Behavioral investment strategy matters: a statistical arbitrage approach

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16 August 2011

Behavioral Investment Strategy Matters:
A Statistical Arbitrage Approach

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Abstract:

In this study, we employ a statistical arbitrage approach to demonstrate that momentum investment strategy tend to work better in periods longer than six months, a result different from findings in past literature. Compared with standard parametric tests, the statistical arbitrage method produces more clearly that momentum strategies work only in longer formation and holding periods. Also they yield positive significant returns in an up market, but negative yet insignificant returns in a down market. Disposition and over-confidence effects are important factors contributing to the phenomenon. The over-confidence effect seems to dominate the disposition effect, especially in an up market. Moreover, the over-confidence investment behavior of institutional investors is the main cause for significant momentum returns observed in an up market. In a down market, the institutional investors tend to adopt a contrarian strategy while the individuals are still maintaining momentum behavior within shorter periods. The behavior difference between investor groups explains in part why momentum strategies work differently between up and down market states. Robustness tests confirm that the momentum returns do not come from firm size, overlapping execution periods, market states definition or market frictions.

Keywords: Momentum Strategy, Statistical Arbitrage, Market State, Disposition Effect
JEL codes: C14, D82, D83, G12, L11

I. Introduction

Efficient market hypothesis has been found to contradict performances of security returns in various studies. Equilibrium model are the most common one employed to examine the contradiction. Results from these models are, however, subject to the potential problem of 'joint hypotheses' as pointed out in Fama (1998). Abnormal returns may indicate the equilibrium model adopted is inappropriate instead of implying market inefficiency. Fama (1998) also argues that the determination of long-term inefficiency is sensitive to statistical methodology.

Extending the prospect theory of Kahnman and Tversky (1979), Jegadeesh and Titman (1993) proposes a model of momentum to examine market efficiency and found that stock prices are predictable under the momentum model. After being adjusted by equilibrium models of CAPM or the Fama-French three-factor model, momentum strategy still generates significant excess returns. In addition, the extension of prospect theory by Daniel and Titman (1999) on overconfidence also indicates that certain stocks could generate greater overconfidence among investors, resulting in a stronger momentum effect. Other studies argue that momentum returns only appear in up-market rather than in down-market.

To the extent that the momentum strategy has been supported by various works based on equilibrium concept regardless of the joint-hypothesis criticism, this study intends to examine momentum related effects through an alternative model based on the concept of statistical arbitrage. As statistical arbitrage is a long horizon trading strategy that generates riskless profits in the limit, it is seen as a natural candidate in extending findings in the existing empirical literature on anomalies out of disposition and overconfidence effects. Statistical arbitrage is the time series analogue of the limiting arbitrage opportunity and is free of any reference to equilibrium model.

Therefore, tests of market efficiency based on the statistical arbitrage approach avoid the joint-hypothesis problem of equilibrium models.

Statistical arbitrage, which is self-financing, zero-cost and generates cumulative discount profit, has the properties of (1) initial discounted profit is zero, (2) at infinity, expected discounted profit is strictly positive, (3) in the limit statistical arbitrage strategy converges to pure arbitrage, and (4) at infinity, even if there is positive probability of a loss at every finite point in time, their time averaged variance converges to zero through portfolio rebalancing or controlling the value of long and short positions. The difference between statistical arbitrage and the APT model is that the former is a limiting condition across time, while the limiting condition of the latter is cross-sectional at a given time.

Based on this difference, we examine momentum effects on excess stock returns under up- or down-market states utilizing the strategy proposed in Cooper, Gutierrez and Hameed (2004) to test market efficiency in the Taiwan stock market. Under the test of statistical arbitrage with constrained-mean, only strategies with matching forming and holding periods generate significant excess returns. The pattern of profitability from statistical arbitrage examination is more consistent and general, leaning toward long-term strategies, than what the raw momentum returns exhibit. The comparison between constrained and unconstrained trading profit means indicates that loosening the constraint on profit path allows us to further conclude that momentum strategies are only profitable in an up market, which is more conclusive than the traditional t-test can offer. Although traditional models support short-term momentum strategies to generate significantly positive profits even in a down market, especially in the emerging markets, statistical arbitrage models suggest that they are not valid if risks are properly taken into account.

More specifically, our statistical arbitrage approach explores the disposition and

overconfidence effects for possible causes of tested results. We found significant momentum effects as in Cooper, *et al* (2004), but we proceed further to conclude that investor overconfidence is the primary reason causing the up-market momentum effects. While a negative disposition effect results in mixed and insignificant momentum effect in a down market. The significant momentum returns found in this study can be considered as driven mainly by the follow-on trading pattern of institutional investor, which dominates the moderate disposition effect. The significant up-market momentum phenomenon is a result of similar behavior of the two major investor groups, while the absence of down-market momentum is due to the difference between them in trading pattern there. Market frictions, size effects, overlapping periods and market state definition are also examined in robustness tests and our main results remain unchanged.

Findings of this paper contribute to the understanding of long term market anomalies and their major driving factors, as compared to results derived through cross- sectional approaches. Our model-free statistical arbitrage analysis adds to those based on equilibrium asset prices in providing conclusions free of Fama's joint-hypothesis problem. Our study of Taiwan market is a helpful reference for studies on return anomalies in the emerging stock markets. Section 2 summarizes previous literatures and introduces our methodology. Section 3 reports empirical results and robustness analysis is discussed in Section 4. Section 5 concludes the study.

II. Literature and Methodology

Statistical arbitrage represents a zero cost, self-financing trading opportunity that has positive expected cumulative trading profits with a declining time-averaged variance and a probability of loss that converges to zero. The statistical arbitrage analysis is designed to exploit persistent anomalies and was firstly introduced by Bondarenko (2003) and Hogan, Jarrow, Teo, and Warachka (2004), and later improved in Jarrow, Teo, Tse, and Warachka (2007). They test statistical arbitrage on stock markets. Hogan, *et al.* (2004) analyzes momentum and value trading strategies while Jarrow, *et al.* (2007) extends the analysis to stock liquidity and industry momentum strategies. Both studies find that these strategies generate statistical arbitrage opportunities even after adjusting for market frictions such as transaction costs, margin requirements, liquidity buffers for the marking-to-market of short-sales and borrowing rates, although momentum and value strategies offer the most profitable trading opportunities.

There are several types of statistical arbitrage strategies most commonly adopted by hedge funds in the industry. The first type is Pair or Basket Trading, which is also known as spread trading, is a statistical arbitrage strategy that allows the trader to capture anomalies, relative strength or even fundamental differences on two stocks or baskets of stocks while maintaining a market neutral position. The strategy may be implemented through matching a long position with a short position in two stocks in the exact same sector. This creates a hedge against the sector and the overall market that the two stocks are in. What the actual market does won't matter much. If the market or the sector moves in one direction or the other, the gain on the long stock is offset by a loss on the short. The profit comes from the changes in spread between the two. Gatev, Goetzmann and Rouwenhorst (2006) summarize a comprehensive list of

market-neutral strategies in practice.

The second one is a multi-factor model, which is based on the correlations of stock returns with several factors chosen, as in APT. The third type falls on the category of mean-reverting strategies. Their assumption is that the stock prices are mean-reverting. According to the strategy, the winning or outperforming stock, which is expected to decrease in the future, should be sold short while the underperforming stock should be bought. One example of this type is contrarian trading. Triantafyllopoulos and Montana (2011) employ a state-space framework for modeling spread under mean reverting process. The fourth kind is related to the econometric relation of cointegration. Its key characteristics is mean reverting tracking error, enhanced weights stability and better use of the information comprised in the stock prices. Therefore it allows a flexible design of various funded and self-financing trading strategies, from index and enhanced index tracking, to long-short market neutral and alpha transfer techniques. Dunis and Ho (2005) outline many applications of cointegration such as index replication, which exploits long-term qualities of cointegration requiring only occasional portfolio rebalancing.

Instead of focusing on the traditional types of strategies summarized above, we look more at the behavioral type of strategy, like the momentum investment introduced by Jagadeesh and Titman (2001). We use stock prices from firms listed on the Taiwan Stock Exchange (TSE) from January 1, 1998 to August 31, 2008. The number of stocks ranges from 462 to 711 over the data period. Those with price under NT$5 are excluded to avoid low liquidity or delisted risks. Stocks listed less than a year are also excluded from our data. Market index for the analysis of momentum returns is the Taiwan Weighted Stock Index which covers all stocks listed on TSE within the same period. Short term interest rate for the statistical arbitrage approach is the overnight interbank money market rate. Balances for margin trading by individual

investors in the data period are obtained from the Securities and Futures Institute in Taiwan. Number of shares purchased and sold by institutional investors is obtained from the Taiwan Economic Journal (TEJ). Corporate characteristics such as book-to-market ratio and sales growth are obtained also from TEJ. The former is used to control for influence of investment value on the disposition or overconfidence effects on momentum returns, while the latter controls for influence of growth potential.

Logarithmic returns of stocks are computed weekly as follows,

$$R_{i,t} = \ln\left(\frac{S_{i,t}}{S_{i,t-1}}\right) \ , i: \text{the } i\text{th stock, } t: \text{the } t\text{th week.}$$

Portfolios are constructed with equal weights for all stocks. An investment portfolio of momentum strategy is defined as longing a portfolio of winning stocks and shorting another portfolio of losing stocks. So the momentum portfolio return is calculated as

$$R_{p,t} = \frac{\sum_{i=1}^{n} R_{i,t}^{W}}{n} - \frac{\sum_{i=1}^{n} R_{i,t}^{L}}{n} \tag{1}$$

Where p denotes a certain portfolio, $R_{i,t}^{W}$ is the return of ith stock at tth period within the winning portfolio, $R_{i,t}^{L}$ is that of a stock in the losing portfolio. 20 stocks are selected for each of the winning and losing portfolio in achieving the momentum portfolio returns. In order to compare long- versus short-term investment strategy, geometric average of consecutive weekly returns are used as follows,

$$R_{p} = \sqrt[T]{\prod_{t=1}^{T}(1 + R_{p,t})} - 1 \tag{2}$$

where T is the total number of weeks in a particular holding period and R_p is the average weekly return of portfolio *p*.

An up-market is, following Cooper, *et al* (2004), a period from the last day of the forming period of a specific portfolio going back a year and the periodic return of closing market index is positive, whereas a down-market is one where periodic index return is negative. To gauge the disposition effect of Shefrin and Statman (1985), we utilize the measure proposed by Weber and Camerer (1998), which is

$$\alpha = \frac{S_+ - S_-}{S_+ + S_-} \qquad (3)$$

where S_+ is the quantity of stocks disposed when the previous return is positive. In the case of individual investor, it would be the margin sell quantity, given previously positive return, minus buyback quantity on shorted stocks given a negative previous return. For institutional investors, it would be sell quantity given previously positive return. When categorized by corporate characteristics, this measure would be the sum of the individuals and the institutional investors. S_- on the other hand is the quantity of stocks sold when the previous return is negative. In the case of individual investor, it would be the margin sell quantity, given previously negative return, minus buyback quantity on shorted stocks given a positive previous return. For institutional investors, it would be sell quantity given previously negative return. If $\alpha > 0$, investor sells more on profits than on losses. The closer this measure is to 1, the more apparent an investor exhibit disposition effect.

The overconfidence measure is, also following Weber and Camerer (1998), is given by

$$\beta = \frac{B_+ - B_-}{B_+ + B_-} \tag{4}$$

where *B* denotes buys rather than sells as compared to (3). So (4) measures buy moves following positive or negative previous period returns. The overconfidence measure also reflects momentum buying behavior. If $\beta > 0$, investor buys more on profits than on losses. The closer this measure is to 1, the more apparent an investor exhibit overconfidence or momentum effect.

Based on the measures listed above, we examine if (1) momentum strategy profits more in an up-market, (2) momentum strategy is consistent with statistical arbitrage, and (3) disposition or overconfidence effect is capable of explaining difference in momentum returns. According to Jarrow, *et al.* (2006), if minimum *t*-statistic is utilized for statistical inferences, both constrained mean (profits in all periods must be fixed and positive) and unconstrained mean (profits across periods can take on various paths) can be tested. The critical value for the minimum *t*-test is the maximum value among all possible critical values. So we employ Monte-Carlo simulation as well as bootstrapping methods to obtain critical values for this test.

Momentum Strategy

We start out with 20 winners and 20 losers instead of top or bottom 10% to maintain the numbers of stocks in portfolios. There are 10 forming intervals and 10 holding intervals, with both being one of 1, 2, 3, 4, 6, 8, 12, 24, 36 and 48 weeks. Losers are the ones with the lowest returns in the respective holding interval, while winners are those with the second highest returns to avoid frequently unexpected

reversals happening in the most profitable stocks. In order to increase statistical power, an over-lapping execution strategy is conducted where a strategy for a given week is repeated in the next week. When forming and holding period is one week, there are 504 observations. While for the 48-week forming and holding period, there are 457 observations. Equal weights are used in forming momentum portfolios. All winning and losing stocks are purchased initially with NT$100, under the assumption that each stock is divisible infinitively and consistent with a self-financing principle. A momentum strategy is to buy winning stocks and sell losing stocks on the day the portfolio is constructed. The portfolio is closed out at the end of the holding period and an average weekly return is computed by subtracting the average losing stock returns from the average winning stock returns, and then divided by total number of weeks within the holding period. Figure 1 shows plots of various holding period returns of portfolios formed using one-week returns, categorized by the level of returns within that forming period. Figure 2 shows the plots for portfolios formed using 8-week returns. In general, those doing better in the forming period also perform better in the subsequent holding periods. But the longer the holding period is, the more likely it is for the most winning portfolios to lose. This patter is much more pronounced for the portfolios formed using 8-week returns than for those formed using one-week returns. This outcome implies that it is more likely for the most winning stocks to reverse their returns in the long run.

Statistical Arbitrage

We modify the definition of statistical arbitrage in Jarrow, *et al.* (2006) as follows,

1. $v(0) = 0$

2. $\lim_{t\to\infty} E^p[v(t)] > 0$

3. $\lim_{t\to\infty} P[v(t) < 0] = 0$, or $\qquad\qquad\qquad\qquad\qquad$ (5)

4. $\lim_{t\to\infty} Var[v(t)|v(t) < 0] = 0$,

Where $v(0)$ is the up-front cost of the investment strategy, while $v(t)$ denotes cumulated discounted trading profits. In the fourth condition, only the variance of having a loss is considered rather than defining all scenarios. A profit model of constrained mean is defined as

$$\Delta v_i = \mu + \sigma i^\lambda Z_i \text{ and } v(t_n) = \sum_{i=1}^{n} \Delta v_i \sim N\left(\mu n, \sigma^2 \sum_{i=1}^{n} i^{2\lambda}\right), \qquad (6)$$

while a model of unconstrained mean is

$$\Delta v_i = \mu i^\theta + \sigma i^\lambda Z_i \text{ and } v(t_n) = \sum_{i=1}^{n} \Delta v_i \sim N\left(\mu \sum_{i=1}^{n} i^\theta, \sigma^2 \sum_{i=1}^{n} i^{2\lambda}\right). (7)$$

In (6), μ is the mean of trading profit and λ is the growth rate of volatility. In (7), θ is the growth rate of profit mean. Discounted trading profits under (6) of all periods are fixed at μ, hence confining possible trading paths as well as strategies available. (7) relaxes the restriction and allows a more general class of statistical arbitrate strategies. Applying log likelihood function on Δv_i, we can solve for the four parameters with first order conditions. Statistical arbitrage requires the following, which would be the null hypothesis of statistical inferences, to hold,

1. $\mu > 0$,

2. $\lambda < 0 \ or \ \theta - \lambda > 0$,

3. $\theta - \lambda + \frac{1}{2} > 0$ and (8)

4. $\theta + 1 > 0$

Statistical inferences are done with a minimum *t*-test. The inference statistic of an unconstrained mean model is given by

$$S_{UM} = Min \left\{ t(\hat{u}), t\left(\hat{\theta} - \hat{\lambda} + \frac{1}{2}\right), t(\hat{\theta} + 1), Max\left[t(-\hat{\lambda}), t(\hat{\theta} - \hat{\lambda})\right] \right\}, \quad (9)$$

while the statistic for a constrained mean model is

$$S_{CM} = Min \left\{ t(\hat{u}), t(-\hat{\lambda}) \right\}. \quad (10)$$

If either of the minimum *t*-test statistics is greater than its respective critical values, all *t*-statistics for the inference is significant to reject null hypothesis (8), and there is statistically significant room for statistical arbitrage to counter market efficiency. The critical values, t_c, is the maximum of all the achievable critical values. But the minimum *t*-test statistics follow a joint distribution rather than a standard normal distribution, t_c has to be obtained through a Monte-Carlo simulation in the absence of sample autocorrelation.

Monte-Carlo Simulation

The simulated parameters should generate a proportion, which is smaller than the

significance level α, where null hypothesis is rejected, or

$$Pr\{S_{UM} > t_c | \mu, \lambda, \theta, \sigma\} \leq \alpha.$$

So the maximum critical value t_c needs the biggest parameter space for null hypothesis. Jarrow, *et al.* (2006) suggest using the space

$$(\mu, \lambda, \theta) = (-1 \times 10^{-6}, -\frac{1}{2}, -1).$$

We simulate 500 discounted trading profit results and calculate parameters based on the maximum likelihood principle. Out of the four *t*-values corresponding to null hypotheses, the largest one is set to be the critical value t_c. The process is repeated a thousand times, and the ranked t_c at the percentile of 100(1-α), for a single-tailed statistical arbitrage test, is the minimum *t*-test critical value used for inferences in our results.

Bootstrapping

We also relax the previous assumption for basic statistical arbitrage by allowing sample return observations to be non-normal and correlated with MA(1) with an parameter of φ. The statistics for minimum *t*-test would then become

$$\hat{z}_i = \frac{\Delta v_i - \hat{\mu} i^{\hat{\theta}}}{\hat{\sigma} i^{\hat{\lambda}}} \quad \text{and} \tag{11}$$

$$\hat{\varepsilon}_i = \hat{z}_i - \varphi \hat{\varepsilon}_{i-1}, \quad \hat{\varepsilon}_0 = 0. \tag{12}$$

Δv_i obtained from samples and MLE estimation together give $\hat{z}_i$ from (11), which

helps yielding $\hat{\varepsilon}_i$ and φ from (12). Repeated drawing sample residuals $\{\hat{\varepsilon}_1, \dots, \hat{\varepsilon}_n\}$ 500 times produces $\{\varepsilon_1^*, \dots, \varepsilon_n^*\}$ in each draw, which gives

$$z_i^* = \varepsilon_i^* + \varphi \varepsilon_{i-1}^* \quad \text{and} \tag{13}$$

$$\Delta v_i^* = \mu i^\theta + \sigma i^\lambda z_i^*. \tag{14}$$

MLE estimation on Δv_i^* gives parameter estimates and t values corresponding to null hypotheses in (8), and the largest one is set to be the critical value t_c. Ranking values on that from a thousand repeated processes, we can then obtain the bootstrapped minimum t-test critical value at the percentile of 100(1-α).

III. Empirical Results

Results of statistical inferences on momentum returns are reported in this section. We intend to show that original returns of a momentum strategy are dependent on market states. Then minimum *t*-statistic inferences are made on four statistical arbitrage models. Disposition and overconfidence effects are examined subsequently to account for the asymmetric pattern of momentum returns.

Tradition t-tests on original returns

A standard *t*-test is conducted first to compare original momentum returns with results under all market states in Table I-A. Out of the 100 momentum strategies, 54 exhibit at 1% significance level positive average weekly returns, while another 15 producing significantly positive returns at 5% and the other 8 are significant at 10%. If samples are further divided according to up- or down-market, in an up market 76 momentum strategies out of 100 achieve significantly positive average weekly returns at 1%, as shown in Table I-B, with another 11 significant at 5% and 7 significant at 10%. Only 6 strategies are not able to produce significant positive returns. Table I-C reports the results in a down market. Only 6 out of 100 produce significantly positive average weekly returns at 1%, and one is significantly positive at 5% and two at 10%. There is also one producing significantly negative average weekly returns at 5%, and another one also negative at 10%. Our results are consistent with Cooper, *et al.* (2004), which concludes that momentum returns are significant in and up market, but not so in a down market.

Under all market states, for all strategies holding longer than 8 weeks, there are always significantly positive returns, suggesting that momentum strategies tend to

produce excess returns in longer holding periods. This phenomenon holds, however, only for those formed on either two-week or shorter, or 36-week or longer, average returns. But if forming period is between 3 and 24 weeks, yet holding period is shorter than 4 weeks, there are no significant returns for momentum strategies. This is consistent with the prediction of Jegadeesh and Titman (1993) on reversals out of over-reaction for very short (within a month) and very long (over 15 months) holding periods. But our study, which is based on weekly return data, shows that reversals do not happen immediately and they last for a period of time.

Figure 3 shows how holding period momentum returns are affected by the length of portfolio forming period. For portfolios formed from very short period returns, significant positive momentum returns tend to persist, regardless of market states. Similar persistence holds for portfolios formed from very long period returns. But momentum strategies for portfolios formed from medium-length period do not seem to produce persistence returns.

Testing Statistical Arbitrage

Following basic tests on sample momentum returns, we proceed with tests based on statistical arbitrage models. Beside constrained-mean and unconstrained-mean models, we also applied correlations on these two models. The uncorrelated models, with assumed normally distributed residuals, are simulated Monte-Carlo method to generate critical values. The 1% and 5% critical values are, respectively, 5.01 and 3.27. Under the constrained-mean model, out of the 100 momentum strategies, as shown in Table I, there are 17 with significant profits given all market states. In an up market, the number of significant strategies increases to 58, while in a down market there are only 11 with significant profits. Table II-A shows only strategies with matching

forming and holding periods. It can be seen that strategies with significant profits are those with both forming and holding periods longer than 24 weeks. Only long-term momentum strategies can win persistent profits in a constrained-mean model. For the unconstrained-mean model, critical value is 181.46 at 1% and 157.77 at 5%. Profitable strategies appear only in an up market. In Table II-B, almost all strategies with matching forming and holding periods, long- or short-term, are significantly profitable in the sense of statistical arbitrage.

Correlated models are assumed to have autoregressive residuals, so a bootstrapping method is used to draw residuals for respective momentum strategies. Critical values are identified with one thousand repetitive draws, as described in the previous section. Each strategy, therefore, has its own critical values due to the nature of drawing. In general, standard deviations are larger and t-statistics tend to be smaller. Under a correlated constrained-mean model, there are 12 strategies with significant statistical arbitrage profits in all market states. In an up market, there are 55 significantly profitable, while the number decreases to only 9 in a down market. Table II-C gives tested results for strategies with matching forming and holding periods. Similar to the results reported in Table II-A, only long-term strategies make profits, regardless of market states. Under a correlated unconstrained-mean model, profitable strategies, with the number of 57, are only showing up in an up market. Table II-D shows the pattern for strategies with matching periods, resembling what is seen in Table II-B.

Results from inferences based on statistical arbitrage, as given in Table II, are consistent in general with those using traditional t-test in Table I. However, there are two basic differences. The first one is that pattern of profitability from statistical arbitrage examination is more consistent and general, leaning toward long-term strategies, than what the raw momentum returns exhibit. The other difference is the

statistical arbitrage inferences offer much stronger statistical power as they are independent of potential distribution and pricing assumptions. The comparison between constrained and unconstrained trading profit means indicates that loosening the constraint on profit path allows us to further conclude that momentum strategies are only profitable in an up market, which is more conclusive than the traditional *t*-test can offer. Although traditional models support short-term momentum strategies to generate significantly positive profits even in a down market, especially in the emerging markets, statistical arbitrage models suggest that they are not valid if risks are properly taken into account.

Disposition and overconfidence effects

To explore the asymmetric pattern of profits from a momentum strategy, as shown in Table I and II, we further examine the effects of disposition and overconfidence under different market states. The examination is done from the dimensions of investor type, market to book ratio, sales growth, liquidity as well as market capitalization. As both the disposition effect, defined in (3), and the overconfidence effect defined in (4) do not necessarily follow a normal distribution, a Wilcoxon sign test is also conducted to determine if the median of either effect is different from zero.

Table III-A shows that, regardless of market states, both effects are significantly positive for all of the ten holding period strategies. Both measure increase roughly with the length holding period, with the strongest effects taking place at the eight- and twelve-week holding periods. Looking at the measures in an up market, both effects are further magnified. But the strongest effects appear instead in the longest holding period, 48 weeks. When both effects are significantly positive, the overconfidence effect is greater than the disposition effect uniformly across all holding periods. The

returns momentum strategy found previously are supported by the two effects. When market is down, the disposition effect tends to be significantly negative, suggesting investors sell more losing stocks than winning ones. The overconfidence effect in a down market is only significantly negative in the longer holding periods, meaning investors buy losing stocks and sell winning stocks there. The disposition effect is stronger than the overconfidence one, indicating that investors tend not to sell winning stocks. The absence of momentum effect found previously is consistent with this phenomenon.

Breaking samples into individual and institutional investors allows us to distinguish how investor preference affects the disposition and overconfidence effects. Tables III-B and III-C give the two measures under different market states for the two types of investors. When the market is up, individuals dispose winning stocks earlier than the institutional investors. But the overconfidence behavior of institutional investors is uniformly stronger than individuals across all holding periods. So the significant momentum returns in Taiwan found in the earlier part of this section can be considered as driven mainly by the follow-on trading pattern of institutional investor, which dominates the moderate disposition effect. When the market is down, Table III-B reports that individuals exhibit certain degree of momentum drive in the short to medium holding periods, while institutional investors practice a contrarian trading behavior all the time. In another word, the significant up-market momentum phenomenon is a result of similar behavior of the two major investor groups, while the absence of down-market momentum is due to the difference between them in trading pattern there.

Comparing stocks with market to book ratio, as shown in Tables III-D and III-E, helps us understanding more about the cause of momentum effect. Investors as a whole chase stocks harder in a bull market than dispose them, especially in those with

higher market-to-book ratio. But in a bear market, losing stocks with high M/B ratio would be sold only in the short term, but in the long term only stocks low M/B ratio would be the subject of stop-loss moves. High M/B stocks suffering loss are almost never targets of follow-on buying in a bear market. However, low M/B stocks are the targets of contrarian trading pattern during longer holding periods.

Sales growth, liquidity and market cap are also utilized as control factors in examining the disposition and overconfidence effects and the results are reported in Tables III-F, III-G, III-H, III-I, III-J and III-I. The overconfidence effect dominates the disposition effect, especially in a bull market. The disposition effect in a bear market is in general negative, suggesting stop-loss moves are taken on losing stocks. The direction and magnitude of the overconfidence effect varies according to length of holding periods and levels of corporate characteristics. Overall evidences indicate that the domination of the overconfidence effect in an up market causes the momentum returns to be significant, as shown in the earlier part of this section. In a down market, although the disposition effect still supports momentum trading, but the ambiguous overconfidence effect weakens motives of momentum trading substantially.

IV. Robustness Discussions

We examine in this section the robustness of results on momentum returns given in the previous section. We take turns analyzing firm size, non-overlapping periods, market state definition and market friction to see if any of them could have altered our results.

The firs robustness check is on firm size. Based on ranked firm size, from high to low, one year prior to forming periods of respective strategies, we keep only firms ranked in the top 50%. Portfolio returns on momentum strategies applied on only larger firms are shown in Table IV. Results for all market states are given in Table IV-A, where 34 out of 100 strategies exhibiting significantly positive returns, and 6 strategies generate negative returns. In an up market, as shown in Table IV-B, 40 strategies produce positive returns, but none have significantly negative returns. Table IV-C shows returns in a down market, only 7 strategies render positive returns, but there are 32 with significantly negative returns. Compared with the whole sample results shown in the previous section, momentum strategies on stocks of larger firms produce fewer cases of positive returns and more cases of negative returns. When the market is up, fewer strategies generate negative returns, while more negative returns appear in a down market. The comparison suggests part of momentum effect is caused by trading stocks of smaller firms, which is excluded in this robustness check. This indicates that momentum phenomenon exists in all stocks, and size is not a factor.

Momentum strategies carried out in non-overlapping periods are also examined as the second robustness verification. The results for all market states, shown in Table V-A, are 26 strategies with significantly positive returns. In an up market, number of strategies with positive returns goes up to 55, as given in Table V-B. But when the market is down, Table V-C reports only two strategies with positive returns and three

with negative returns. Changing the execution style from overlapping to non-overlapping periods does diminish the momentum effect to some extent. But the influence of market state on the momentum effect is still present, which does not alter our argument in the previous section that the dominance of the overconfidence effect over the disposition effect is the main cause for the momentum effect.

We would also like to know if the definition of market states plays a role in making momentum effect to happen. Table VI-A gives results based on an extended definition of quintile market states. The strongest momentum effects appear in the medium range, rather than in the state where market return is the highest. The state with the worst market return does show more negative strategies. However, this verification suggests that the original halving classification is appropriate as it separates the situation where more strategies with momentum returns cluster. To further determine how market states affect momentum returns, we conduct a regression of returns on the level and the squared market returns. The results are show in Table VI-B, suggesting that the level market returns affects momentum returns positively, but the squared market returns have negative influence on momentum returns. This nonlinear relation between market and momentum returns reflect that a finer division of market states does not help much in analyzing momentum returns or how they are drive by the overconfidence effects.

Market friction is also considered as a factor possibly causing the momentum effect. Table VII presents results with transactions costs, short sell constraint and whole lot restriction (transaction can only be executed on lots of 1,000 shares). If portfolios are formed using only with stocks allowed to be shorted, 91 out of 100 strategies generate significantly positive returns regardless of market state, as given in Table VII-A. Similar selection is done in an up market, where all strategies realize a significantly positive return in Table VII-B. Table VII-C reports results in a down

market, where 18 out of 100 strategies realize positive return, while 50 produce negative returns. Incorporating market friction tends to magnify our original results on the momentum effect. In this sense, our analysis and results in the previous section is robust against market friction.

V. Conclusion

This study employs the concept of statistical arbitrage to analyze the momentum phenomenon in the Taiwan market. We extend the analysis with statistical arbitrage to situations under different market states, which allows us to relate the momentum effects to other behavioral facts, namely the disposition effect and the overconfidence effect. The method of statistical arbitrage frees us from getting benchmark return via an equilibrium model suffering the joint-hypothesis criticism. The statistical arbitrage analysis, carried out through a long horizon trading strategy, identifies momentum effect and helps us perform subsequent examinations and explorations.

The approach of statistical arbitrage reassures our preliminary finding with raw portfolio returns. The distinction between constrained and unconstrained profit path, as well as the inclusion of autocorrelation, alters the profile original results and yet preserves the main findings. The momentum strategies are seen to prevail in an up market especially, but behave inconclusively in a down market. The introduction of the disposition effect and the overconfidence effect helps greatly in identifying the overconfidence effect as a major driving factor for the momentum effect. Coupled with further categorizations of investor type, market-to-book ratio, sales growth, liquidity and market cap, the analysis of the disposition and overconfidence effects tells how the two factors affect momentum returns in more details and clarity. Our findings are also robust to firm size, overlapping executions, alternative market state definition and market friction.

The study of momentum effect in this study benefits the understanding of trading behavior especially in the emerging markets. Our adoption of statistical arbitrage is also more desirable in markets where high volatilities twist greatly the

distribution of equilibrium returns. There are more behavioral factors that can be extended in studying the momentum phenomenon. This study serves as a fruitful step in that continuum.

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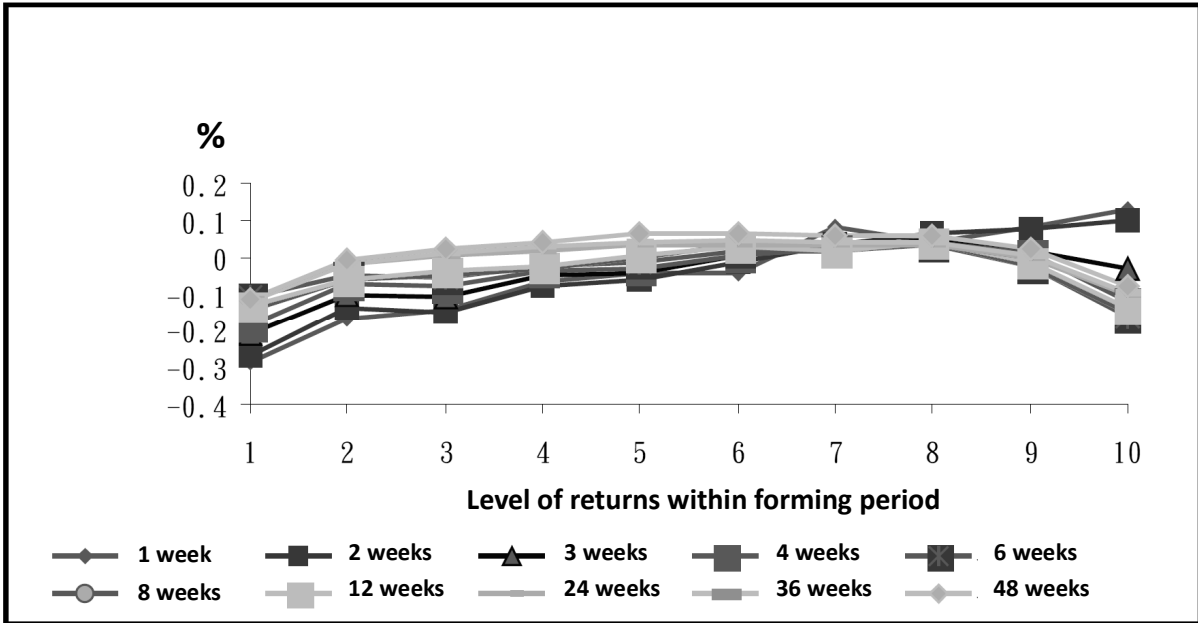
Figure 1   Holding Period Returns for Portfolios with One-Week Forming Period
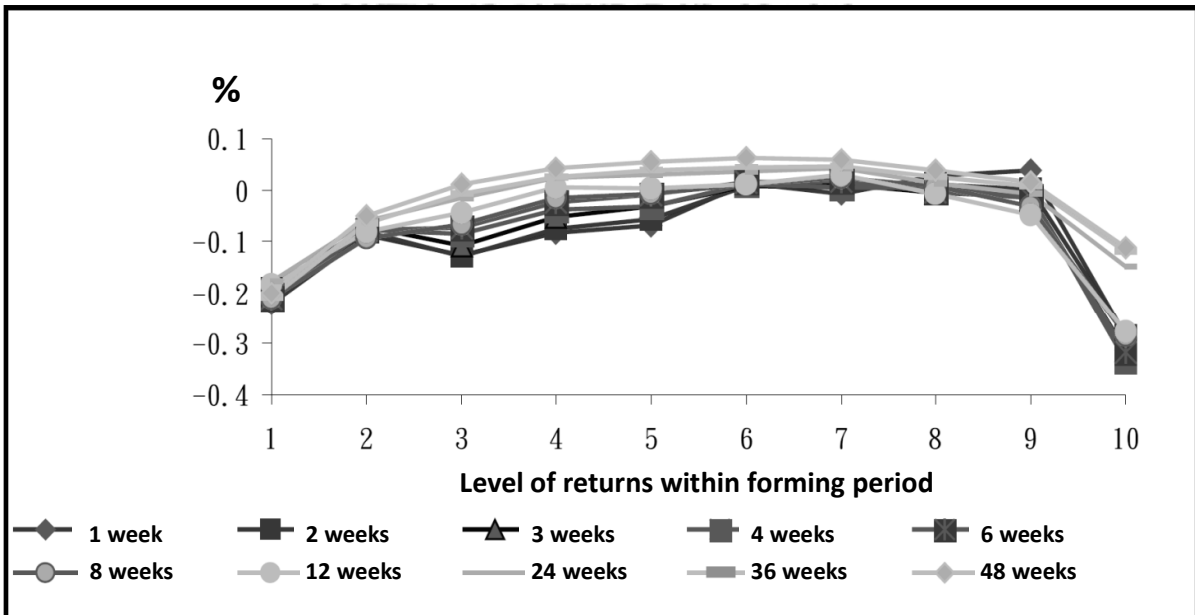
Figure 2   Holding Period Returns for Portfolios with Eight-Week Forming Period

Table I-A   Returns of Momentum Strategies: All Market States

Pane1 A：**All Market States**									
	Portfolio Holding Periods								
	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks

	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
1 week	0.3033	0.313	0.235	0.2081	0.1259	0.1677	0.1643	0.1012	0.1168	0.1179
	(2.03)**	(3.05)***	(2.79)***	(2.85)***	(2.07)**	(3.14)***	(3.65)***	(3.59)***	(5.88)***	(6.6)***
2 weeks	0.3634	0.3275	0.2336	0.1925	0.153	0.2021	0.1771	0.1369	0.1388	0.1468
	(2.43)**	(3.3)***	(2.96)***	(2.79)***	(2.71)***	(3.92)***	(4.02)***	(4.77)***	(6.89)***	(8.3)***
3 weeks	0.2512	0.1986	0.1193	0.0848	0.0999	0.1398	0.1281	0.1334	0.1476	0.1562
	(1.66)*	(2)**	(1.46)	(1.16)	(1.64)	(2.61)***	(2.86)***	(4.36)***	(6.89)***	(8.47)***
4 weeks	0.2655	0.1322	0.1101	0.0912	0.1346	0.1785	0.1218	0.1316	0.1426	0.1527
	(1.67)*	(1.22)	(1.24)	(1.2)	(2.07)**	(3.12)***	(2.59)***	(4.28)***	(6.56)***	(8.03)***
6 weeks	0.1517	0.113	0.0696	0.0502	0.1142	0.1285	0.0998	0.1267	0.1617	0.183
	(0.93)	(1.05)	(0.77)	(0.62)	(1.69)*	(2.18)**	(2.08)**	(3.94)***	(7.47)***	(9.46)***
8 weeks	0.1935	0.1179	0.0856	0.1142	0.1178	0.1348	0.1268	0.1163	0.1673	0.1921
	(1.17)	(1.05)	(0.93)	(1.44)	(1.73)*	(2.27)**	(2.57)**	(3.54)***	(7.45)***	(9.71)***
12 weeks	0.3153	0.1351	0.0904	0.0833	0.1057	0.1185	0.1134	0.1151	0.1854	0.1789
	(1.86)*	(1.17)	(0.94)	(1.01)	(1.53)	(1.95)*	(2.24)**	(3.34)***	(8.15)***	(9.09)***
24 weeks	0.1468	0.1537	0.1399	0.1391	0.1459	0.1598	0.1666	0.2748	0.2927	0.2465
	(0.85)	(1.23)	(1.37)	(1.54)	(1.88)*	(2.3)**	(2.84)***	(7.5)***	(11.9)***	(12.05)***
36 weeks	0.2143	0.2636	0.2463	0.2775	0.2965	0.3106	0.3286	0.3582	0.3099	0.2706
	(1.25)	(2.1)**	(2.34)**	(2.97)***	(3.66)***	(4.4)***	(5.72)***	(9.85)***	(13.26)***	(14.96)***
48 weeks	0.2993	0.2449	0.2413	0.2733	0.2917	0.2905	0.3027	0.28	0.2696	0.2433
	(1.86)*	(2.05)**	(2.31)**	(2.87)***	(3.6)***	(4.14)***	(5.41)***	(8.08)***	(10.86)***	(12.46)***

Portfolio Forming Periods (row header spanning the left side)

Table I-B   Returns of Momentum Strategies: Up-Market

Panel B：**Up-Market**										
	Portfolio Holding Periods									
	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
1 week	0.3356	0.3529	0.2991	0.2342	0.1542	0.1984	0.2087	0.1304	0.1453	0.1471
	(1.91)*	(3.07)***	(3.16)***	(2.87)***	(2.31)***	(3.36)***	(4.24)***	(4.14)***	(6.45)***	(7.42)***
2 weeks	0.4383	0.4176	0.2847	0.2332	0.1909	0.2422	0.2332	0.1673	0.1676	0.1789
	(2.54)**	(3.72)***	(3.19)***	(3.02)***	(3.09)***	(4.37)***	(4.97)***	(5.38)***	(7.75)***	(9.42)***
3 weeks	0.3909	0.3026	0.2317	0.1777	0.1774	0.2052	0.211	0.1896	0.2005	0.2045
	(2.26)**	(2.74)***	(2.5)***	(2.2)***	(2.61)***	(3.51)***	(4.32)***	(5.56)***	(8.59)***	(10.14)***
4 weeks	0.4277	0.2575	0.2052	0.1828	0.2232	0.2853	0.2199	0.1974	0.2046	0.2062
	(2.43)**	(2.12)**	(2.08)**	(2.16)**	(3.1)***	(4.56)***	(4.21)***	(5.73)***	(8.59)***	(9.55)***
6 weeks	0.3334	0.226	0.1793	0.147	0.1977	0.2322	0.1848	0.1929	0.2248	0.2426
	(1.78)*	(1.86)*	(1.76)*	(1.61)	(2.68)***	(3.63)***	(3.51)***	(5.45)***	(9.4)***	(11.33)***
8 weeks	0.3007	0.172	0.1399	0.1674	0.21	0.2484	0.2239	0.1922	0.234	0.2582
	(1.59)	(1.38)	(1.38)	(1.91)*	(2.82)***	(3.83)***	(4.07)***	(5.45)***	(9.59)***	(11.93)***
12 weeks	0.5155	0.2982	0.2334	0.1938	0.2088	0.2415	0.2269	0.2003	0.2457	0.2296
	(2.67)***	(2.28)**	(2.11)***	(2.06)**	(2.68)***	(3.53)***	(4.02)***	(5.59)***	(10.46)***	(10.89)***
24 weeks	0.3552	0.3273	0.3045	0.2849	0.2806	0.2932	0.2876	0.3545	0.3305	0.2711
	(1.76)*	(2.25)**	(2.51)**	(2.66)***	(3.15)***	(3.71)***	(4.38)***	(8.84)***	(11.95)***	(11.36)***
36 weeks	0.3744	0.4107	0.3884	0.3947	0.4099	0.4106	0.3775	0.389	0.3274	0.2909
	(1.87)*	(2.78)***	(3.11)***	(3.59)***	(4.42)***	(5.08)***	(5.7)***	(9.81)***	(12.79)***	(14.4)***
48 weeks	0.2573	0.2213	0.2454	0.299	0.3351	0.3595	0.3711	0.3337	0.3251	0.2969
	(1.41)	(1.62)	(2.04)**	(2.76)***	(3.66)***	(4.55)***	(5.83)***	(9.37)***	(12.46)***	(13.11)***

Portfolio Forming Periods

Table I-C   Returns of Momentum Strategies: Down-Market

		Portfolio Holding Periods									
Panel C: Down-Market											
		1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
	1 week	0.1533	0.1813	0.0473	0.1235	0.0381	0.0847	0.0434	0.0243	0.0419	0.0413
		(0.54)	(0.84)	(0.26)	(0.79)	(0.28)	(0.73)	(0.43)	(0.4)	(1.05)	(1.11)
	2 weeks	0.058	0.0622	0.0751	0.0555	0.0343	0.0792	0.0101	0.0505	0.0542	0.0608
		(0.19)	(0.31)	(0.46)	(0.38)	(0.28)	(0.67)	(0.1)	(0.79)	(1.2)	(1.57)
P	**3 weeks**	-0.212	-0.119	-0.21	-0.19	-0.135	-0.048	-0.109	-0.018	0.0083	0.0296
o		(-0.67)	(-0.56)	(-1.21)	(-1.17)	(-1.02)	(-0.4)	(-1.11)	(-0.29)	(0.18)	(0.78)
r	**4 weeks**	-0.254	-0.247	-0.182	-0.198	-0.153	-0.147	-0.18	-0.059	-0.029	0.0087
t		(-0.74)	(-1.09)	(-0.96)	(-1.18)	(-1.06)	(-1.16)	(-1.81)	(-0.93)	(-0.64)	(0.24)
f											
o	**6 weeks**	-0.415	-0.233	-0.24	-0.22	-0.114	-0.147	-0.137	-0.05	-0.007	0.0317
l		(-1.27)	(-1.03)	(-1.27)	(-1.27)	(-0.76)	(-1.13)	(-1.31)	(-0.73)	(-0.16)	(0.83)
i	**8 weeks**	-0.179	-0.056	-0.078	-0.054	-0.158	-0.194	-0.162	-0.097	-0.018	0.0208
o		(-0.54)	(-0.23)	(-0.4)	(-0.31)	(-1.05)	(-1.52)	(-1.57)	(-1.34)	(-0.38)	(0.53)
F	**12 weeks**	-0.293	-0.327	-0.312	-0.244	-0.203	-0.24	-0.218	-0.12	0.0215	0.0486
o		(-0.85)	(-1.39)	(-1.65)	(-1.44)	(-1.43)	(-1.94)*	(-2.11)**	(-1.53)	(0.41)	(1.16)
r											
m	**24 weeks**	-0.395	-0.274	-0.264	-0.228	-0.191	-0.188	-0.16	0.0665	0.199	0.1874
i		(-1.19)	(-1.14)	(-1.42)	(-1.42)	(-1.26)	(-1.37)	(-1.33)	(0.85)	(3.95)***	(4.82)***
n	**36 weeks**	-0.221	-0.104	-0.11	-0.023	0.0099	0.0505	0.1977	0.2783	0.2632	0.2187
g		(-0.67)	(-0.45)	(-0.58)	(-0.13)	(0.06)	(0.36)	(1.74)*	(3.47)***	(5.16)***	(5.83)***
P											
e	**48 weeks**	0.4078	0.319	0.2548	0.2268	0.1979	0.1209	0.1273	0.1418	0.1273	0.1104
r		(1.21)	(1.32)	(1.2)	(1.17)	(1.17)	(0.83)	(1.12)	(1.71)*	(2.28)**	(3.12)***
i											
o											
d											
s											

Figure 3   Holding Period Returns under Different Market States

Table II-A   Tests on Existence of Statistical Arbitrage from Momentum Strategies
Constrained-Mean Model

Panel A : **Constrained-Mean**						
All Market States						
	μ	λ	σ	t1	t2	min-t
1_1	0.0590	-0.1741	0.7333	1.8005	5.3082	(1.8005)
2_2	-0.0023	-0.2734	0.3268	-0.1576	18.7079	(-0.1576)
3_3	-0.1039	-0.2320	0.4222	-5.5034	12.2853	(-5.5034)
4_4	-0.1165	-0.2469	0.4313	-6.0428	12.7993	(-6.0428)
6_6	-0.1055	-0.1555	0.7810	-3.0203	4.4525	(-3.0203)
8_8	-0.1264	-0.1565	0.7936	-3.5626	4.4093	(-3.5626)
12_12	-0.1559	-0.1498	0.8510	-4.0975	3.9365	(-4.0975)
24_24	0.2476	-0.5876	0.7409	7.4722	17.7345	(7.4722)**
36_36	0.1266	-0.7621	0.1873	15.1096	90.9926	(15.1096)***
48_48	0.0158	-1.0408	0.0357	9.9168	651.2465	(9.9168)***
Up Market						
1_1	0.0291	-0.3886	0.2858	2.2791	30.4088	(2.2791)
2_2	0.1014	-0.3059	0.3232	7.0155	21.1639	(7.0155)***
3_3	0.0086	-0.2995	0.3383	0.5655	19.7987	(0.5655)
4_4	-0.0085	-0.2524	0.4616	-0.4120	12.2280	(-0.4120)
6_6	0.0185	-0.2078	0.6149	0.6715	7.5552	(0.6715)
8_8	0.0854	-0.1700	0.7263	2.6289	5.2334	(2.6289)*
12_12	0.0812	-0.1623	0.7827	2.3190	4.6375	(2.3190)
24_24	0.3656	-0.6686	0.4318	18.9330	34.6247	(18.9330)***
36_36	0.2989	-0.4984	0.1334	50.0889	83.5390	(50.0889)***
48_48	0.0652	-1.2137	0.0242	60.2179	1121.6203	(60.2179)***
Down Market						
1_1	0.1751	0.2165	0.2438	16.0616	-19.8530	(-19.8530)
2_2	-0.0214	-0.1778	0.5388	-0.8884	7.3795	(-0.8884)
3_3	-0.1549	-0.1258	0.7161	-4.8368	3.9282	(-4.8368)
4_4	-0.2206	-0.2470	0.5468	-9.0204	10.1009	(-9.0204)
6_6	-0.3148	-0.2213	0.7648	-9.2029	6.4693	(-9.2029)
8_8	-0.5271	-0.3006	0.6078	-19.3930	11.0579	(-19.3930)
12_12	-0.6538	-0.2345	0.8153	-17.9316	6.4321	(-17.9316)
24_24	0.3323	-1.0323	0.3013	24.6625	76.6114	(24.6625)***
36_36	0.1056	-0.9191	0.2108	11.1976	97.4712	(11.1976)***
48_48	0.0108	-1.2947	0.0331	7.3051	874.4050	(7.3051)***

Table II-B   Tests on Existence of Statistical Arbitrage from Momentum Strategies
Unconstrained-Mean Model

Panel B : Unconstrained-Mean

	μ	λ	θ	σ	t1	t2	t3	t4	min-t
All Market States									
1_1	-2.1328	-0.0198	0.2112	0.0598	-797.3786	7.4045	273.2929	452.8190	(-797.3786)
2_2	0.0033	0.2414	0.2733	0.0327	2.2723	-165.0626	363.7679	870.7650	(-165.0626)
3_3	-1.4406	-2.3916	0.2792	0.0326	-987.7399	1639.8130	2174.0714	877.0816	(-987.7399)
4_4	-0.4376	-0.3249	0.2506	0.0422	-231.7516	172.0892	569.6115	662.3239	(-231.7516)
6_6	-1.5228	0.1907	-0.9018	0.0647	-526.3861	-65.9212	-204.8100	33.9503	(-526.3861)
8_8	-1.3524	-0.7716	0.1866	0.0676	-447.3593	255.2483	482.3860	392.5379	(-447.3593)
12_12	-1.3313	-0.5521	0.1764	0.0738	-403.3753	167.2858	372.2338	356.4441	(-403.3753)
24_24	0.4034	-0.2462	0.6184	0.0623	144.8966	88.4196	490.1079	581.2775	(88.4196)
36_36	0.1068	0.1272	0.7915	0.0160	149.3914	-177.8425	1628.5725	2505.7379	(-177.8425)
48_48	0.0145	0.3195	0.6893	0.0437	7.4026	-163.3881	444.8676	863.9860	(-163.3881)
Up Market									
1_1	-0.0026	-1.2341	0.3895	0.0285	-2.0288	969.5711	1668.4411	1091.7039	(-2.0288)
2_2	0.3116	-0.2850	0.3060	0.0322	216.1970	197.7270	756.9313	906.0877	(197.7270)***
3_3	0.6549	-0.2772	0.3207	0.0303	483.1769	204.5250	810.0455	974.4035	(204.5250)***
4_4	0.2737	-0.6956	0.4146	0.0193	317.3080	806.4516	1866.7708	1639.9753	(317.3080)***
6_6	0.9277	-1.0264	0.2607	0.0453	457.7325	506.4119	881.7211	622.0073	(457.7325)***
8_8	0.7398	-1.0963	0.1941	0.0689	239.9482	355.5843	580.7111	387.3038	(239.9482)***
12_12	1.0884	-1.1713	0.0187	0.0828	293.9053	316.3006	456.3773	275.0998	(275.0998)***
24_24	0.5419	-0.5027	0.6004	0.0705	171.8861	159.4339	508.4283	507.5757	(159.4339)**
36_36	0.1108	-0.0900	0.8116	0.0200	123.7197	100.5207	1564.8629	2022.5751	(100.5207)
48_48	0.0676	-0.1219	0.8800	0.0069	217.4275	392.2386	4833.5709	6050.5665	(217.4275)***
Down Market									
1_1	-2.1326	-0.1898	1.0000	0.0122	-3913.9630	348.2983	3101.1924	3670.5255	(-3913.9630)
2_2	-0.9949	-0.8381	0.2619	0.0389	-571.8096	481.7082	919.6228	725.2796	(-571.8096)
3_3	-1.4378	-0.8664	0.2050	0.5192	-61.9293	37.3154	67.6795	51.8998	(-61.9293)
4_4	-0.9949	-0.9533	0.4366	0.0306	-726.6279	696.2745	1380.3566	1049.2597	(-726.6279)
6_6	-0.9886	-0.7958	0.2314	0.0518	-426.9888	343.7334	659.6549	531.8878	(-426.9888)
8_8	-0.9925	-0.2538	0.3563	0.0488	-454.8712	116.3377	508.8147	621.6377	(-454.8712)
12_12	-1.8679	-1.0558	0.5605	0.2314	-180.5145	102.0289	204.5155	150.8068	(-180.5145)
24_24	0.3733	-0.2780	0.8823	0.0529	157.8694	117.5715	702.2150	796.1185	(117.5715)
36_36	0.0914	0.1851	0.9818	0.0164	125.0289	-253.1484	1772.9859	2709.8113	(-253.1484)
48_48	0.0127	-0.0839	0.7343	0.0112	25.3656	168.0485	2639.6895	3472.9061	(25.3656)

Table II-C   Tests on Existence of Statistical Arbitrage from Momentum Strategies
Correlated Constrained-Mean Model

Panel C : Correlated Constrained-Mean							
All Market States							
	μ	λ	σ	φ	t1	t2	min-t
1_1	0.0590	-0.1741	0.8429	-0.0369	1.5664	4.6179	(1.5664)
2_2	-0.0023	-0.2734	0.6785	0.0989	-0.0759	9.0104	(-0.0759)
3_3	-0.1039	-0.2320	0.5322	0.2247	-4.3661	9.7464	(-4.3661)
4_4	-0.1165	-0.2469	0.7364	0.3499	-3.5389	7.4957	(-3.5389)
6_6	-0.1055	-0.1555	0.8435	0.4759	-2.7967	4.1228	(-2.7967)
8_8	-0.1264	-0.1565	0.9579	0.5454	-2.9514	3.6529	(-2.9514)
12_12	-0.1559	-0.1498	0.8972	0.6174	-3.8864	3.7337	(-3.8864)
24_24	0.2476	-0.5876	0.3871	0.7821	14.3011	33.9421	(14.3011)***
36_36	0.1266	-0.7621	0.2375	0.7339	11.9151	71.7549	(11.9151)***
48_48	0.0158	-1.0408	0.1059	0.8103	3.3463	219.7578	(3.3463)***
Up Market							
1_1	0.0291	-0.3886	0.4534	-0.0327	1.4366	19.1670	(1.4366)
2_2	0.1014	-0.3059	0.6213	0.0660	3.6497	11.0101	(3.6497)**
3_3	0.0086	-0.2995	0.8762	0.1719	0.2183	7.6437	(0.2183)
4_4	-0.0085	-0.2524	0.6716	0.2898	-0.2832	8.4045	(-0.2832)
6_6	0.0185	-0.2078	0.9041	0.3827	0.4567	5.1385	(0.4567)
8_8	0.0854	-0.1700	0.8735	0.3950	2.1861	4.3517	(2.1861)*
12_12	0.0812	-0.1623	0.8324	0.4897	2.1805	4.3605	(2.1805)
24_24	0.0366	-0.0669	0.5602	0.6614	14.5921	2.6686	(2.6686)**
36_36	0.2989	-0.4984	0.2381	0.7378	28.0667	46.8101	(28.0667)***
48_48	0.0652	-1.2137	0.1246	0.8160	11.6937	217.8068	(11.6937)***
Down Market							
1_1	0.1751	0.2165	0.3618	-0.0151	10.8243	-13.3795	(-13.3795)
2_2	-0.0214	-0.1778	0.8263	0.1551	-0.5793	4.8122	(-0.5793)
3_3	-0.1549	-0.1258	0.8925	0.3390	-3.8807	3.1518	(-3.8807)
4_4	-0.2206	-0.2470	0.6181	0.5099	-7.9800	8.9359	(-7.9800)
6_6	-0.3148	-0.2213	0.8815	0.6684	-7.9847	5.6130	(-7.9847)
8_8	-0.5271	-0.3006	0.7270	0.7359	-16.2132	9.2448	(-16.2132)
12_12	-0.6538	-0.2345	0.8843	0.7994	-16.5332	5.9305	(-16.5332)
24_24	0.3323	-1.0323	0.2004	0.8459	37.0796	115.1840	(37.0796)***
36_36	0.1056	-0.9191	0.2053	0.6402	11.4997	100.1010	(11.4997)***
48_48	0.0108	-1.2947	0.0390	0.6856	6.2018	742.3441	(6.2018)***

Table II-D   Tests on Existence of Statistical Arbitrage from Momentum Strategies
Correlated Unconstrained-Mean Model

Panel D : Correlated Unconstrained-Mean									
All Market States									
	μ	λ	θ	σ	φ	t1	t2	t3	t4	min-t
1_1	-2.1328	-0.0198	0.2112	0.0613	-0.0356	-777.9988	7.2245	266.6507	441.8135	(-777.9988)
2_2	0.0033	0.2414	0.2733	0.0391	0.0987	1.9002	-138.0334	304.2004	728.1760	(-138.0334)
3_3	-1.4406	-2.3916	0.2792	0.0422	0.2300	-763.3347	1267.2629	1680.1428	677.8169	(-763.3347)
4_4	-0.4376	-0.3249	0.2506	0.0508	0.3521	-192.6165	143.0291	473.4232	550.4795	(-192.6165)
6_6	-1.5228	0.1907	-0.9018	0.0734	0.4865	-463.9599	-58.1034	-180.5208	29.9240	(-463.9599)
8_8	-1.3524	-0.7716	0.1866	0.0715	0.5568	-422.6944	241.1754	455.7899	370.8955	(-422.6944)
12_12	-1.3313	-0.5521	0.1764	0.0872	0.6285	-341.2298	141.5132	314.8861	301.5291	(-341.2298)
24_24	0.4034	-0.2462	0.6184	0.0657	0.7775	137.3409	83.8089	464.5509	550.9664	(83.8089)
36_36	0.1068	0.1272	0.7915	0.0599	0.7370	39.8927	-47.4902	434.8857	669.1195	(-47.4902)
48_48	0.0145	0.3195	0.6893	0.0438	0.8089	7.3906	-163.1242	444.1491	862.5905	(-163.1242)
Up Market									
1_1	-0.0026	-1.2341	0.3895	0.0299	-0.0325	-1.9286	921.6667	1586.0070	1037.7652	(-1.9286)
2_2	0.3116	-0.2850	0.3060	0.0383	0.0578	181.7952	166.2641	636.4864	761.9086	(166.2641)**
3_3	0.6549	-0.2772	0.3207	0.0336	0.1750	435.3280	184.2709	729.8270	877.9087	(184.2709)***
4_4	0.2737	-0.6956	0.4146	0.0287	0.3166	213.1731	541.7883	1254.1293	1101.7642	(213.1731)***
6_6	0.9277	-1.0264	0.2607	0.0498	0.3871	416.3033	460.5768	801.9169	565.7097	(416.3033)***
8_8	0.7398	-1.0963	0.1941	0.0794	0.4060	208.4402	308.8920	504.4570	336.4463	(208.4402)***
12_12	1.0884	-1.1713	0.0187	0.0881	0.4980	276.1720	297.2160	428.8409	258.5012	(258.5012)***
24_24	0.5419	-0.5027	0.6004	0.0853	0.6600	142.1508	131.8528	420.4732	419.7681	(131.8528)*
36_36	0.1108	-0.0900	0.8116	0.0271	0.7410	91.4681	74.3167	1156.9292	1495.3235	(74.3167)
48_48	0.0676	-0.1219	0.8800	0.0087	0.8450	174.6361	315.0431	3882.2878	4859.7695	(174.6361)***
Down Market									
1_1	-2.1326	-0.1898	1.0000	0.0218	0.0144	-2183.5761	194.3135	1730.1363	2047.7638	(-2183.5761)
2_2	-0.9949	-0.8381	0.2619	0.0436	0.1678	-509.9026	429.5561	820.0598	646.7572	(-509.9026)
3_3	-1.4378	-0.8664	0.2050	0.0593	0.3404	-541.9000	326.5211	592.2164	454.1385	(-541.9000)
4_4	-0.9949	-0.9533	0.4366	0.0318	0.5245	-700.4587	671.1984	1330.6436	1011.4710	(-700.4587)
6_6	-0.9886	-0.7958	0.2314	0.0579	0.6756	-381.7086	307.2820	589.7015	475.4835	(-381.7086)
8_8	-0.9925	-0.2538	0.3563	0.0497	0.6407	-446.4362	114.1804	499.3794	610.1103	(-446.4362)
12_12	-1.8679	-1.0558	0.5605	0.0280	0.8358	-1492.2265	843.4240	1690.6311	1246.6476	(-1492.2265)
24_24	0.3733	-0.2780	0.8823	0.0589	0.8587	141.6067	105.4600	629.8775	714.1077	(105.4600)
36_36	0.0914	0.1851	0.9818	0.0195	0.6497	104.9065	-212.4063	1487.6387	2273.6900	(-212.4063)
48_48	0.0127	-0.0839	0.7343	0.0156	0.6571	18.1330	120.1322	1887.0253	2482.6638	(18.1330)

Table III-A   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Entire Sample

Panel A : **Entire Sample**	**1 week**	**2 weeks**	**3 weeks**	**4 weeks**	**6 weeks**	**8 weeks**	**12 weeks**	**24 weeks**	**36 weeks**	**48 weeks**
Disposition Effect *- All Market States*	0.0970 (19.24)*** <.0001	0.1504 (23.72)*** <.0001	0.1854 (29.38)*** <.0001	0.1985 (28.65)*** <.0001	0.2144 (26.81)*** <.0001	0.2378 (30.5)*** <.0001	0.2468 (26.47)*** <.0001	0.2326 (21.2)*** <.0001	0.2221 (17.07)*** <.0001	0.2343 (15.92)*** <.0001
Disposition Effect *- Up Market*	0.1309 (24.01)*** <.0001	0.1940 (29.15)*** <.0001	0.2349 (34.75)*** <.0001	0.2596 (37.16)*** <.0001	0.2893 (40.24)*** <.0001	0.3094 (38.79)*** <.0001	0.3179 (34.57)*** <.0001	0.2967 (27.71)*** <.0001	0.3297 (25.3)*** <.0001	0.3514 (23.94)*** <.0001
Disposition Effect *- Down Market*	-0.0510 (-6.47)*** <.0001	-0.0330 (-3.37)*** 0.454	-0.0180 (-1.75)* 0.3239	-0.0340 (-3.12)*** 0.8076	-0.0550 (-4.49)*** 0.1416	-0.0670 (-5.22)*** 0.0033	-0.0550 (-3.97)*** 0.0318	-0.0350 (-2.24)** 0.1907	-0.2070 (-11.4)*** <.0001	-0.2730 (-14.17)*** <.0001
Overconfidence Effect *- All Market States*	0.1530 (27.32)*** <.0001	0.2104 (31.4)*** <.0001	0.2428 (36.48)*** <.0001	0.2562 (34.77)*** <.0001	0.2671 (31.84)*** <.0001	0.2917 (36.34)*** <.0001	0.2925 (30.24)*** <.0001	0.2656 (24.07)*** <.0001	0.2535 (19.54)*** <.0001	0.2631 (17.71)*** <.0001
Overconfidence Effect *- Up Market*	0.1853 (31.28)*** <.0001	0.2475 (35.42)*** <.0001	0.2851 (38.97)*** <.0001	0.3108 (42.62)*** <.0001	0.3349 (44.58)*** <.0001	0.3548 (42.79)*** <.0001	0.3630 (39.67)*** <.0001	0.3310 (32.11)*** <.0001	0.3526 (27.33)*** <.0001	0.3716 (25.47)*** <.0001
Overconfidence Effect *- Down Market*	-0.0003 (-0.04) 0.0117	0.0269 (2.71)*** <.0001	0.0396 (3.84)*** <.0001	0.0183 (1.61) <.0001	-0.0060 (-0.46) <.0001	-0.0200 (-1.49) 0.4593	-0.0210 (-1.43) 0.6775	-0.0220 (-1.35) 0.5669	-0.1870 (-10.1)*** <.0001	-0.2460 (-12.18)*** <.0001

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-B   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Individual Investors

Panel B : **Individual Investors**	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect - *All Market States*	0.1311 (30.42)*** <.0001	0.1773 (30.76)*** <.0001	0.2092 (36.96)*** <.0001	0.2178 (33.09)*** <.0001	0.2213 (27.74)*** <.0001	0.2233 (25.07)*** <.0001	0.2396 (25.72)*** <.0001	0.2022 (17.43)*** <.0001	0.1638 (12.02)*** <.0001	0.1658 (10.72)*** <.0001
Disposition Effect - *Up Market*	0.1614 (34.9)*** <.0001	0.2119 (35.11)*** <.0001	0.2468 (39.65)*** <.0001	0.2642 (40.57)*** <.0001	0.2788 (38.96)*** <.0001	0.2903 (35.77)*** <.0001	0.2989 (32.43)*** <.0001	0.2540 (21.26)*** <.0001	0.2451 (17.54)*** <.0001	0.2722 (17.12)*** <.0001
Disposition Effect - *Down Market*	-0.0230 (-3.04)*** 0.7541	-0.0010 (-0.1) <.0001	0.0158 (1.51) <.0001	0.0057 (0.51) <.0001	-0.0140 (-1.14) 0.0027	-0.0390 (-3.02)*** 0.6715	-0.0250 (-1.86)* 0.6089	-0.0310 (-2.02)** 0.224	-0.2150 (-12.08)*** <.0001	-0.3030 (-16.68)*** <.0001
Overconfidence Effect - *All Market States*	0.1475 (29.4)*** <.0001	0.1981 (31.45)*** <.0001	0.2339 (38.51)*** <.0001	0.2405 (34.75)*** <.0001	0.2437 (29.91)*** <.0001	0.2473 (26.94)*** <.0001	0.2633 (28.52)*** <.0001	0.2390 (21.73)*** <.0001	0.1936 (14.78)*** <.0001	0.2011 (13.46)*** <.0001
Overconfidence Effect - *Up Market*	0.1754 (33.65)*** <.0001	0.2313 (36.27)*** <.0001	0.2700 (41.51)*** <.0001	0.2864 (43.93)*** <.0001	0.2999 (42.31)*** <.0001	0.3125 (38.14)*** <.0001	0.3202 (35.8)*** <.0001	0.2924 (26.12)*** <.0001	0.2782 (20.96)*** <.0001	0.3023 (19.88)*** <.0001
Overconfidence Effect - *Down Market*	0.0077 (1.02) <.0001	0.0362 (3.72)*** <.0001	0.0569 (5.65)*** <.0001	0.0422 (3.81)*** <.0001	0.0206 (1.69)* <.0001	-0.0080 (-0.64) 0.0122	0.0005 (0.03) 0.0307	-0.0270 (-1.73)* 0.3344	-0.2010 (-11.11)*** <.0001	-0.2790 (-14.73)*** <.0001

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-C   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Institutional Investors

Panel C: **Institutional Investors**	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect *- All Market States*	-0.0310 (-4.92)*** <.0001	0.0114 (1.64) 0.0027	0.0449 (5.77)*** <.0001	0.0611 (7.36)*** <.0001	0.0611 (7.36)*** <.0001	0.1215 (12.87)*** <.0001	0.1534 (14.5)*** <.0001	0.1923 (14.85)*** <.0001	0.1664 (11.02)*** <.0001	0.2158 (14.02)*** <.0001
Disposition Effect *- Up Market*	0.0054 (0.77) 0.0782	0.0634 (8.43)*** <.0001	0.1052 (12.64)*** <.0001	0.1309 (14.46)*** <.0001	0.1309 (14.46)*** <.0001	0.2187 (22.24)*** <.0001	0.2462 (22.58)*** <.0001	0.2551 (19.92)*** <.0001	0.2847 (20.17)*** <.0001	0.3533 (22.85)*** <.0001
Disposition Effect *- Down Market*	-0.1690 (-15.54)*** <.0001	-0.1840 (-14.6)*** <.0001	-0.1910 (-13.89)*** <.0001	-0.2020 (-14.52)*** <.0001	-0.2020 (-14.52)*** <.0001	-0.2340 (-14.47)*** <.0001	-0.2040 (-12.01)*** <.0001	-0.0740 (-3.78)*** <.0001	-0.2660 (-12.29)*** <.0001	-0.3570 (-16.45)*** <.0001
Overconfidence Effect *- All Market States*	0.1565 (24.28)*** <.0001	0.2082 (27.91)*** <.0001	0.2351 (28.67)*** <.0001	0.2505 (28.97)*** <.0001	0.2505 (28.97)*** <.0001	0.2800 (27.96)*** <.0001	0.2768 (24.52)*** <.0001	0.2686 (20.51)*** <.0001	0.2323 (15.32)*** <.0001	0.2803 (18.23)*** <.0001
Overconfidence Effect *- Up Market*	0.1920 (27.33)*** <.0001	0.2476 (32.12)*** <.0001	0.2819 (33.07)*** <.0001	0.3143 (35.76)*** <.0001	0.3143 (35.76)*** <.0001	0.3640 (37.03)*** <.0001	0.3602 (32.26)*** <.0001	0.3205 (25.11)*** <.0001	0.3369 (24.24)*** <.0001	0.4002 (26.87)*** <.0001
Overconfidence Effect *- Down Market*	-0.0400 (-3.3)*** 0.0229	-0.0270 (-1.9)* 0.5768	-0.0390 (-2.66)** 0.0886	-0.0830 (-5.28)*** <.0001	-0.0830 (-5.28)*** <.0001	-0.1350 (-7.66)*** <.0001	-0.1310 (-7.14)*** <.0001	-0.0310 (-1.5) 0.2108	-0.2230 (-9.92)*** <.0001	-0.3050 (-13.35)*** <.0001

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-D   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of High Market-to-Book Ratio Firms

Panel D: **High M/B Firms**	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect *- All Market States*	0.0862 (3.03)*** <.0001	0.1599 (4.99)*** <.0001	0.1999 (6.09)*** <.0001	0.2134 (6.69)*** <.0001	0.2582 (7.75)*** <.0001	0.2847 (8.53)*** <.0001	0.3232 (9.05)*** <.0001	0.3012 (5.85)*** <.0001	0.3114 (5.72)*** <.0001	0.3163 (5.75)*** <.0001
Disposition Effect *- Up Market*	0.1550 (4.81)*** <.0001	0.2327 (6.71)*** <.0001	0.2800 (7.88)*** <.0001	0.2989 (8.54)*** <.0001	0.3583 (10.10)*** <.0001	0.3946 (11.43)*** <.0001	0.4119 (11.38)*** <.0001	0.3985 (7.63)*** <.0001	0.4793 (10.12)*** <.0001	0.4696 (9.61)*** <.0001
Disposition Effect *- Down Market*	-0.1641 (-3.82)*** <.0001	-0.1352 (-2.79)*** 0.034	-0.1155 (-2.34)** 0.1013	-0.1239 (-2.42)** 0.0757	-0.1183 (-2.23)** 0.1358	-0.1202 (-2.28)** 0.1358	0.0100 (0.19) 0.5173	0.0110 (0.17) 0.7231	-0.0902 (-1.23) 0.2316	-0.1018 (-1.37) 0.253
Overconfidence Effect *- All Market States*	0.1804 (5.48)*** <.0001	0.2601 (10.46)*** <.0001	0.3003 (13.01)*** <.0001	0.3232 (12.57)*** <.0001	0.3692 (13.28)*** <.0001	0.3918 (13.13)*** <.0001	0.3841 (9.156)*** <.0001	0.3592 (6.73)*** <.0001	0.4039 (7.47)*** <.0001	0.3881 (7.12)*** <.0001
Overconfidence Effect *- Up Market*	0.2397 (6.79)*** <.0001	0.2833 (8.01)*** <.0001	0.3315 (9.53)*** <.0001	0.3594 (9.89)*** <.0001	0.4185 (10.69)*** <.0001	0.4451 (10.80)*** <.0001	0.5009 (15.11)*** <.0001	0.4254 (7.66)*** <.0001	0.5380 (12.55)*** <.0001	0.5091 (12.00)*** <.0001
Overconfidence Effect *- Down Market*	-0.1109 (-2.63)** 0.0588	-0.0355 (-0.75) 0.7705	-0.0095 (-0.20) 0.8431	-0.0236 (-0.47) 0.7546	-0.0319 (-0.60) 0.7705	-0.0362 (-0.65) 0.8759	0.0410 (0.74) 0.2316	0.0535 (0.79) 0.341	-0.0515 (-0.69) 0.4908	-0.0447 (-0.56) 0.6768

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-E   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of Low Market-to-Book Ratio Firms

Panel E: **Low M/B Firms**	**1 week**	**2 weeks**	**3 weeks**	**4 weeks**	**6 weeks**	**8 weeks**	**12 weeks**	**24 weeks**	**36 weeks**	**48 weeks**
Disposition Effect *- All Market States*	0.0275 (2.24)** 0.0295	0.0786 (4.96)*** <.0001	0.1045 (6.89)*** <.0001	0.1135 (7.02)*** <.0001	0.1309 (7.53)*** <.0001	0.1318 (6.93)*** <.0001	0.1394 (6.22)*** <.0001	0.1376 (4.34)*** <.0001	0.1361 (3.46)*** 0.0002	0.1469 (3.61)*** 0.0001
Disposition Effect *- Up Market*	0.0515 (4.29)*** <.0001	0.1075 (6.71)*** <.0001	0.1425 (7.89)*** <.0001	0.1568 (8.05)*** <.0001	0.1860 (8.50)*** <.0001	0.1958 (8.68)*** <.0001	0.2295 (9.00)*** <.0001	0.2239 (7.09)*** <.0001	0.2544 (7.08)*** <.0001	0.2786 (7.11)*** <.0001
Disposition Effect *- Down Market*	-0.0807 (-2.61)** 0.0176	-0.0351 (-1.20) 0.5139	-0.0530 (-1.64) 0.3274	-0.0715 (-2.12)** 0.0813	-0.0844 (-2.20)** 0.1044	-0.1155 (-3.15)*** 0.0042	-0.1747 (-4.40)*** <.0001	-0.1430 (-3.07)*** 0.0041	-0.2890 (-5.21)*** <.0001	-0.3945 (-6.26)*** <.0001
Overconfidence Effect *- All Market States*	0.0975 (9.77)*** <.0001	0.1516 (11.25)*** <.0001	0.1730 (11.51)*** <.0001	0.1783 (10.84)*** <.0001	0.1943 (9.90)*** <.0001	0.1946 (8.68)*** <.0001	0.1973 (8.16)*** <.0001	0.1781 (5.94)*** <.0001	0.1535 (4.33)*** <.0001	0.1695 (4.54)*** <.0001
Overconfidence Effect *- Up Market*	0.1167 (10.17)*** <.0001	0.1751 (11.49)*** <.0001	0.2052 (11.37)*** <.0001	0.2151 (11.53)*** <.0001	0.2388 (11.47)*** <.0001	0.2484 (10.63)*** <.0001	0.2702 (10.91)*** <.0001	0.2467 (8.19)*** <.0001	0.2664 (7.73)*** <.0001	0.2991 (7.84)*** <.0001
Overconfidence Effect *- Down Market*	-0.0027 (-0.09) 0.5017	0.0453 (1.68) 0.0451	0.0186 (0.60) 0.2907	-0.0025 (-0.07) 0.8903	-0.0167 (-0.43) 0.9507	-0.0568 (-1.44) 0.1683	-0.1245 (-2.88)*** 0.0072	-0.1143 (-2.38)** 0.0265	-0.2800 (-5.11)*** <.0001	-0.3637 (-5.39)*** <.0001

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-F   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of High Sales Growth Firms

Panel F: High Growth Firms	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect *- All Market States*	0.0622 (4.41)*** <.0001	0.1140 (7.58)*** <.0001	0.1361 (7.95)*** <.0001	0.1527 (8.24)*** <.0001	0.1606 (8.35)*** <.0001	0.1613 (7.72)*** <.0001	0.1740 (7.23)*** <.0001	0.1755 (5.96)*** <.0001	0.1700 (5.23)*** <.0001	0.1941 (5.45)*** <.0001
Disposition Effect *- Up Market*	0.0834 (5.40)*** <.0001	0.1374 (8.69)*** <.0001	0.1636 (9.30)*** <.0001	0.1840 (9.17)*** <.0001	0.1974 (9.22)*** <.0001	0.2075 (9.43)*** <.0001	0.2312 (9.66)*** <.0001	0.2423 (8.56)*** <.0001	0.2783 (9.53)*** <.0001	0.3374 (10.43)*** <.0001
Disposition Effect *- Down Market*	-0.0431 (-1.48) 0.801	0.0161 (0.55) 0.1087	0.0199 (0.61) 0.1109	0.0119 (0.36) 0.4038	-0.0057 (-0.17) 0.9659	-0.0365 (-1.09) 0.2293	-0.0715 (-1.85)* 0.0519	-0.0988 (-2.13)** 0.0295	-0.2649 (-4.85)*** <.0001	-0.4046 (-7.04)*** <.0001
Overconfidence Effect *- All Market States*	0.1294 (10.54)*** <.0001	0.1817 (14.22)*** <.0001	0.2019 (14.36)*** <.0001	0.2150 (12.19)*** <.0001	0.2175 (11.82)*** <.0001	0.2137 (10.45)*** <.0001	0.2171 (8.97)*** <.0001	0.2111 (7.48)*** <.0001	0.2018 (6.49)*** <.0001	0.2286 (6.67)*** <.0001
Overconfidence Effect *- Up Market*	0.1501 (9.63)*** <.0001	0.2016 (12.97)*** <.0001	0.2241 (13.19)*** <.0001	0.2454 (12.00)*** <.0001	0.2557 (12.13)*** <.0001	0.2607 (11.95)*** <.0001	0.2734 (11.17)*** <.0001	0.2774 (9.89)*** <.0001	0.3105 (10.91)*** <.0001	0.3714 (11.89)*** <.0001
Overconfidence Effect *- Down Market*	0.0068 (0.24) 0.2293	0.0754 (2.86)*** 0.0003	0.0818 (2.84)*** 0.0011	0.0516 (1.50) 0.0153	0.0249 (0.76) 0.4484	-0.0052 (-0.15) 0.7645	-0.0497 (-1.21) 0.2256	-0.0817 (-1.82)* 0.0389	-0.2562 (-4.69)*** <.0001	-0.3946 (-6.69)*** <.0001

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-G   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of Low Sales Growth Firms

Panel G: Low Growth Firms	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect - *All Market States*	0.0624 (2.25)** 0.0009	0.1537 (4.77)*** <.0001	0.1892 (6.18)*** <.0001	0.1799 (5.09)*** <.0001	0.2170 (5.65)*** <.0001	0.2252 (5.60)*** <.0001	0.2050 (3.76)*** <.0001	0.2722 (4.75)*** <.0001	0.0673 (0.92) 0.2658	0.0980 (1.24) 0.1584
Disposition Effect - *Up Market*	0.1089 (3.17)*** 0.0004	0.2063 (5.35)*** <.0001	0.2324 (6.15)*** <.0001	0.2541 (5.93)*** <.0001	0.3018 (6.42)*** <.0001	0.3262 (6.79)*** <.0001	0.3501 (6.34)*** <.0001	0.3629 (5.79)*** <.0001	0.2495 (3.29)*** <.0001	0.2178 (2.57)*** 0.0143
Disposition Effect - *Down Market*	-0.1332 (-2.49)** 0.0289	-0.1067 (-1.67) 0.2181	-0.0320 (-0.55) 0.9356	-0.1008 (-1.62) 0.1957	-0.1302 (-1.96)* 0.1175	-0.1539 (-2.33)** 0.049	-0.1566 (-2.24)** 0.0868	-0.0274 (-0.38) 0.7922	-0.4102 (-5.93)*** <.0001	-0.3513 (-4.36)*** <.0001
Overconfidence Effect - *All Market States*	0.1478 (3.82)*** <.0001	0.1927 (4.88)*** <.0001	0.1963 (4.47)*** <.0001	0.2683 (6.38)*** <.0001	0.2836 (6.09)*** <.0001	0.3229 (6.42)*** <.0001	0.3555 (6.79)*** <.0001	0.3230 (5.31)*** <.0001	0.2244 (3.23)*** 0.0022	0.2001 (2.52)** 0.0152
Overconfidence Effect - *Up Market*	0.1780 (4.14)*** <.0001	0.2351 (5.55)*** <.0001	0.2455 (5.28)*** <.0001	0.3233 (7.45)*** <.0001	0.3560 (7.41)*** <.0001	0.4086 (8.53)*** <.0001	0.4850 (11.51)*** <.0001	0.4653 (9.35)*** <.0001	0.3749 (5.58)*** <.0001	0.2973 (3.70)*** <.0001
Overconfidence Effect - *Down Market*	-0.0854 (-1.63) 0.24	-0.0489 (-0.85) 0.7267	-0.0638 (-1.06) 0.6709	-0.0506 (-0.76) 0.7675	-0.0662 (-1.02) 0.4937	-0.0717 (-0.99) 0.4375	-0.0874 (-1.18) 0.4904	-0.0731 (-1.05) 0.4757	-0.3412 (-4.99)*** <.0001	-0.2286 (-2.50)** 0.0147

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

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Table III-H   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of High Liquidity Firms

Panel H: High Liquidity Firms	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect *- All Market States*	0.1153 (14.48)*** <.0001	0.1656 (18.58)*** <.0001	0.2022 (20.23)*** <.0001	0.2092 (18.08)*** <.0001	0.2145 (18.62)*** <.0001	0.2153 (16.17)*** <.0001	0.2101 (13.68)*** <.0001	0.1610 (6.98)*** <.0001	0.1308 (5.09)*** <.0001	0.1491 (4.55)*** <.0001
Disposition Effect *- Up Market*	0.1387 (14.28)** <.0001	0.1980 (19.24)*** <.0001	0.2282 (18.57)*** <.0001	0.2471 (17.69)*** <.0001	0.2695 (19.49)*** <.0001	0.2809 (17.89)*** <.0001	0.2941 (17.59)*** <.0001	0.2586 (11.82)*** <.0001	0.2871 (12.60)*** <.0001	0.3227 (10.90)*** <.0001
Disposition Effect *- Down Market*	0.0413 (2.91)*** 0.0077	0.0624 (4.08)*** <.0001	0.1099 (5.63)*** <.0001	0.0831 (3.82)*** 0.0004	0.0387 (2.07)** 0.1109	-0.0022 (-0.09) 0.8454	-0.0637 (-2.28)*** 0.0583	-0.1516 (-3.81)*** 0.0007	-0.3295 (-6.55)*** <.0001	-0.4060 (-7.90)*** <.0001
Overconfidence Effect *- All Market States*	0.1442 (18.28)*** <.0001	0.1970 (21.90)*** <.0001	0.2339 (22.61)*** <.0001	0.2382 (19.68)*** <.0001	0.2386 (19.88)*** <.0001	0.2341 (16.73)*** <.0001	0.2234 (13.73)*** <.0001	0.1676 (7.01)*** <.0001	0.1385 (4.89)*** <.0001	0.1536 (4.49)*** <.0001
Overconfidence Effect *- Up Market*	0.1671 (17.65)*** <.0001	0.2283 (22.46)*** <.0001	0.2582 (20.21)*** <.0001	0.2760 (19.34)*** <.0001	0.2930 (20.78)*** <.0001	0.2987 (18.40)*** <.0001	0.3056 (17.83)*** <.0001	0.2666 (11.85)*** <.0001	0.2977 (11.98)*** <.0001	0.3291 (10.81)*** <.0001
Overconfidence Effect *- Down Market*	0.0732 (4.85)*** <.0001	0.0966 (5.84)*** <.0001	0.1447 (6.87)*** <.0001	0.1109 (4.80)*** <.0001	0.0649 (2.98)*** 0.0095	0.0211 (0.82) 0.4092	-0.0430 (-1.41) 0.1971	-0.1526 (-3.67)*** 0.0006	-0.3265 (-6.27)*** <.0001	-0.4046 (-7.46)*** <.0001

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-I   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of Low Liquidity Firms

Panel I: Low Liquidity Firms	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect - *All Market States*	0.0428 (1.38) 0.0075	0.1106 (3.11)*** <.0001	0.1529 (4.45)*** <.0001	0.1775 (5.04)*** <.0001	0.2251 (6.57)*** <.0001	0.2703 (7.65)*** <.0001	0.2907 (6.08)*** <.0001	0.3250 (5.79)*** <.0001	0.3066 (4.52)*** <.0001	0.3377 (5.07)*** <.0001
Disposition Effect - *Up Market*	0.0883 (2.66)** 0.0007	0.1591 (4.36)*** <.0001	0.2318 (7.76)*** <.0001	0.2613 (7.35)*** <.0001	0.3099 (8.28)*** <.0001	0.3755 (9.18)*** <.0001	0.4281 (10.52)*** <.0001	0.4404 (8.35)*** <.0001	0.4784 (8.26)*** <.0001	0.4541 (7.53)*** <.0001
Disposition Effect - *Down Market*	-0.1394 (-3.02)*** 0.0006	-0.0882 (-1.61) 0.1176	-0.1042 (-1.81)* 0.0658	-0.1188 (-2.06)** 0.0399	-0.0934 (-1.54) 0.2464	-0.0849 (-1.41) 0.2422	-0.0506 (-0.77) 0.5239	0.0779 (1.19) 0.222	-0.0551 (-0.67) 0.4295	-0.0086 (-0.10) 0.8882
Overconfidence Effect - *All Market States*	0.1777 (5.31)*** <.0001	0.2350 (6.25)*** <.0001	0.2339 (6.25)*** <.0001	0.3012 (9.03)*** <.0001	0.2984 (7.28)*** <.0001	0.3970 (9.91)*** <.0001	0.4427 (11.53)*** <.0001	0.4222 (8.42)*** <.0001	0.4143 (7.36)*** <.0001	0.4463 (7.99)*** <.0001
Overconfidence Effect - *Up Market*	0.1973 (5.12)*** <.0001	0.2618 (6.61)*** <.0001	0.2698 (6.36)*** <.0001	0.3516 (9.15)*** <.0001	0.3489 (7.74)*** <.0001	0.4614 (10.69)*** <.0001	0.5328 (16.82)*** <.0001	0.4898 (10.58)*** <.0001	0.4851 (8.40)*** <.0001	0.5051 (9.71)*** <.0001
Overconfidence Effect - *Down Market*	-0.0024 (-0.06) 0.9786	0.0350 (0.72) 0.428	0.0027 (0.05) 0.97	-0.0159 (-0.27) 0.7511	0.0149 (0.26) 0.6131	0.0011 (0.02) 0.7593	0.0115 (0.17) 0.6553	0.1245 (2.10)** 0.0413	0.0564 (0.75) 0.385	0.0980 (1.11) 0.2444

1. *: significant at10%; **: significant at5%;***: significant at1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-J   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of High Market Cap Firms

Panel J: High Market Cap Firms	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect - *All Market States*	0.0121 (1.50) 0.1653	0.0547 (4.81)*** <.0001	0.0769 (6.11)*** <.0001	0.0852 (6.81)*** <.0001	0.0961 (6.69)*** <.0001	0.0949 (6.39)*** <.0001	0.1071 (5.51)*** <.0001	0.1160 (4.38)*** <.0001	0.1323 (3.87)*** 0.0003	0.1507 (3.88)*** 0.0003
Disposition Effect - *Up Market*	0.0338 (3.67)*** 0.001	0.0854 (6.39)*** 0.001	0.1084 (6.84)*** <.0001	0.1294 (8.13)*** <.0001	0.1499 (8.38)*** <.0001	0.1698 (9.13)*** <.0001	0.1913 (8.43)*** <.0001	0.1975 (7.40)*** <.0001	0.2574 (8.36)*** <.0001	0.2920 (8.43)*** <.0001
Disposition Effect - *Down Market*	-0.0541 (-3.86)*** 0.0009	-0.0387 (-2.27)** 0.0532	-0.0180 (-1.07) 0.4427	-0.0477 (-2.76)*** 0.0057	-0.0673 (-3.19)*** 0.0026	-0.1336 (-5.85)*** <.0001	-0.1522 (-4.78)*** <.0001	-0.1246 (-2.76)*** 0.0052	-0.2264 (-3.78)*** 0.0003	-0.2899 (-4.40)*** <.0001
Overconfidence Effect - *All Market States*	0.0804 (10.09)*** <.0001	0.1261 (11.64)*** <.0001	0.1505 (11.55)*** <.0001	0.1548 (11.92)*** <.0001	0.1541 (10.12)*** <.0001	0.1492 (9.58)** <.0001	0.1496 (7.47)*** <.0001	0.1348 (5.10)*** <.0001	0.1385 (4.05)*** 0.0002	0.1576 (4.04)*** 0.0002
Overconfidence Effect - *Up Market*	0.1023 (11.62)*** <.0001	0.1530 (12.01)*** <.0001	0.1825 (11.41)*** <.0001	0.2016 (12.29)*** <.0001	0.2131 (11.97)*** <.0001	0.2277 (12.51)*** <.0001	0.2352 (11.27)*** <.0001	0.2203 (8.34)*** <.0001	0.2638 (8.69)*** <.0001	0.3026 (8.89)*** <.0001
Overconfidence Effect - *Down Market*	0.0104 (0.71) 0.3227	0.0398 (2.28)** 0.0273	0.0500 (2.92)*** 0.0019	0.0102 (0.61) 0.3825	-0.0280 (-1.27) 0.1653	-0.0935 (-3.83)*** 0.0003	-0.1179 (-3.37)*** 0.0005	-0.1222 (-2.59)** 0.0072	-0.2221 (-3.66)*** 0.0003	-0.2877 (-4.27)*** <.0001

1. *: significant at 10%; **: significant at 5%; ***: significant at 1%.
2. Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table III-K   Tests on Disposition and Overconfidence Effects in Momentum Strategies

Stocks of Low Market Cap Firms

Panel K: Low Market Cap Firms	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Disposition Effect *- All Market States*	0.0399 (1.11) 0.0026	0.1135 (2.84)*** 0.0001	0.1656 (4.06)*** <.0001	0.1819 (4.18)*** <.0001	0.2124 (4.69)*** <.0001	0.2635 (6.20)*** <.0001	0.2842 (5.96)*** <.0001	0.3131 (5.53)*** <.0001	0.1884 (2.70)*** 0.0065	0.2245 (2.94)*** 0.0061
Disposition Effect *- Up Market*	0.1040 (2.71)*** 0.0006	0.1792 (4.65)*** <.0001	0.2294 (5.92)*** <.0001	0.2521 (6.01)*** <.0001	0.3004 (7.09)*** <.0001	0.3799 (9.47)*** <.0001	0.3921 (9.74)*** <.0001	0.4328 (8.47)*** <.0001	0.4220 (6.74)*** <.0001	0.4172 (5.79)*** <.0001
Disposition Effect *- Down Market*	-0.1779 (-3.69)*** <.0001	-0.1299 (-2.18)** 0.1591	-0.0418 (-0.71) 0.7929	-0.0506 (-0.84) 0.8399	-0.0936 (-1.41) 0.4294	-0.0908 (-1.32) 0.5172	-0.0256 (-0.34) 0.9036	0.0607 (0.76) 0.4333	-0.2623 (-3.22)*** 0.0045	-0.1982 (-2.22)** 0.0407
Overconfidence Effect *- All Market States*	0.1355 (2.95)*** <.0001	0.1995 (4.74)*** <.0001	0.1941 (4.22)*** <.0001	0.2819 (6.35)*** <.0001	0.2934 (6.24)*** <.0001	0.3803 (8.19)*** <.0001	0.4043 (7.99)*** <.0001	0.3860 (6.71)*** <.0001	0.3485 (5.67)*** <.0001	0.3337 (4.49)*** 0.0001
Overconfidence Effect *- Up Market*	0.1735 (3.54)*** <.0001	0.1979 (4.09)*** <.0001	0.1898 (3.66)*** <.0001	0.2814 (5.47)*** <.0001	0.3019 (5.38)*** <.0001	0.3888 (7.03)*** <.0001	0.4902 (10.88)*** <.0001	0.4443 (7.69)*** <.0001	0.4778 (8.42)*** <.0001	0.4656 (6.77)*** <.0001
Overconfidence Effect *- Down Market*	-0.0740 (-1.49) 0.5444	0.0086 (0.16) 0.5297	0.0279 (0.47) 0.3401	0.0660 (1.09) 0.1489	0.0399 (0.63) 0.55	0.0722 (1.02) 0.2494	0.0799 (1.03) 0.1589	0.0939 (1.21) 0.2855	-0.1391 (-1.70)*** 0.119	-0.1111 (-1.17) 0.2358

1.   *: significant at10%; **: significant at5%;***: significant at1%.
2.   Numbers on the third line of each cells are *p* values of Wilcoxon sign tests.

Table IV-A   Returns from Momentum Strategies on Stocks of Larger Firms
All Market States

Panel A: **All Market States**

		Portfolio Holding Periods									
		1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
P o r t f o l i o F o r m i n g P e r i o d s	**1 week**	0.4213	0.3844	0.1903	0.0546	-0.04	0.0006	0.005	0.0107	0.0271	0.0364
		(2.4)**	(3.32)***	(1.99)**	(0.65)	(-0.59)	(0.01)	(0.1)	(0.33)	(1.13)	(1.74)*
	2 weeks	0.5772	0.4184	0.2122	0.0591	-0.042	0.02	0.0215	0.037	0.0466	0.0616
		(2.97)***	(3.37)***	(2.11)**	(0.69)	(-0.61)	(0.33)	(0.43)	(1.08)	(1.96)**	(2.9)***
	3 weeks	0.3023	0.1333	-0.034	-0.132	-0.11	-0.021	-0.032	0.0234	0.0419	0.0638
		(1.51)	(1.06)	(-0.34)	(-1.51)	(-1.5)	(-0.33)	(-0.61)	(0.65)	(1.65)	(2.78)***
	4 weeks	0.1692	-0.03	-0.149	-0.227	-0.146	-0.071	-0.084	0.0027	0.0292	0.0576
		(0.86)	(-0.23)	(-1.4)	(-2.47)**	(-1.89)*	(-1.11)	(-1.63)	(0.07)	(1.17)	(2.48)**
	6 weeks	-0.028	-0.117	-0.182	-0.189	-0.1	-0.071	-0.087	0.0079	0.0476	0.078
		(-0.13)	(-0.87)	(-1.67)	(-1.99)**	(-1.3)	(-1.11)	(-1.68)*	(0.21)	(1.83)*	(3.21)***
	8 weeks	-0.069	-0.102	-0.146	-0.157	-0.136	-0.096	-0.095	0.0046	0.0751	0.0925
		(-0.33)	(-0.73)	(-1.3)	(-1.63)	(-1.72)*	(-1.44)	(-1.75)*	(0.12)	(2.8)***	(3.7)***
	12 weeks	0.0487	-0.093	-0.175	-0.186	-0.169	-0.129	-0.091	0.0293	0.117	0.0963
		(0.24)	(-0.69)	(-1.58)	(-1.95)*	(-2.18)**	(-1.91)*	(-1.58)	(0.71)	(4.03)***	(3.68)***
	24 weeks	-0.039	-0.014	-0.057	-0.068	-0.032	0.0099	0.0552	0.2033	0.2312	0.1339
		(-0.18)	(-0.09)	(-0.45)	(-0.59)	(-0.34)	(0.12)	(0.8)	(4.69)***	(7.17)***	(4.92)***
	36 weeks	0.0738	0.0235	0.0113	0.02	0.0608	0.1021	0.189	0.2615	0.2054	0.1417
		(0.35)	(0.15)	(0.09)	(0.17)	(0.64)	(1.27)	(2.99)***	(6.23)***	(6.82)***	(5.96)***
	48 weeks	0.2532	0.255	0.2346	0.2302	0.2462	0.2549	0.2598	0.2411	0.2005	0.1382
		(1.24)	(1.7)	(1.78)*	(1.94)*	(2.51)**	(3.1)***	(4.01)***	(5.43)***	(5.93)***	(5.02)***

Table IV-B   Returns from Momentum Strategies on Stocks of Larger Firms
Up Market

Panel B: Up Market

		Portfolio Holding Periods									
		1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Portfolio Forming Periods	1 week	0.6152	0.4868	0.2797	0.1048	-0.004	0.0424	0.0673	0.0543	0.0608	0.0653
		(2.93)***	(3.59)***	(2.54)**	(1.09)	(-0.05)	(0.65)	(1.33)	(1.53)	(2.29)**	(2.88)***
	2 weeks	0.7399	0.4956	0.2435	0.1012	-0.001	0.0815	0.1015	0.0752	0.0828	0.097
		(3.27)***	(3.43)***	(2.07)**	(1.04)	(-0.02)	(1.23)	(1.92)*	(1.93)*	(3.22)***	(4.18)***
	3 weeks	0.5703	0.2758	0.0792	-0.029	-0.003	0.0864	0.0611	0.0648	0.0819	0.1015
		(2.52)**	(1.98)**	(0.71)	(-0.31)	(-0.04)	(1.24)	(1.1)	(1.6)	(2.94)***	(4.02)***
	4 weeks	0.3941	0.1173	-0.044	-0.112	-0.034	0.0566	0.0167	0.0498	0.0797	0.1031
		(1.8)*	(0.79)	(-0.36)	(-1.09)	(-0.4)	(0.82)	(0.3)	(1.22)	(2.88)***	(3.9)***
	6 weeks	0.228	0.0395	-0.064	-0.055	0.0298	0.0606	0.0229	0.06	0.0998	0.126
		(0.95)	(0.26)	(-0.52)	(-0.51)	(0.35)	(0.88)	(0.41)	(1.43)	(3.51)***	(4.6)***
	8 weeks	0.1361	0.0404	-0.028	-0.04	-0.001	0.0386	0.0118	0.0599	0.1299	0.1475
		(0.57)	(0.26)	(-0.22)	(-0.37)	(-0.01)	(0.53)	(0.2)	(1.4)	(4.51)***	(5.37)***
	12 weeks	0.304	0.1022	0.0024	-0.011	-0.02	0.0154	0.0339	0.0967	0.1609	0.1312
		(1.27)	(0.64)	(0.02)	(-0.1)	(-0.22)	(0.2)	(0.54)	(2.23)**	(5.54)***	(4.74)***
	24 weeks	0.216	0.1799	0.1391	0.1264	0.1306	0.1671	0.1738	0.238	0.2184	0.1116
		(0.83)	(0.97)	(0.9)	(0.91)	(1.15)	(1.7)*	(2.21)**	(5.1)***	(6.35)***	(3.73)***
	36 weeks	0.1904	0.0914	0.0624	0.0659	0.0907	0.132	0.1763	0.2225	0.1653	0.1141
		(0.75)	(0.5)	(0.4)	(0.47)	(0.8)	(1.36)	(2.34)**	(4.78)***	(5.06)***	(4.27)***
	48 weeks	0.2214	0.2221	0.2106	0.2247	0.2547	0.2854	0.2894	0.2524	0.2356	0.1817
		(0.92)	(1.23)	(1.32)	(1.57)	(2.17)**	(2.91)***	(3.78)***	(5.11)***	(6)***	(5.32)***

Table IV-C   Returns from Momentum Strategies on Stocks from Larger Firms
Down Market

Panel C: **Down Market**										
	Portfolio Holding Periods									
	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
1 week	0.0468	0.168	-0.018	-0.05	-0.118	-0.11	-0.165	-0.104	-0.056	-0.031
	(0.15)	(0.75)	(-0.09)	(-0.3)	(-0.78)	(-0.82)	(-1.44)	(-1.5)	(-1.08)	(-0.66)
2 weeks	0.2673	0.2429	0.1181	-0.038	-0.149	-0.149	-0.196	-0.062	-0.037	-0.019
	(0.72)	(0.99)	(0.6)	(-0.21)	(-1)	(-1.08)	(-1.66)	(-0.87)	(-0.69)	(-0.41)
3 weeks	-0.268	-0.194	-0.324	-0.389	-0.38	-0.312	-0.288	-0.089	-0.059	-0.024
	(-0.66)	(-0.72)	(-1.51)	(-2.01)**	(-2.44)**	(-2.2)**	(-2.43)**	(-1.18)	(-1.08)	(-0.5)
4 weeks	-0.275	-0.356	-0.41	-0.501	-0.416	-0.402	-0.348	-0.115	-0.088	-0.043
	(-0.66)	(-1.35)	(-1.9)	(-2.55)**	(-2.47)**	(-2.8)***	(-3)***	(-1.56)	(-1.67)	(-0.94)
6 weeks	-0.544	-0.463	-0.477	-0.528	-0.437	-0.433	-0.388	-0.134	-0.083	-0.037
	(-1.3)	(-1.67)	(-2.15)**	(-2.63)***	(-2.65)***	(-2.97)***	(-3.3)***	(-1.68)*	(-1.48)	(-0.74)
8 weeks	-0.489	-0.433	-0.426	-0.429	-0.471	-0.45	-0.372	-0.136	-0.055	-0.038
	(-1.16)	(-1.5)	(-1.79)*	(-2.1)**	(-2.75)***	(-3.03)***	(-3.13)***	(-1.62)	(-0.92)	(-0.71)
12 weeks	-0.554	-0.604	-0.641	-0.631	-0.56	-0.517	-0.43	-0.146	0.0161	0.0149
	(-1.38)	(-2.29)**	(-3.07)***	(-3.54)***	(-3.76)***	(-3.74)***	(-3.42)***	(-1.51)	(0.22)	(0.25)
24 weeks	-0.699	-0.553	-0.62	-0.604	-0.513	-0.446	-0.29	0.1052	0.2659	0.1901
	(-1.84)*	(-2.06)**	(-2.92)***	(-3.14)***	(-2.98)***	(-2.82)***	(-2.09)**	(1.05)	(3.54)***	(3.18)***
36 weeks	-0.281	-0.198	-0.175	-0.14	-0.071	-0.009	0.2066	0.3613	0.3116	0.2122
	(-0.74)	(-0.73)	(-0.83)	(-0.74)	(-0.43)	(-0.07)	(1.8)*	(3.93)***	(4.65)***	(4.28)***
48 weeks	0.3234	0.3158	0.2393	0.2044	0.1774	0.1423	0.1571	0.2013	0.1055	0.0275
	(0.87)	(1.18)	(1.05)	(0.99)	(1.03)	(0.95)	(1.3)	(2.07)**	(1.58)	(0.62)

Portfolio Forming Periods (row axis label)

Table V-A   Returns on Momentum Strategies with Non-overlapping Periods
All Market States

Panel A: All Market States

		Portfolio Holding Periods									
		1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
Portfolio Forming Periods	1 week	0.3033	0.2928	0.3334	0.278	0.1215	0.2018	0.2412	0.119	0.1535	0.1802
		(2.03)**	(2.15)**	(2.15)**	(2.11)**	(0.85)	(1.69)*	(1.75)*	(1.01)	(1.39)	(1.43)
	2 weeks	0.3634	0.3764	0.2375	0.2521	0.0194	0.1072	0.0517	0.0572	0.226	0.2157
		(2.43)**	(2.74)***	(1.86)*	(1.69)*	(0.14)	(0.77)	(0.49)	(0.72)	(1.65)	(2.1)
	3 weeks	0.2512	0.2358	0.2205	0.0951	0.1199	0.0732	0.1948	0.2891	0.2362	0.2635
		(1.66)	(1.68)*	(1.62)	(0.69)	(0.88)	(0.61)	(1.65)	(1.58)	(1.75)*	(3.41)***
	4 weeks	0.2655	0.1142	0.1057	0.0848	0.1768	0.0566	0.1569	0.2377	0.2958	0.1485
		(1.67)*	(0.74)	(0.74)	(0.56)	(1.21)	(0.39)	(1.28)	(1.68)*	(2.08)**	(1.55)
	6 weeks	0.1517	0.1568	0.0336	0.0347	0.1166	0.0158	0.0915	0.0813	0.1228	0.0997
		(0.93)	(1.01)	(0.22)	(0.21)	(0.71)	(0.09)	(0.38)	(0.44)	(0.61)	(0.49)
	8 weeks	0.1935	0.1626	0.1085	0.0552	0.1592	0.1306	0.1893	-0.05	0.2238	0.1037
		(1.17)	(1.03)	(0.69)	(0.35)	(0.99)	(0.79)	(1.27)	(-0.26)	(1.94)*	(1.31)
	12 weeks	0.3153	-0.005	0.04	-0.063	0.0586	0.1587	0.1124	0.0579	0.1857	0.2523
		(1.86)*	(-0.03)	(0.25)	(-0.39)	(0.34)	(1.03)	(0.43)	(0.3)	(1.29)	(2.15)**
	24 weeks	0.1468	0.1536	0.1664	0.1673	0.165	0.2116	0.1683	0.2351	0.2753	0.2457
		(0.85)	(0.89)	(0.95)	(0.93)	(0.97)	(1.04)	(0.88)	(1.11)	(1.29)	(1.68)*
	36 weeks	0.2143	0.2625	0.1999	0.3073	0.2199	0.4362	0.2357	0.3664	0.4236	0.4192
		(1.25)	(1.47)	(1.14)	(1.61)	(1.22)	(2.11)**	(0.83)	(2.06)**	(3.2)***	(1.5)
	48 weeks	0.2993	0.2318	0.222	0.3175	0.2792	0.2351	0.2747	0.2136	0.2887	0.3095
		(1.86)*	(1.36)	(1.26)	(1.37)	(1.47)	(0.59)	(1.29)	(1.08)	(2.53)**	(2.35)**

Table V-B   Returns on Momentum Strategies with Non-overlapping Periods
Up Market

Panel B : Up Market

		Portfolio Holding Periods									
		1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
P o r t f o l i o F o r m i n g P e r i o d s	**1 week**	0.3463	0.3434	0.4064	0.3053	0.1495	0.2244	0.2792	0.134	0.2088	0.2088
		(2.37)**	(2.34)**	(2.29)**	(2.53)**	(0.85)	(1.89)*	(1.31)	(1.06)	(1.46)	(2.98)***
	2 weeks	0.4383	0.4772	0.3708	0.2856	0.1154	0.3841	0.4506	0.1952	0.2895	0.2605
		(2.54)**	(3.21)***	(2.45)**	(2.12)**	(0.74)	(2.4)**	(1.81)*	(1.18)	(2.68)***	(2.59)***
	3 weeks	0.3909	0.3685	0.3234	0.2432	0.3188	0.1783	0.2244	0.296	0.3003	0.3862
		(2.26)**	(2.4)**	(2.15)*	(1.44)	(2.16)**	(1.08)	(1.09)	(2.62)***	(2.47)**	(3.62)***
	4 weeks	0.4277	0.2155	0.2685	0.1892	0.4136	0.3889	0.3705	0.2826	0.3187	0.4197
		(2.43)**	(1.26)	(1.75)*	(1.03)	(2.67)***	(2)**	(1.76)*	(1.74)*	(1.86)*	(3.16)***
	6 weeks	0.3334	0.27	0.1636	0.2504	0.2957	0.3563	0.203	0.3359	0.3234	0.3717
		(1.78)*	(1.58)	(0.98)	(1.38)	(1.62)	(2.05)**	(1.32)	(2.4)**	(2.82)***	(2.88)***
	8 weeks	0.3007	0.1992	0.1862	0.2775	0.2972	0.4129	0.2391	0.1591	0.2943	0.3344
		(1.59)	(1.14)	(1.07)	(1.7)*	(1.66)	(1.91)*	(1.08)	(0.95)	(1.5)	(2.07)**
	12 weeks	0.5155	0.1864	0.1877	0.1521	0.2035	0.2479	0.1549	0.1462	0.3278	0.3467
		(2.67)***	(1.02)	(1.03)	(0.76)	(1)	(1.04)	(1.01)	(0.91)	(2.87)***	(2.55)***
	24 weeks	0.3552	0.3532	0.3673	0.2697	0.2907	0.3339	0.1865	0.2478	0.4498	0.344
		(1.76)*	(1.84)*	(1.71)*	(1.37)	(1.4)	(1.4)	(0.73)	(1.17)	(3.11)***	(2.5)**
	36 weeks	0.3744	0.3867	0.3308	0.3198	0.3224	0.3636	0.3788	0.3858	0.464	0.4805
		(1.87)*	(1.86)*	(1.6)	(1.44)	(1.56)	(1.34)	(1.91)*	(1.95)*	(4.13)***	(4.6)***
	48 weeks	0.2573	0.2224	0.2393	0.3357	0.3461	0.4185	0.2461	0.3752	0.3073	0.3773
		(1.41)	(1.14)	(1.19)	(0.95)	(1.77)*	(1.52)	(1.08)	(2.2)**	(2.14)**	(3.94)***

Table V-C   Returns on Momentum Strategies with Non-overlapping Periods
Down Market

Panel C: **Down Market**										

		Portfolio Holding Periods								
		1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks

		1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
P o r t f o l i o F o r m i n g P e r i o d s	**1 week**	0.1533	0.1097	0.1456	-0.073	0.0555	0.029	-0.076	-0.167	0.1392	0.0301
		(0.54)	(0.36)	(0.46)	(-0.23)	(0.22)	(0.08)	(-0.3)	(-0.75)	(1.08)	(1.16)
	2 weeks	0.058	0.0874	-0.106	-0.165	-0.207	-0.232	-0.306	-0.414	-0.058	0.0897
		(0.19)	(0.29)	(-0.45)	(-0.58)	(-0.72)	(-0.71)	(-1.55)	(-2.1)	(-0.37)	(0.56)
	3 weeks	-0.212	-0.191	-0.044	-0.371	-0.349	-0.262	-0.329	-0.475	-0.189	0.1096
		(-0.67)	(-0.61)	(-0.15)	(-1.13)	(-1.24)	(-0.82)	(-1.48)	(-3.26)***	(-1.06)	(0.49)
	4 weeks	-0.254	-0.219	-0.313	-0.512	-0.382	-0.47	-0.393	-0.364	-0.064	0.1271
		(-0.74)	(-0.64)	(-1)	(-1.58)	(-1.25)	(-1.28)	(-1.89)*	(-1.63)	(-0.6)	(1.04)
	6 weeks	-0.415	-0.211	-0.301	-0.326	-0.306	-0.406	0.0799	-0.002	-0.075	0.0198
		(-1.27)	(-0.62)	(-0.93)	(-1.02)	(-0.93)	(-1.75)*	(0.38)	(-0.01)	(-0.34)	(0.09)
	8 weeks	-0.179	0.0298	-0.092	-0.171	-0.167	-0.43	0.0239	-0.093	-0.085	0.0962
		(-0.54)	(0.09)	(-0.27)	(-0.54)	(-0.5)	(-1.49)	(0.12)	(-0.41)	(-1.02)	(1.03)
	12 weeks	-0.293	-0.554	-0.34	-0.325	-0.283	-0.358	-0.19	-0.429	-0.323	0.1562
		(-0.85)	(-1.59)	(-1.02)	(-1.01)	(-0.92)	(-1)	(-0.94)	(-1.47)	(-2.21)	(1.29)
	24 weeks	-0.395	-0.289	-0.351	-0.198	-0.132	-0.128	-0.2	-0.182	0.0217	0.1056
		(-1.19)	(-0.79)	(-1.22)	(-0.63)	(-0.44)	(-0.32)	(-0.91)	(-0.83)	(0.14)	(1.12)
	36 weeks	-0.221	0.008	-0.137	0.0498	-0.022	0.0374	0.222	0.3574	0.2839	0.2083
		(-0.67)	(0.02)	(-0.42)	(0.15)	(-0.06)	(0.09)	(0.9)	(1.65)	(1.75)*	(2.22)**
	48 weeks	0.4078	0.3269	0.1774	0.2118	0.1213	0.1903	0.2945	0.0935	0.2016	0.0223
		(1.21)	(0.93)	(0.49)	(1.11)	(0.27)	(1.05)	(1.02)	(0.29)	(0.91)	(0.24)

Table VI-A   Returns on Momentum Strategies by Quintile Market States

Strategies	1(lowest)	t-statistic	2	t-statistic	3	t-statistic	4	t-statistic	5(highest)	t-statistic
1_1	-0.015	(-0.04)	0.0641	(0.19)	0.933	(2.65)***	0.4243	(1.29)	0.78	(1.6)
1_4	0.0117	(0.05)	0.059	(0.33)	0.405	(2.69)***	0.026	(0.16)	0.021	(0.1)
1_12	-0.152	(-1.02)	-0.046	(-0.4)	0.141	(1.47)	0.0865	(1.05)	0.029	(0.29)
1_24	-0.161	(-2.07)**	0.0489	(0.59)	0.132	(2.05)**	0.0956	(1.42)	-0.069	(-1.06)
1_48	-0.119	(-2.6)***	0.1117	(1.88)*	0.095	(2.32)**	0.0592	(1.37)	0.0324	(0.81)
4_1	-0.245	(-0.45)	-0.016	(-0.04)	0.972	(2.7)***	0.2753	(0.76)	0.0124	(0.03)
4_4	-0.605	(-2.29)**	-0.15	(-0.74)	0.264	(1.68)*	-0.146	(-0.86)	-0.481	(-2.16)**
4_12	-0.449	(-2.89)***	-0.008	(-0.08)	0.002	(0.03)	0.0548	(0.68)	-0.065	(-0.49)
4_24	-0.194	(-2.28)**	0.0838	(0.99)	0.203	(2.87)***	0.0749	(1.16)	-0.142	(-1.66)
4_48	-0.111	(-2.35)**	0.0853	(1.45)	0.186	(3.68)***	0.0514	(1.09)	0.0868	(1.77)*
12_1	-0.603	(-1.12)	-0.245	(-0.59)	0.658	(1.59)	0.0315	(0.08)	0.3696	(0.7)
12_4	-0.91	(-3.93)***	-0.061	(-0.3)	0.361	(2.08)**	0.267	(1.55)	0.121	(0.48)
12_12	-0.702	(-4.44)***	0.1049	(0.81)	0.031	(0.3)	0.1101	(1.31)	-0.09	(-0.61)
12_24	-0.312	(-2.62)***	0.1609	(1.67)	0.245	(2.63)***	0.1594	(2.68)***	-0.118	(-1.43)
12_48	-0.007	(-0.1)	0.0864	(1.32)	0.141	(2.38)**	0.0902	(1.74)*	0.1637	(3.6)***
24_1	-1.135	(-2.26)**	-0.1858	(-0.45)	0.715	(1.68)*	0.1735	(0.44)	-0.234	(-0.39)
24_4	-1.196	(-4.97)***	-0.3722	(-1.83)*	0.597	(2.94)***	0.0312	(0.14)	-0.283	(-0.86)
24_12	-0.621	(-3.32)***	0.2786	(2.26)**	0.226	(1.62)	0.4685	(4.29)***	-0.19	(-1.06)
24_24	0.0115	(0.09)	0.2161	(2.32)**	0.412	(4.27)***	0.3996	(6.73)***	0.021	(0.22)
24_48	0.2458	(3.21)***	0.0718	(1.14)	0.054	(0.87)	0.1596	(2.87)***	0.1412	(2.82)***
48_1	0.1172	(0.26)	0.8424	(1.91)*	0.856	(2.33)**	0.1287	(0.37)	-0.6	(-1.03)
48_4	-0.101	(-0.39)	0.6743	(2.75)***	0.818	(4.7)***	0.0326	(0.15)	-0.293	(-0.83)
48_12	0.0216	(0.15)	0.4349	(3.06)***	0.342	(2.46)**	0.3681	(2.79)***	0.0889	(0.56)
48_24	0.0942	(0.82)	0.254	(2.27)**	0.426	(4.34)***	0.1675	(2.24)**	0.2364	(2.43)**
48_48	-0.022	(-0.48)	0.035	(0.58)	0.169	(2.56)**	0.2326	(3.47)***	0.243	(4)***

Table VI-B   Regression of Momentum Returns on Market Returns

Strategies	intercept	t-statistic	coefficient of market return	t-statistic	coefficient of (market return)²	t-statistic
1_1	0.2498712	(1.79)*	0.262	(0.29)	0.1231881	(0.5)
1_4	0.2413212	(3.31)***	0.714	(1.71)*	-0.3460990	(-1.86)*
1_12	0.1486686	(3.27)***	0.139	(0.52)	-0.0872980	(-0.36)
1_24	0.107822	(3.75)***	0.017	(0.06)	-0.0037053	(-0.01)
1_48	0.1133613	(5.88)***	0.022	(0.18)	-0.0083140	(-0.3)
4_1	0.263267	(1.34)	2.234	(3.4)***	-0.7401640	(-3.39)***
4_4	-0.1269084	(-1.39)	1.391	(2.13)**	-1.9551600	(-2.55)**
4_12	-0.0670368	(-1.33)	0.61	(1.81)*	-0.7535500	(-1.89)*
4_24	0.0489883	(1.36)	0.42	(1.54)	-0.1875300	(-0.4)
4_48	0.0615068	(2.5)**	0.018	(0.18)	-0.0455228	(-0.19)
12_1	-0.0068538	(-0.03)	2.722	(1.32)	-0.7795330	(-1.27)
12_4	-0.191473	(-2.06)**	1.659	(2.37)**	-1.2292200	(-2.33)**
12_12	-0.0632049	(-1.12)	0.045	(0.17)	-0.9705130	(-2.4)**
12_24	0.0874891	(2.06)*	0.742	(2.98)***	-0.2707670	(-2.42)**
12_48	0.0953588	(3.27)***	0.029	(0.24)	-0.3643893	(-0.32)
24_1	-0.0748871	(-0.36)	2.374	(1.01)	-0.7030960	(-1)
24_4	-0.037323	(-0.35)	1.857	(2.45)**	-0.6061520	(-2.51)**
24_12	0.1149979	(1.74)*	1.168	(4.16)***	-0.4160660	(-4.27)***
24_24	0.2598451	(5.78)***	0.692	(3)***	-0.2626140	(-3.72)***
24_48	0.1422263	(4.72)***	0.048	(0.77)	-0.0213390	(-1.05)
48_1	0.3054744	(1.57)	2.853	(1.42)	-0.9330760	(-1.54)
48_4	0.2736304	(2.46)**	2.835	(4.2)***	-0.5682803	(-4.22)***
48_12	0.2707832	(4.11)***	1.968	(7.87)***	-0.7000060	(-7.6)***
48_24	0.2333171	(4.84)***	1.162	(8.93)***	-0.2320725	(-8.66)***
48_48	0.1382632	(4.49)***	0.102	(0.99)	-0.0442220	(-1.03)

Table VII-A   Returns on Momentum Strategies with Market Frictions
All Market States

Panel A : **All Market States**

| | **Portfolio Holding Periods** | | | | | | | | | |
	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
1 week	0.24	0.23	0.14	0.22	0.24	0.33	0.35	0.36	0.34	0.37
	(2.1)**	(2.06)**	(1.94)*	(3.78)***	(4.65)***	(8.46)***	(11.6)***	(15.27)***	(15.2)***	(17.55)***
2 weeks	0.15	0.2	0.17	0.26	0.26	0.31	0.33	0.36	0.36	0.38
	(1.52)	(2.68)***	(2.56)**	(4.9)***	(5.43)***	(8.61)***	(11.8)***	(16.73)***	(16.27)***	(17.91)***
3 weeks	0.12	0.08	0.07	0.15	0.2	0.28	0.3	0.38	0.37	0.38
	(1.22)	(1.15)	(1.02)	(2.59)***	(3.7)***	(6.99)***	(10.89)***	(16.8)***	(16.5)***	(18.26)***
4 weeks	0.13	0.21	0.21	0.28	0.33	0.37	0.38	0.39	0.34	0.35
	(1.25)	(2.93)***	(3.15)***	(5.16)***	(6.84)***	(9.43)***	(13.6)***	(18.15)***	(15.66)***	(18.01)***
6 weeks	0.12	0.2	0.15	0.24	0.27	0.32	0.38	0.4	0.36	0.36
	(1.25)	(2.72)***	(2.2)**	(4.43)***	(5.61)***	(8.24)***	(13.93)***	(18.94)***	(16.12)***	(17.95)***
8 weeks	0.21	0.27	0.27	0.32	0.37	0.41	0.41	0.43	0.38	0.37
	(1.9)*	(3.54)***	(3.95)***	(5.83)***	(7.6)***	(10.69)***	(14.33)***	(20.14)***	(17.7)***	(18.57)***
12 weeks	0.27	0.41	0.4	0.43	0.46	0.43	0.45	0.44	0.4	0.36
	(2.48)**	(5.09)***	(6.69)***	(8.38)***	(10.58)***	(11.69)***	(15.73)***	(18.91)***	(16.87)***	(16.93)***
24 weeks	0.29	0.36	0.35	0.42	0.48	0.5	0.53	0.49	0.43	0.42
	(2.82)***	(4.89)***	(5.45)***	(7.02)***	(9.37)***	(11.77)***	(14.89)***	(18.43)***	(17.83)***	(18.09)***
36 weeks	0.2	0.39	0.32	0.36	0.37	0.37	0.47	0.4	0.34	0.35
	(1.93)*	(4.54)***	(4.05)***	(5.59)***	(6.96)***	(8.63)***	(14.13)***	(15.74)***	(15.02)***	(15.82)***
48 weeks	0.17	0.28	0.29	0.32	0.28	0.36	0.44	0.35	0.3	0.32
	(1.7)*	(3.56)***	(3.19)***	(4.43)***	(4.61)***	(7.65)***	(11.27)***	(13.86)***	(12.84)***	(15.37)***

Portfolio Forming Periods (row grouping label)

Table VII-B Returns on Momentum Strategies with Market Frictions
Up Market

Panel B : **Up Market**										
	Portfolio Holding Periods									
	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
1 week	0.45	0.43	0.28	0.32	0.3	0.37	0.38	0.38	0.35	0.37
	(3.91)***	(5.571)***	(3.74)***	(5.41)***	(5.58)***	(9.13)***	(11.75)***	(15.84)***	(15.31)***	(16.87)***
2 weeks	0.38	0.4	0.29	0.36	0.32	0.36	0.37	0.38	0.38	0.38
	(3.9)***	(5.38)***	(4.11)***	(6.5)***	(6.24)***	(9.55)***	(12.55)***	(17.38)***	(16.39)***	(17.42)***
3 weeks	0.33	0.25	0.2	0.25	0.26	0.35	0.34	0.4	0.39	0.38
	(3.31)***	(3.57)***	(2.73)***	(4.06)***	(4.57)***	(8.26)***	(12.0)***	(17.2)***9	(16.6)***9	(17.9)***
4 weeks	0.35	0.37	0.31	0.36	0.38	0.43	0.41	0.4	0.36	0.35
	(3.32)***	(5.2)***	(4.42)***	(6.31)***	(7.36)***	(10.43)***	(14.18)***	(18.44)***	(15.88)***	(17.45)***
6 weeks	0.35	0.41	0.32	0.36	0.33	0.38	0.4	0.41	0.38	0.36
	(3.52)***	(5.57)***	(4.44)***	(6.42)***	(6.55)***	(9.36)***	(14.09)***	(18.35)***	(16.06)***	(17.24)***
8 weeks	0.43	0.46	0.39	0.41	0.41	0.44	0.43	0.44	0.39	0.36
	(3.75)***	(5.87)***	(5.24)***	(6.89)***	(7.76)***	(10.84)***	(14.42)***	(19.97)***	(17.61)***	(17.66)***
12 weeks	0.44	0.57	0.51	0.51	0.52	0.49	0.5	0.46	0.41	0.36
	(3.97)***	(7.07)***	(8.37)***	(9.76)***	(11.08)***	(12.56)***	(16.57)***	(18.99)***	(17.14)***	(16.14)***
24 weeks	0.45	0.53	0.49	0.54	0.58	0.59	0.6	0.48	0.44	0.41
	(4.22)***	(7.09)***	(7.24)***	(8.67)***	(10.62)***	(13.23)***	(16.25)***	(17.65)***	(17.43)***	(17.02)***
36 weeks	0.34	0.54	0.46	0.51	0.48	0.47	0.54	0.39	0.34	0.35
	(3.22)***	(6.07)***	(5.81)***	(7.67)***	(8.83)***	(10.9)***	(16.15)***	(14.77)***	(14.73)***	(14.98)***
48 weeks	0.33	0.41	0.4	0.42	0.36	0.43	0.49	0.35	0.31	0.32
	(3.13)***	(4.93)***	(4.22)***	(5.49)***	(5.53)***	(8.55)***	(11.83)***	(13.23)***	(12.91)***	(14.79)***

Portfolio Forming Periods

Panel B : Down Market

	Portfolio Holding Periods									
	1 week	2 weeks	3 weeks	4 weeks	6 weeks	8 weeks	12 weeks	24 weeks	36 weeks	48 weeks
1 week	0.45	0.43	0.28	0.32	0.3	0.37	0.38	0.38	0.35	0.37
	(3.91)***	(5.571)***	(3.74)***	(5.41)***	(5.58)***	(9.13)***	(11.75)***	(15.84)***	(15.31)***	(16.87)***
2 weeks	0.38	0.4	0.29	0.36	0.32	0.36	0.37	0.38	0.38	0.38
	(3.9)***	(5.38)***	(4.11)***	(6.5)***	(6.24)***	(9.55)***	(12.55)***	(17.38)***	(16.39)***	(17.42)***
3 weeks	0.33	0.25	0.2	0.25	0.26	0.35	0.34	0.4	0.39	0.38
	(3.31)***	(3.57)***	(2.73)***	(4.06)***	(4.57)***	(8.26)***	(12.0)***	(17.2)***9	(16.6)***9	(17.9)***
4 weeks	0.35	0.37	0.31	0.36	0.38	0.43	0.41	0.4	0.36	0.35
	(3.32)***	(5.2)***	(4.42)***	(6.31)***	(7.36)***	(10.43)***	(14.18)***	(18.44)***	(15.88)***	(17.45)***
6 weeks	0.35	0.41	0.32	0.36	0.33	0.38	0.4	0.41	0.38	0.36
	(3.52)***	(5.57)***	(4.44)***	(6.42)***	(6.55)***	(9.36)***	(14.09)***	(18.35)***	(16.06)***	(17.24)***
8 weeks	0.43	0.46	0.39	0.41	0.41	0.44	0.43	0.44	0.39	0.36
	(3.75)***	(5.87)***	(5.24)***	(6.89)***	(7.76)***	(10.84)***	(14.42)***	(19.97)***	(17.61)***	(17.66)***
12 weeks	0.44	0.57	0.51	0.51	0.52	0.49	0.5	0.46	0.41	0.36
	(3.97)***	(7.07)***	(8.37)***	(9.76)***	(11.08)***	(12.56)***	(16.57)***	(18.99)***	(17.14)***	(16.14)***
24 weeks	0.45	0.53	0.49	0.54	0.58	0.59	0.6	0.48	0.44	0.41
	(4.22)***	(7.09)***	(7.24)***	(8.67)***	(10.62)***	(13.23)***	(16.25)***	(17.65)***	(17.43)***	(17.02)***
36 weeks	0.34	0.54	0.46	0.51	0.48	0.47	0.54	0.39	0.34	0.35
	(3.22)***	(6.07)***	(5.81)***	(7.67)***	(8.83)***	(10.9)***	(16.15)***	(14.77)***	(14.73)***	(14.98)***
48 weeks	0.33	0.41	0.4	0.42	0.36	0.43	0.49	0.35	0.31	0.32
	(3.13)***	(4.93)***	(4.22)***	(5.49)***	(5.53)***	(8.55)***	(11.83)***	(13.23)***	(12.91)***	(14.79)***

Portfolio Forming Periods