Presence and Sources of Contrarian and Momentum Profits in Bangladeshi Stock Market Returns

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Abstract

Early studies have shown that stock returns are unpredictable. Literature in the late 1980s and 1990s has confirmed the existence of various forms of return regularities in stock returns. Two most well-known return regularities are contrarian and momentum profits. This paper, using weekly data for the period 2002 through 2013, investigates the presence of both contrarian and momentum profits and their sources in the Bangladeshi stock market. The paper follows the methodology of Lo and MacKinlay (1990) to form portfolios with a weighted relative strength scheme. Then methodology of Jegadeesh and Titman (1995) is used to decompose the contrarian/momentum profits into three elements: compensation for cross-sectional risk, lead-lag effect in time series with respect to the common factor, and time pattern of stock returns.

Results give the evidence of significant contrarian profits for the holding period of one through eight weeks during the whole period. During the sub-period 2002-2008, there are also contrarian profits for one through eight week holding period strategies. However, contrarian profits only occur for holding period of eight weeks during 2008-2013. Time series pattern is found to be the main source of contrarian profits. This suggests that idiosyncratic (firm-specific) information is the main contributor of contrarian profits. Interestingly, the impact of idiosyncratic information on such profits has gradually decreased since 2008. Returns of zero weight portfolios are robust to market risk factors such as market return, small minus big firm returns (SMB) and widely used sentiment factors like Arms index.

JEL Code: G12, G14
Key words: Dhaka Stock Exchange, Contrarian profits, Momentum profits, Frontier markets

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Momentum and Contrarian Profits: Evidence from the Bangladesh Stock Market

1. Introduction

Research in the 1980s, (for example, French (1980); Keim (1983); DeBondt and Thaler (1985, 1987); Lo and MacKinlay (1988)), indicates that stock returns are predictable to some extent. Literature in the 1980s and 1990s has confirmed the existence of various forms of return regularities in stock returns. Among these, the two most notable regularities are contrarian and momentum profits. Contrarian profits arise when the previous period’s best (worst) performing stocks systematically become worst (best) performing stocks in the next period. On the other hand, momentum profits arise when the previous period’s best-performing stocks consistently do well in the next period.

DeBondt and Thaler (1985, 1987) are the first to provide evidence of contrarian profits in the U.S. market in the long-run investment horizon. Thus, investors may benefit from buying past losers and selling past winners. Jegadeesh (1990), Lehman (1990), and Chopra et al. (1992) also provide evidence in favor of short- and long-term contrarian profits. Jegadeesh and Titman (1993, 2001) give the evidence of momentum profits in the U.S. market in the medium-term investment horizon. More recently, other research findings also support the presence of momentum profits in the U.S. market. In general, contrarian and momentum profits are attributed to overreaction and underreaction of investors to market information, respectively.

Behavioral explanations for stock market over- and under-reaction are nicely presented by Daniel, Hirshleifer, and Subrahmanyam (hereafter DHS, 1998) and Hong and Stein (hereafter HS, 1999). HS believe that there are two types of investors. The first group consists of investors
who are well-informed about the market. The second group is comprised of technical analysts who use invest based on past information. Informed investors react to new information first. Then technical analysts react to the same information, resulting in stock prices to move farther in the same direction. Thus, if there is any good news about a firm, the stock price may go up in two phases – underreaction to information initially and momentum profits later. DHS assume that investors have their own information and value their stock selection skills very highly. This overconfidence leads these investors to overreact to new information, which drives the price away from the true value. In the long run, the market realizes that stocks are overvalued and makes necessary corrections. This phenomenon causes momentum profits initially and contrarian profits in longer investment horizons.

Predictable behavior is not a good sign for a frontier market such as Bangladesh because possibly only a handful of big individual and institutional investors will exploit the resultant profit opportunities, leaving a significant dent in the wealth and confidence of small investors. It is generally believed that small investors constitute a large portion of the market participants in a frontier market. Therefore, in order to ensure proper functioning of the channel between the surplus and deficit units in the economy, small investors’ interests must be protected.

Most of the previous papers attempt to detect the presence of momentum and contrarian profits in developed markets. In the past ten years, many papers have also investigated the sources of contrarian and momentum returns. However, research in this context has mainly focused on developed markets. Academicians have conducted research more seriously on frontier markets since the early 1990s, mainly because these markets historically have low correlation with developed markets, creating opportunities for global portfolio managers to achieve further diversification benefits. Previous literature on the Bangladesh stock market
focuses primarily on efficiency issues, stock-price predictability, return volatility, and integration with other markets.

The paper follows the methodology of Lo and MacKinlay (1990) to form portfolios with a weighted relative strength scheme (WRSS). Then we use the methodology followed by Jegadeesh and Titman (1995) to decompose the contrarian/momentum profits into three elements: compensation for cross-sectional risk, lead-lag effect in time series with respect to the common factor, and time pattern of stock returns. This paper focuses on the presence of contrarian or momentum profits, their sources, and robustness of results with regard to various risk factors and changes in the behavior of the sources of such profits over the period 2002 through 2013.

The rest of the paper is structured as follows. We provide a brief survey of the relevant literature in section 2. Section 3 discusses data and methodology used in the study. Section 4 analyzes the results. Section 5 concludes the paper.

2. Literature Review

In their seminal paper DeBondt and Thaler (1985) report that past winners (losers) ultimately turn into losers (winners) in the three- to five-year investment horizon. Many subsequent research papers, including DeBondt and Thaler (1987) and Jones (1993), find similar results. Jegadeesh (1990), Lehman (1990), and Chopra et al. (1992) give evidence of contrarian profits even in weekly returns. Jegadeesh and Titman (1995) argue that contrarian profits occur due to overreaction to firm-specific information. Boudoukh et al. (1994) and Conrad et al. (1997) argue that market microstructure is the cause of observed contrarian returns. Wongchoti
and Pyun (2005) show that long-term contrarian profits are still present even after adjusting for relevant risk. 

Jegadeesh and Titman (1993) first show the presence of momentum profits in the U.S. market for the investment horizon of three to 12 months. Their momentum profits are robust to relevant market risk factors. Conrad and Kaul (1998) argue that momentum profits occur due to cross-sectional differences in risk, i.e., expected returns. Moskowitz and Grinblatt (1999) suggest that momentum in industry risk factors explains observed momentum profits. Lee and Swaminathan (2000) show that momentum profits are more prevalent in high-turnover stock returns. Hong et al. (2000) find that small firms with low analyst attention are more susceptible to momentum phenomena. Griffin et al. (2003) suggest that macroeconomic risk factors cannot explain momentum profit. They show that momentum profits are large and exist in both good and bad states and that profits tend to reverse over an investment horizon of one to five years. More recently, Chui et al. (2010) suggest that momentum is related to individualism and cultural or psychological explanations. Cooper et al. (2004), Daniel et al. (1998) and Huang (2006) find that momentum profits occur only in the “up” market.

Many recent papers have focused on the presence and sources of momentum and contrarian profits in emerging markets. Rouwenhorst (1999) finds momentum profits in emerging market returns and concludes that “factors are fundamentally related to the way by which investors set prices in financial markets around the world.” Naranjo and Porter (2007) investigate returns of almost 16,000 stocks from 22 developed and 18 emerging markets for the period 1990-2004, and report the presence of momentum profits for both markets and opportunity for diversification benefits when emerging markets are included in portfolio. McInish et al. (2008) show that short-run trading strategies based on past return are not
profitable in the Pacific Basin markets except Japan and Hong Kong. These two markets, in fact, provide contrarian profits.

Now, let us focus on the findings of momentum and contrarian profits in emerging and frontier stock markets. Kang et al. (2002) find short-term contrarian and medium-term momentum profits for the Chinese stock market. They also report that negative serial correlation contributes to momentum profit. Hameed and Ting (2000) examine the effect of trading volume on contrarian profits and find that contrarian profits are higher from actively traded firms than from thinly traded firms. Galariotis (2004) uses the methodology of Jegadeesh and Titman (1995) and finds that short-term contrarian profits are present in the stock returns and firm-specific component contributes to overreaction in stock returns. Similarly, Ding et al. (2008) show that high-volume firms are more likely to experience price reversals than low-volume ones in the Asia-Pacific markets. However, Ding et al. (2009) suggest that the lack of momentum in an Asian emerging market like Taiwan is due more to state dependence than to cultural differences between Asian and developed markets. In a comprehensive empirical study on 24 frontier stock markets and 1,400 stocks, De Groot et al. (2010) report momentum return of about 1% per month. Li et al. (2010) find contrarian profit in Chinese stock market of approximately 12% per annum in the short horizon of one to three months. Cakici et al. (2013) in a study of 18 emerging stock markets have found the presence of momentum profits in all but four Eastern European countries.
3. Data and Methodology

3.1. Data

Weekly stock price index and market capitalization data on Bangladesh stocks are collected from Thomson Datastream. Since the interest in emerging markets is a relatively recent phenomenon, early data contain some missing values. This requires us to drop many firms from the initial dataset. We consider only the stocks that have been relatively regularly traded and have survived for the whole study period. After screening the data, we have the final dataset of 178 firms to use for the study. The study covers the stock market for the period January 2002 through August 2013. Returns are calculated as the log difference of stock price indices times 100.

3.2. Methodology

3.2.1. Construction of Portfolios

We use the weighted relative strength scheme (WRSS) of Lo and MacKinlay (1990) to construct riskless (zero weight) portfolios. The formation and holding periods are of same duration. That is, if formation period is two weeks then the holding period is also two weeks and so on. There are five trading strategies with formation and holding period of 1, 2, 4, 6, and 8 months. Under this portfolio formation strategy the stocks with positive (negative) return (i.e., higher return than the market or average return) over the formation period are bought (sold). The positive (negative) return stocks with respect to the market return are considered to be the winners (losers). The stocks that have higher positive (negative) return in the formation period have larger positive (negative) weights in the portfolios. Thus the weight of an individual stock
depends on the magnitude of its performance in the formation period. During each study period, each stock is assigned the weight of

\[ w_{i,t} = \frac{1}{N} \left( r_{i,t-1} - \bar{r}_{t-1} \right), \]  

where \( r_{i,t-1} \) is the return of stock \( i \) at time \( t-1 \), \( N \) is the number of stocks at period \( t-1 \), and \( \bar{r}_{t-1} \) is the market return at time \( t-1 \). Thus the total weight of the portfolio becomes zero if individual stock weights are added. The momentum or contrarian profit, \( \pi_t \), is given by

\[ \pi_t = \frac{1}{N} \sum_{i=1}^{N} r_{i,t} \left( r_{i,t-1} - \bar{r}_{t-1} \right). \]

We create the portfolios considering the performance of the past \( j \) weeks where \( j = 1, 2, 4, 6 \) and 8 weeks. This is called the formation or ranking period. The performance of the portfolio is evaluated during the next 1, 2, 4, 6, and 8 weeks. This duration is called the evaluation or holding period. Thus there are five trading strategies that involve short to medium-run trading horizons. After the portfolio is made, the cumulative return in the holding period is calculated. The respective momentum/contrarian profit in the observation period \( k = 1, 2, 4, 6, \) and 8 weeks is given by

\[ \pi_{j,t}(k) = \sum_{i=1}^{N_j} w_{i,t} r_{i,t+k}, \]  

where \( J = L \) (loser portfolio), \( W \) (winner portfolio), \( C \) (contrarian portfolio), \( w_{i,t} \) is the weight of respective stocks in the portfolio, and \( N_j \) is the number of stocks in the portfolio during the ranking (formation) period. The weight of individual stocks does not change during the holding (observation) period.

WRSS, winner and loser portfolio return may occur because of change of risk over time. Thus, for robustness check of results, we consider a model somewhat close to Fama-French three
factor model. We cannot use book-to-market value based risk factor (HML in Fama-French terminology) because of unavailability of reliable data. Since market capitalization and return data are reliable and available, small minus big (SMB) and market return can be used for robustness check of momentum and contrarian profits. Moreover, TRIN ratio, also known as Arms Index, is used as a proxy for sentiment variable. We estimate the following model

$$\pi_{j,t} = \alpha_j + \beta_j r_{m,t} + \gamma_j r_{SMB,t} + \delta_j trn_t + e_t,$$

where \(\pi_{j,t}\) is weekly WRSS, winner and loser portfolio returns.

4.2.2. Decomposition of Contrarian/Momentum Profits

The decomposition of momentum and contrarian profits given by Jegadeesh and Titman (1995) is

\[
\begin{align*}
\pi^m &= \sigma^2_{\mu} + \delta \sigma^2_f + \Omega \\
\pi^c &= -\sigma^2_{\mu} - \delta \sigma^2_f - \Omega,
\end{align*}
\]

where \(\pi^m\) and \(\pi^c\) are momentum and contrarian profit, respectively, and \(\sigma^2_f\) is the variance of the factor (market portfolio return).

Jegadeesh and Titman (1995) develop the following framework to find the sources of momentum and contrarian profits. They estimate

\[
r_{i,t} = \mu + b_{0,i} f_t + b_{1,i} f_{t-k} + e_{i,t}
\]

where \(r_{i,t}\) is the return of individual stock \(i\) at time \(t\); \(f_t\) is the market return (equally weighted) at time \(t\), which happens to be the common factor for all the stocks; \(f_{t-k}\) is the market return (equally weighted) during \(t-k\) period; \(k\) is the observation period; and \(b_{0,i}\) and \(b_{1,i}\) are the estimated parameters. From this factor model we can calculate the following components of contrarian/momentum returns:

(i) Cross-sectional risk component:
\[ \sigma^2_{\mu} = \frac{1}{N} \sum_{i=1}^{N} (\mu_i - \mu)^2, \quad (7) \]

(ii) Lead-lag effect component:

\[ \delta = \frac{1}{N} \sum_{i=1}^{N} (b_{0,i} - \bar{b}_0)(b_{1,i} - \bar{b}_1), \quad (8) \]

(iii) Time-series pattern component:

\[ \Omega = \frac{1}{N} \sum_{i=1}^{N} \text{Cov}(\epsilon_{i,t}, \epsilon_{i,t-1}), \quad (9) \]

where \( \mu_i \) is the intercept of the regression for an individual stock; \( b_{0,i} \) and \( \bar{b}_0 \) are the regression coefficient and mean (cross-sectional) regression coefficients, respectively; \( b_{1,i} \) and \( \bar{b}_1 \) are the second regression coefficient and mean (cross-sectional) of that, respectively; \( \epsilon_{i,t} \) is the error-term of the regression equation.

After using equations (7), (8), and (9), we use equation (5a) and (5b) to decompose the expected contrarian/momentum profits into three components: the first term is the cross-sectional variance of expected returns, the second term is contrarian or momentum profits attributable to time difference in reacting to a common factor, and the last term is the stock price adjustment to idiosyncratic information.

4. Analysis of Results

Table 1 presents the returns from WRSS portfolios for 1-1, 2-2, 4-4, 6-6 and 8-8 trading strategies. Loser portfolio continues to produce significantly negative returns for all strategies. Since individual stocks in loser portfolio have negative weight by construction and portfolio returns are negative in sign in all the investment horizons, this phenomenon is a strong indication
of contrarian profits. This finding can be discussed in more details. If a stock has negative weight based on formation period returns and produces negative return again in holding period, then its contribution to the portfolio is positive return. If the weight is negative but return in holding period is positive, then its contribution to the portfolio is negative. For winner portfolios, there are no significant returns in short investment horizon of up to four weeks. For relatively longer investment horizons of six and eight weeks, there is evidence of momentum profits. However, the winner and loser portfolio returns could possibly be related to market risk factors since these are not zero-weight portfolios. On the other hand, WRSS portfolio has weight of zero by construction and is supposed to have no such profits. But, all the strategies used in the study show significantly negative profits for the WRSS portfolio. That is, we observe the presence of contrarian profits in the market. From trading point of view, an investor needs to (short) sell losing portfolio and buy winner portfolio to reverse overall loss to profit. In case of a weekly strategy, an investor, thus, can make a profit of 1.48% per week.

**Table 1 about here**

In Table 2 we divide the whole study period into two sub-periods – 2002-08 and 2009-13. For the first period results are very similar to that reported in Table 1. Significant presence of contrarian profits is evident in all the five strategies. Also winner tends to produce no profits up to six week holding period. Magnitude of WRSS portfolio returns is very close to what we have found in Table 1. In a one-week strategy, an investor on average can make 2.50 % return per week. A change in the profit outcome is clearly observed for WRSS portfolio during 2009-13. WRSS portfolio does not produce significant profit in one and two week strategy. Profit for four and six week strategies are significant at 10% level. Only eight week strategy produces significant profit at 5% level. Thus, WRSS portfolio returns are much milder for the period
2009-13 in contrast to the period 2002-08. However, in both periods loser portfolio produces significant negative returns, an indication of contrarian profits. The difference of behavior of WRSS portfolios may be related to the recent market crash in 2010.

**Table 2 about here**

Table 3 provides the results for all five trading strategies for five distinct periods. Overall, this table shows that the magnitude of WRSS portfolio returns is small during all these sub-periods. During the period January 2011 through August 2013 none of the portfolios shows any profit. It is a big difference from findings in earlier periods. However, it is hard to believe that the market has suddenly become very efficient. The behavior of these portfolios is probably linked to the fact that the market crashed in 2010 and since then the market has been behaving in a different way. Market has been on a downward slide for a long period of time, which results in disappearance of contrarian and momentum profits. Robustness check for the results involve three factors – market return, sentiment (TRIN) and SMB – to find if returns can be explained by market risk. Although not reported here, results show that these factors largely explain the returns of winner and loser portfolios, but cannot explain that of zero weight (WRSS) portfolio.

**Table 3 about here**

Table 4 shows the contribution of sources of contrarian and momentum profits for the whole period as well as for the sub-periods. Every sub-period shows that the time-series pattern is the most important source of momentum/contrarian profits. This source is related to error terms of the equation (6). Thus, it occurs from the mispricing resulted from firm-specific information. This is not an unexpected result since Bangladesh stock market is a frontier market where reliable firm-specific information may not be available, especially for small firms. Moreover, this market is dominated by mostly individual investors who do not know how to
process information and thus they create noise when they trade. Nonetheless, it is encouraging that the contribution from this source is gradually going down from -3.53 in 2002-03 to -0.89 in 2011-13. It indicates that market is gradually processing firm-specific information more accurately.

Table 4 about here

5. Conclusion

This paper studies the presence and sources of contrarian and momentum profits in the Bangladeshi stock market for the period January 2002 through August 2013. Weighted relative strength scheme (WRSS) of Lo and MacKinlay (1990) is used to find the presence of contrarian and momentum profits and the methodology of Jegadeesh and Titman (1995) is used to find the components of such profits. Contrarian profits are present in Bangladesh stock market in short horizon of one to eight week. Thus, to reap the benefit of such profit opportunities, an investor has to (short) sell and buy a past loser portfolio and a winner portfolio, respectively. After the stock market crash of December 2010, this opportunity has simply vanished. The continuous downward movement of stock prices ever since the crash could be the reason for this. Therefore, the latest phenomenon of absence of momentum or contrarian profits does not mean that the market has become efficient. As far as sources are concerned, firm-specific information has been the main source of contrarian or momentum profits. This could happen due to dominant involvement of uninformed individual investors or their tendency for noise trade. Nonetheless, its impact on such profits has also diminished after the crash of 2010.
References


Table 1. WRSS Portfolio Returns for Short and Medium Term Strategies

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Mean Return ( (t\text{-stat.}) )</th>
<th>Mean Return ( (t\text{-stat.}) )</th>
<th>Mean Return ( (t\text{-stat.}) )</th>
<th>Mean Return ( (t\text{-stat.}) )</th>
<th>Mean Return ( (t\text{-stat.}) )</th>
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</thead>
<tbody>
<tr>
<td><strong>Winner+Loser</strong></td>
<td>-1.48 (2.48)**</td>
<td>-2.15 (2.94)**</td>
<td>-2.64 (3.12)**</td>
<td>-3.09 (3.00)**</td>
<td>-3.92 (3.31)**</td>
</tr>
<tr>
<td><strong>Winner</strong></td>
<td>0.23 (0.39)</td>
<td>0.41 (0.54)</td>
<td>1.38 (1.39)</td>
<td>2.69 (2.31)**</td>
<td>3.84 (2.91)**</td>
</tr>
<tr>
<td><strong>Loser</strong></td>
<td>-1.71 (3.91)**</td>
<td>-2.56 (4.15)**</td>
<td>-4.01 (5.10)**</td>
<td>-5.77 (5.84)**</td>
<td>-7.77 (6.95)**</td>
</tr>
</tbody>
</table>

* and ** indicate significance at the 10% and 5% level, respectively. Winner, Loser, and WRSS (Winner+Loser) are constructed using equation (3). We create the portfolios considering the performance of the past 1, 2, 4, 6 and 8 weeks. This is called the formation or ranking period. The performance of the portfolio is evaluated during the next 1, 2, 4, 6, and 8 weeks. This duration is called the evaluation or holding period. Formation and holding periods are same duration. Thus there are five trading strategies that involve short to medium-run trading horizons. Holding-period returns are calculated based on the weight derived from the formation period and cumulative return for the respective holding period where weights of the firms do not change. Winner and Loser portfolio returns are calculated when assigned weights are positive and negative, respectively.
Table 2. WRSS Portfolio Returns for Short and Medium Term Strategies for Two Sub-periods

<table>
<thead>
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<td>(t-stat.)</td>
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<td>(t-stat.)</td>
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<tr>
<td><strong>Panel A: Period 2002 - 08</strong></td>
<td></td>
<td></td>
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<tr>
<td>Winner+Loser</td>
<td>-2.50</td>
<td>-2.70</td>
<td>-2.95</td>
<td>-3.03</td>
<td>-3.37</td>
</tr>
<tr>
<td></td>
<td>(-3.39)**</td>
<td>(-3.24)**</td>
<td>(-3.20)**</td>
<td>(-2.94)**</td>
<td>(-2.98)**</td>
</tr>
<tr>
<td>Winner</td>
<td>-0.91</td>
<td>-0.43</td>
<td>0.06</td>
<td>0.86</td>
<td>2.07</td>
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<tr>
<td></td>
<td>(-1.25)</td>
<td>(-0.51)</td>
<td>(0.07)</td>
<td>(0.79)</td>
<td>(1.81)*</td>
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<tr>
<td>Loser</td>
<td>-1.59</td>
<td>-2.27</td>
<td>-3.02</td>
<td>-3.90</td>
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<tr>
<td></td>
<td>(-4.49)**</td>
<td>(-4.70)**</td>
<td>(-4.92)**</td>
<td>(-5.33)**</td>
<td>(-6.86)**</td>
</tr>
<tr>
<td><strong>Panel B: Period 2009 - 13</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Winner+Loser</td>
<td>-0.43</td>
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<td>-3.53</td>
<td>-4.74</td>
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<tr>
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<td>(-0.45)</td>
<td>(-1.30)</td>
<td>(-1.85)*</td>
<td>(-1.92)*</td>
<td>(-2.19)**</td>
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<tr>
<td>Winner</td>
<td>1.43</td>
<td>1.26</td>
<td>2.43</td>
<td>4.15</td>
<td>5.41</td>
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<tr>
<td></td>
<td>(1.52)</td>
<td>(0.96)</td>
<td>(1.37)</td>
<td>(1.96)**</td>
<td>(2.18)**</td>
</tr>
<tr>
<td>Loser</td>
<td>-1.86</td>
<td>-2.84</td>
<td>-5.09</td>
<td>-7.69</td>
<td>-10.15</td>
</tr>
<tr>
<td></td>
<td>(-2.26)**</td>
<td>(-2.42)**</td>
<td>(-3.39)**</td>
<td>(-4.03)**</td>
<td>(-4.66)**</td>
</tr>
</tbody>
</table>

* and ** indicate significance at the 10% and 5% level, respectively. Winner, Loser, and WRSS (Winner+Loser) are constructed using equation (3). We create the portfolios considering the performance of the past 1, 2, 4, 6 and 8 weeks. This is called the formation or ranking period. The performance of the portfolio is evaluated during the next 1, 2, 4, 6, and 8 weeks. This duration is called the evaluation or holding period. Formation and holding periods are same duration. Thus there are five trading strategies that involve short to medium-run trading horizons. Holding-period returns are calculated based on the weight derived from the formation period and cumulative return for the respective holding period where weights of the firms do not change. Winner and Loser portfolio returns are calculated when assigned weights are positive and negative, respectively.
Table 3. WRSS Portfolio Returns for Short and Medium Strategies for Sub-Periods

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Panel A: Period 01/01/02 – 12/31/03</th>
<th>Panel B: Period 01/01/04 – 12/31/05</th>
<th>Panel C: Period 01/01/06 – 12/31/07</th>
<th>Panel D: Period 01/01/08 – 12/31/10</th>
<th>Panel E: Period 01/01/11 – 08/13/13</th>
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</thead>
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<tr>
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<td>(j=4,k=4)</td>
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<td>((t)-stat.)</td>
<td>((t)-stat.)</td>
<td>((t)-stat.)</td>
<td>((t)-stat.)</td>
<td>((t)-stat.)</td>
</tr>
<tr>
<td>Winner+Loser</td>
<td>-3.6589</td>
<td>-4.2217</td>
<td>-4.4566</td>
<td>-3.8494</td>
<td>-4.3882</td>
</tr>
<tr>
<td></td>
<td>(-1.81)*</td>
<td>(-1.98)**</td>
<td>(-1.93)^{\text{t}}</td>
<td>(-1.64)</td>
<td>(-1.87)^{\text{t}}</td>
</tr>
<tr>
<td>Winner</td>
<td>-2.3971</td>
<td>-2.3662</td>
<td>-2.2521</td>
<td>-1.0733</td>
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* and ** indicate significance at the 10% and 5% level, respectively. Winner, Loser, and WRSS (Winner+Loser) are constructed using equation (3). We create the portfolios considering the performance of the past 1, 2, 4, 6 and 8 weeks. This is called the formation or ranking period. The performance of the portfolio is evaluated during the next 1, 2, 4, 6, and 8 weeks. This duration is called the evaluation or holding period. Formation and holding periods are of same duration. Thus there are five trading strategies that involve short to medium-run trading horizons. Holding-period returns are calculated based on the weight derived from the formation period and cumulative return for the respective holding period where weights of the firms do not change. Winner and Loser portfolio returns are calculated when assigned weights are positive and negative, respectively.
This table exhibits the sources of momentum and contrarian profits when the total period is divided into two approximately 6-year sub-periods and five 2-year sub-periods to investigate how the role of components on such profits changes over time. The expected profits are decomposed using the one factor (contemporaneous and lagged market return) model shown in equation (6). To estimate the parameters we use equally weighted market return as the proxy for the common factor for the return of individual stocks. The momentum/contrarian profit components, cross-sectional risk, lead-lag effect, and time-series pattern correspond to equations (7), (8), and (9), respectively. Since these numbers are estimated based on weekly returns, results can be treated only as related to weekly contrarian or momentum characteristics. Thus, the components are not valid for investment horizons of more than one week.

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