1 momentum strategy can achieve an average rate of return for 10.05%, and 1×1 and 1×3 contrarian strategies realize the returns of 14.98% and 11.64% respectively. On the other hand, even if during the period from 2001.6 to 2005.6, which is treated as the longest bear period, the three strategies mentioned above can still achieve a stable achievement.

Sixthly, concluding from the out-of-sample test, 6×1 momentum strategy, 1×1 and 1×3 contrarian strategies are all achieve a positive absolute return. However, 6×1 momentum strategy and 1×3 contrarian strategy suffer a poor return while the 1×1 contrarian strategy is just passable. If we carry out 6×1 momentum strategy and 1×1 contrarian strategy at the same time, the volatility of returns can be decreased efficiently, and the return will be more stable and much higher.

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