Growth/Value, Market-Cap, and Momentum

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Abstract

This paper examines the profitability of style momentum strategies on portfolios based on firm growth/value characteristics and market capitalization. We use monthly total returns of nine S&P style indices to avoid concerns about firm size, liquidity, credit risk, short-sale constraints, and transaction costs. We find that historically buying a past best performing style index and short-selling a past worst performing style index generates economically and statistically significant profit of 0.8% per month over the period June 1995 to March 2009. This profitability remains economically plausible after adjusting for systematic risk, short-sale costs, and transaction costs. Investors may actually implement style momentum strategies on exchange traded funds linked to the S&P style indices.

Key Words: Market-cap, Value, Growth, Momentum, Style, S&P
JEL Classifications: G11, G12

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1. Introduction

Diversified portfolio performance is influenced by investing styles. Two common equity style measures are valuation and capitalization. Valuation style divides stocks into growth, blend, and value while capitalization style breaks stocks to large-cap, mid-cap, and small-cap. Certain styles may sometimes improve the portfolio performance. For example, during the tech boom of the late 1990s investors moved to large and mid cap growth while investors refocused on small cap value during the 2003 to 2006 period. The switch between growth and value can be the result of changes in earnings expectation or the overall economic outlook. At times, investors shift to lower book-to-market ratio stocks in pursuit of growth. Other times investors swing back to firm values in defense of market turmoil. Meanwhile, investors favor small-cap or mid-cap companies for their greater growth potential or large-cap companies for their relative stability from time to time.

1.1 Growth vs. Value

There is a general belief among academics and practitioners that value stocks are likely to outperform growth stocks. This belief would seem to provide strong support for favoring a value-oriented style. However, the S&P pure growth and value indices reveal that the case is not so clear-cut. Growth and value are highly cyclical, but on a cumulative monthly basis growth stocks outperformed value stocks over the period June 1995 to March 2009. The swing in performance between growth and value is not only hard to follow but can also adversely affect a portfolio's long-term buy-and-hold returns. Nevertheless, this substantial cyclicality can be turned to an investment advantage. Since these two styles are successful at different times, buying a past winner and short-selling a past loser may create an attractive

investment opportunity to increase portfolio returns and reduce performance volatility.

1.2   Market-Cap

In investing, company size also matters. Conventional wisdom holds that small-cap stocks outperform large-cap stocks over extended periods of time. However, the market favors different firm size at different times, resulting in a rotation of market-cap into or out of favor. Barberis and Shleifer (2003) point out that the outperformance of small-cap stocks during late 1970s and early 1980s drove investors and funds to small-cap stocks, pushing their returns higher. But after 1983 these good returns were eventually reversed. Jensen, Johnson, and Mercer (1998) find the small-cap premium is quite large during expansive policy periods and virtually non-existent during restrictive periods. Gompers and Metrick (2001) document that institutional holding of large-cap stocks has increased rapidly since 1990s. This large-cap favor may cause the underperformance of small stocks during some periods. In general, the differences in returns on small-caps and large-caps provide another investment opportunity: buying outperforming market-caps and short-selling underperforming market-caps.

1.3   Momentum Investing

Momentum-based investing strategies, first documented by Jegadeesh and Titman (1993), have led to extensive research. Using data from 1965 to 1989, Jegadeesh and Titman find that stocks with high returns over the past three to twelve months continue to outperform stocks with low past returns over the same period. Jegadeesh and Titman (2001) provide evidence that substantial momentum profits can still be made by buying past winners and short-selling past losers during 1990s even after the publication of their original study. Rouwenhorst (1999) documents momentum profits across 12 European countries. Chordia and Shivakumar (2006)

and Cooper, Gutierrez, Hameed (2004) find that momentum effect exists during expansionary periods but disappears after controlling for macroeconomic variables.

Moskowitz and Grinblatt (1999) document industry momentum and conjecture that industry momentum could be caused by cross-autocorrelation among stocks within the same industry. Hong, Torous and Valkanov (2007) show that a number of industries lead the stock market by up to two months, which is consistent with cross-industry momentum at the aggregate level.

Some papers examine whether institutional investors implement momentum strategies on equity portfolios. Grinblatt, Titman, and Wermers (1995) find that 77% of the funds examined are momentum investors. This percentage is higher for growth fund managers compared to balanced and income fund managers. Later, Burch and Swaminathan (2001) find that institutional investors such as insurance companies, banks, investment advisors and fund managers, adopt momentum trading strategies when allocating equity assets.

However, several researchers suspect whether momentum strategies can actually be implemented. Avramov, Chordia, Jostova, and Philipov (2007) find that the winner and loser portfolios in other empirical papers are comprised mainly of high credit risk stocks. Momentum profitability is statistically significant and economically large among low-rated firms, but it is nonexistent among high-grade firms. The influence of momentum is limited to a small sample (4% of market capitalization) of companies with high credit risk. Hong, Lim and Stein (2000) focus on stock-level momentum and find that momentum strategies perform well among small stocks with low analyst coverage.

To examine style momentum strategies, we use nine S&P style indices for this study to

avoid previous researchers' concerns about firm size, credit rating, or stock liquidity, as well as short-selling constraints and transaction costs. The remainder of this paper is organized as follows. Section 2 describes sample data and methodology employed for momentum portfolio construction and momentum trading strategies. Section 3 reports the profitability of various momentum strategies. Section 4 conducts some robustness checks. Section 5 concludes the study.

2.   Data and Methodology

The data used in this study are the nine S&P style total return indices: S&P 500, S&P 500 Pure Growth, S&P 500 Pure Value, S&P MidCap 400, S&P MidCap 400 Pure Growth, S&P MidCap 400 Pure Value, S&P SmallCap 600, S&P SmallCap 600 Pure Growth, and S&P SmallCap 600 Pure Value. These nine indices divide the largest 1,500 domestic companies into nine portfolios from intersections of three market-cap categories (large-cap, mid-cap and small-cap) and three investment evaluations (growth, blend, and value). On the basis of market-cap, the S&P 500 index focuses on the large-cap stocks with at least US$ 3 billion each, covering approximately 75% of the U.S. equities. The S&P MidCap 400 index represents the mid-cap range of companies with market capitalization of US$ 750 million to US$ 3.3 billion, covering 7% of the U.S. equities. The S&P SmallCap 600 index represents the small-cap companies with market capitalization between US$ 200 million and US$ 1.0 billion, covering approximately 3% of the domestic equity market. Meanwhile, on the basis of firm evaluation, the S&P pure growth or value index consists of those stocks that exhibit only

strong growth or value characteristics. To indicate firm characteristics more precisely, S&P adopts a 3 growth factor and 4 value factor methodology to calculate growth and value classfications in separate dimensions rather than only one factor such as the book-to-market ratio. The three growth factors include 5-year earnings per share growth rate, 5-year sales per share growth rate, and 5-year internal growth rate while the four value factors consist of price-to-book ratio, price-to-cash flow ratio, price-to-sales ratio, and dividend yield. The stocks in pure growth or value baskets have a total 33% value weight in their market cap categories respectively.

	Growth	**Blend**	**Value**
Large-Cap	S&P 500 Pure Growth	S&P 500	S&P 500 Pure Value
Mid-Cap	S&P MidCap 400 Pure Growth	S&P MidCap 400	S&P MidCap 400 Pure Value
Small-Cap	S&P SmallCap 600 Pure Growth	S&P SmallCap 600	S&P SmallCap 600 Pure Value

We use the S&P indices as sample data for this study for four reasons. First, these nine S&P indices are widely used as benchmarks among academics and financial practitioners for trading or performance evaluation purposes. Second, the S&P indices are easier and less expensive to trade because of their market acceptability as basket trades and the fact that they require less rebalancing of individual stocks in comparison to customized portfolios. Third, by focusing on those 1,500 largest domestic stocks widely accepted by institutional investors, the results are less subject to potential severe illiquidity problems associated with micro companies. Last, nine style ETFs have been developed to closely track the nine S&P style

indices and are actively traded since 2006[1]. Thus investors are able to use those nine style ETFs to facilitate their asset allocation decisions and actually implement the momentum trading strategies discussed in this paper.

Monthly values of the nine S&P total return indices are obtained from Bloomberg. Since the S&P pure growth and pure value index values are available only after June 1995, we use the complete history of monthly data from June 1995 to March 2009. This gives 1,368 observations and a 166-month sample period.

Insert Table 1 Here

Table 1 summarizes firm market-cap, total market coverage, average monthly raw returns, average monthly excess returns in excess of 1-month U.S. Treasury bill rate, as well as average monthly abnormal returns adjusted by Fama-French three factors and t-statistics for each of the nine S&P style indices. On average mid-cap outperforms large-cap and also surprisingly outperforms small-cap although the difference between mid-cap and small-cap returns is less than the difference between mid-cap and large-cap returns. Fama and French (1993) documents that average monthly returns monotonically decrease from the smallest market-cap quintile to the largest market-cap quintile over the period 1963 to 1991, but the average returns presented in Table 1 suggest that mid-cap stocks have the highest returns during our sample period.

Another surprise in Table 1 is the average monthly returns of pure growth index and pure value index. In each of the three market-cap categories, the pure growth index outperforms the pure value index by 0.18% to 0.41% per month. Due to the size effect, S&P MidCap 400

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[1] We calculate correlation coefficients for the nine S&P indices and their corresponding ETFs and find all the values are greater than 0.99.

Pure Growth Index performs the best with a 1.01% monthly return while S&P 500 Pure Value

Index averages the lowest monthly return of 0.50%.

2.1   Cyclicality of Market-cap and Growth/Value

Figure 1.1 presents cumulative monthly returns on the portfolio that short-sells S&P 500

and uses the proceeds to buy MidCap 400 but assumes 100% cash margin requirement for the

short position. On a cumulative basis, large-cap cycle lasts 3 years until December 1998 when

large-cap outperformed mid-cap by 40%. After 1998, however, mid-cap cycle started. By

early 2001 mid-cap had quickly erased the relative gap created by the previous 3 year

large-cap cycle and continued to outperform large-cap by 60% until 2006. In the current bear

market, both large-cap and mid-cap have been disastrous and the difference in performance is

relatively small. Figure 1.2 shows that small-cap has the same cycle as mid-cap and

underperformed large-cap during 1995-1998 but outperformed large-cap during 1999-2006.

Compared to the sizeable difference in returns between mid-cap and large-cap, the advantage of

mid-cap over small-cap is relatively small as exhibited by Figure 1.3.

Insert Figure 1 Here

Controlling for the market-cap effect, Figure 2 shows cumulative monthly returns on the

portfolios that are long on pure growth index and short on pure value index in the large-cap,

mid-cap and small-cap categories respectively. Clearly, growth and value stocks are cyclical. In

1998 and 1999, growth stocks soared and value stocks stalled. Then in the next two years, value

rose while growth fell. But during 2002-2006, the differences in returns on value or growth stocks

significantly shrank. In the recent economic recession, the growth stock cycle began again. During

the full sample period June 1995 to March 2009, the returns on large-cap growth stocks and

large-cap value stocks are virtually identical, but mid-cap and small-cap growth stocks cumulatively outperform mid-cap and small-cap value stocks by about 60% and 20% respectively.

Insert Figure 2 Here

2.2   Momentum Portfolio Construction and Trading Strategies

Using market-cap and growth/value cycles to time entry into and exit from a particular style can be successful if one is able to accurately identify the transition from one cycle to the other. However, on one hand, knowing which one style will perform well in the future is very difficult. On the other hand, momentum investing may be able to take advantage of style rotation. This section details how to construct momentum portfolios and how to rotate nine investment styles represented by the S&P large/mid/small-cap and growth/blend/value indices.

We construct momentum portfolios in the same way as Jegadeesh and Titman (1993).[2] Specifically, at the beginning of each month, we select a winner and a loser on the basis of returns over the previous J month(s) (J = 1, 3, 6, 9 or 12). The winner (loser) is the index that has the highest (lowest) return over the previous month(s) among the nine S&P style indices. We then buy the winner, simultaneously short-sell the loser, and hold the positions for the next K month(s) (K = 1, 3, 6, 9 or 12). When the holding horizon K is longer than one month, an overlap occurs in the holding period. To avoid test statistics calculated on overlapping returns, we follow Jegadeesh and Titman (1993) to compute average monthly return of K strategies, each starting one month apart. In other words, this return is equivalent to the return of a composite portfolio in which 1/K of the holdings is updated each month and the remaining from the previous periods. For example, to construct Strategy 6-6 that is based on a

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[2] Jegadeesh and Titman (1993) focus on the permutations of J=3, 6, 9, 12 and K =3, 6, 9, 12, but we consider more periods for portfolio formation and holding.

6-month ranking period and a 6-month holding horizon (J=6 and K=6), at the beginning of each month t, we buy a previous 6-month winning index and short-sell a previous 6-month losing index, then hold this long and short position for the next 6 months. Hence, at each month t, the 6-6 momentum portfolio consists of six parts equally weighted: a new long-short position at month t and the other five winner-loser positions carried over from month t-5 through t-1. The return on Strategy 6-6 in month t is the equal-weighted return on those six parts at month t.

3.   Profitability of Momentum Strategies

3.1   Monthly Returns of Momentum Portfolios

Table 2 reports average monthly returns of winner, loser, and winner-loser momentum portfolios for 25 trading strategies based on 5 different ranking periods and 5 different holding horizons. 24 out of the 25 style momentum strategies produce positive returns, 10 of which are statistically significant at 1% or 5%. The most significant strategy, Strategy 6-6, yields an economically and statistically significant profit of 80 basis points per month (t = 2.41), to which the long position (buying the winner) contributes 81% of the total profit. The 1-K strategies (Panel A) are the least profitable with a slightly significant return on Strategy 1-12 only. For the 3-K strategies (Panel B), average payoffs to Strategy 3-9 and Strategy 3-12 are 0.59% (t = 2.21) and 0.51% (t = 2.09) per month respectively while the return on Strategy 3-6 is 0.51% per month (t = 1.80). The 6-K strategies (Panel C) are the most statistically significant with monthly profits ranging from 0.69% (t = 2.29) to 0.80% (t = 2.41) per month

over a 3- to 12- month holding horizon. Finally, all the 9-K strategies (Panel D) and 12-K strategies (Panel E) generate significant profits between 0.60% (t = 1.66) and 0.86% (t = 2.07) per month.

Insert Table 2 Here

In summary, each of the 25 momentum portfolios is less risky than its corresponding winner or loser portfolio and generally less volatile than the S&P indices in terms of standard deviation. Second, a previous 6- or 9- month winner (loser) is most likely to continue to outperform (underperform) in the next 3, 6, 9 or 12 months while a previous 1- month return on the S&P indices fails to indicate any future momentum performance. Third, the payoff to the momentum strategy is the highest over a 3, 6 or 9- month horizon and is still statistically significant over a 12-month horizon but may be indistinguishable from 0 over a 1-month horizon. Last, the momentum profit is primarily attributed to the long position that has a smaller standard deviation than the short position.

So far we calculate the rate of monthly return for the momentum portfolio based on a trading strategy that short-sells one losing index and uses the proceeds to buy the other winning index but assumes 100% cash margin requirement for the short position. If the cash margin requirements drop to 50%, the momentum profits detailed in Table 2 would double. As the margin requirements decrease further, the rate of return on the momentum portfolio increases even higher. For example, Ameritrade requires that the minimum amount of equity or cash relative to the market value of the short position be 30%, so the zero-cost momentum profits in Table 2 would more than triple.

3.2   Frequency of S&P Indices in Momentum Portfolios

The momentum strategy involves intensive trading activities: buying a winner and short-selling a loser at the end of each ranking period and closing out the long and short position at the end of each holding period. To examine which index is likely to be a winner or a loser, we report in Table 3 the frequency of each S&P index that appears in the 25 momentum portfolios as either a winner or a loser. For a close comparison, the frequency of the loser is shown in parentheses. On average, small-cap value index as well as large-cap growth, blend or value indices appear the most frequently as either a winner or a loser in the 25 momentum portfolios while S&P SmallCap 600 Index and MidCap 400 are the least likely to win or lose. Given the outperformance of growth over value as documented in previous section, it is not surprising that MidCap 400 is much more likely to be a winner than to be a loser.

Insert Table 3 Here

Table 4 and Figure 3 focus on the most significant momentum strategy, Strategy 6-6. S&P 500 Pure Growth wins as frequently as it loses with the frequency of 30 months out of the 154 months observed or 19% of the time. In contrast, the blend index MidCap 400 and SmallCap 600 appear the least frequently in the 6-6 momentum strategy portfolios. As one might expect, MidCap 400 Pure Growth is three times as likely to be a winner as to be a loser due to its relative outperformance among the nine S&P indices. Further examination of the monthly momentum portfolios over the full period reveals that the winner or loser position sometimes stays in the winner-loser momentum portfolio from one holding period to the next for several consecutive months. This observation suggests that transaction costs are not actually incurred since there is no need to close the initial position and re-open a new one.

Insert Table 4 and Figure 3 Here

3.3   Seasonality of Style Momentum

Jegadeesh and Titman (1993) and Chordia and Shivakumar (2002) document the strong negative January return for price momentum strategies. More recently Chordia and Shivakumar (2006) find the similar January effect on earnings momentum and speculate that this January loss is due to the tax loss selling hypothesis that investors sell losers in November and December and buy them back in January. This tax loss selling may not occur in our case since a momentum strategy buys a winner and simultaneously short-sells a loser each month, but a November or December loser is not necessarily a January winner, therefore momentum investors may not need to buy the loser back in January. To further investigate the January effect on style momentum strategies, we compute average payoffs to winner, loser, and momentum (winner-loser) portfolios of Strategy 6-6 in each calendar month and report the results in Table 5. As anticipated, the so-called January tax loss selling seems not to exist on style momentum strategies since January shows a similar positive return in magnitude as November and December. In addition, Strategy 6-6 realizes a relatively high return of 4.80% in February, 2.63% in June, and 1.25% in August. In contrast, only five months exhibit small losses ranging from -0.02% in July to -0.48% in October.

Insert Table 5 Here

3.4   Correlation between Style Momentum and S&P 500

Chordia and Shivakumar (2002) find that momentum strategies on individual stocks produce positive returns during expansion periods but insignificantly negative returns during recession periods. To investigate whether style momentum strategies follow the same pattern, we examine the correlation between style momentum and S&P 500. Figure 4 compares

rolling compounded 12-month returns of Strategy 6-6 and S&P 500. The style momentum strategy appears profitable most time, especially during an economic contraction period 2001 to 2003. The graph shows that Strategy 6-6 performs extremely well when the market does extremely poorly. In contrast, when the market performs well, Strategy 6-6 does well too.

Insert Figure 4 Here

Table 6 reports the correlations among monthly returns on the 25 momentum strategies and the 9 S&P indices. Almost all the correlation coefficients are slightly negative, suggesting that momentum profits are not correlated with the overall market. For example, the most significant momentum strategy, Strategy 6-6, has a -0.2 correlation with S&P 500. In general, style momentum is more negatively correlated with value stocks than with growth stocks. Among three S&P pure value indices and three pure growth indices, S&P 500 Pure Value has the highest negative coefficients while S&P 500 Pure Growth has the lowest negative coefficients. Also, style momentum is more negatively correlated with mid-caps than with large-caps and small-caps since MidCap 400 has the highest negative coefficients among three blend market-caps. Finally, the 9-K strategies are most negatively correlated with all nine indices.

Insert Table 6 Here

4.   Robustness Checks

4.1 Adjusting the Market, Size and B/M Factor

Fama and French (1996) argue that the differences in returns between small and big firms (SMB) and between high and low book-to-market ratios (HML) can be additional risk factors in explaining cross-sectional U.S stock returns. To further examine whether excess returns of style momentum strategies are compensated by systematic risks, we use the Fama-French (1993) three-factor model:

$$R_t - R_{ft} = \alpha_t + b_1(Mkt - Rf)_t + b_2 SMB_t + b_3 HML_t + \varepsilon_t.$$

For month t, R_t is the monthly return of the momentum strategy, R_f is the 1-month Treasury bill rate, and Mkt-R_f, SMB and HML are the three factors. The estimate of the intercept α_t represents the average risk-adjusted abnormal return for month t. We regress the monthly excess returns of Strategy 6-6 and Strategy 12-12 on the three factors over the sample period June 1995 through March 2009. The results are reported in Table 7.

Insert Table 7 Here

Panel A shows the Fama-French three factors have significant effect on the winner or loser portfolio as expected, but only SMB has a slightly significant positive loading on the winner-loser momentum portfolio while the market factor has even negative effect on the performance of Strategy 6-6. After being adjusted by the three factors, the excess return on Strategy 6-6 is 0.55% per month, statistically significant at 10% level. In the regression on winner and loser, R^2 equals 86.5% and 79.2%. In contrast, R^2 value decreases to only 7.9% for the regression on winner-loser. Panel B reports the regression result on Strategy 12-12. Although the risk-adjusted excess return on Strategy 12-12 is not statistically significant, 44 basis points per month are still economically large. In a word, exposure to the Market, SMB or HML factor does not provide a simple

explanation for the excess returns on style momentum strategies.

4.2 Short-Sale Costs

Short-selling stocks involves using borrowed shares. A momentum portfolio consists of a long and a short position, so an investor has to borrow the security to be shorted from a brokerage firm or an institutional investor using cash or Treasury securities as collateral equal to 102% of the market value (marked and settled daily) of the borrowed shares (see D'Avolio (2002)). Short-sellers also may face recall risks and short squeezes when increasingly optimistic investors compete with recalled borrowers to buy shares being sold by lenders. D'Avolio (2002) finds the value-weighted cost to borrow the shares is 25 basis points per annum and only 2% of stocks on loans experience recall. Since the S&P index linked ETFs are considered large, liquid and lendable stocks, it is reasonable to assume that the cost to borrow ETFs should be below 25 basis points a year.

4.3 Transaction Costs

Since Chan and Lakonishok (1997) report that an average round-trip cost is 0.90% for large-cap stocks and 3.31% for small-cap stocks on the NYSE, a number of researchers (Sadka (2003), Lesmond, Schill, and Zhou (2004), as well as Hanna and Ready (2005)) argue that transaction costs have traditionally been understated because most momentum portfolios mainly consist of small-cap, high-beta, and illiquid stocks that contribute most of momentum profits but cost much more to trade than large-cap stocks. Furthermore, momentum strategies could require high trading turnover and expensive short-sales. Therefore, academics and practitioners suspect whether momentum strategies can actually be profitable.

With current exchange-traded funds (ETFs) underlying the nine S&P indices that this paper

studies, style momentum strategies could be profitable and become an attractive alternative to dynamic strategies based on individual stocks. For instance, to trade a highly liquid ETF that represents an S&P index is far cheaper than to trade hundreds of stocks in a momentum strategy portfolio. However, style momentum strategies are still more trading intensive than simple buy-and-hold strategies: investors must buy a past winner and short-sell a past loser at the end of each ranking period and close out their long-short positions by selling the winner and buying back the loser at the end of each holding period. This process requires up to four round-trip trades a year for the strategies with a 3-month holding period, up to two round-trip trades a year for the strategies with a 6-month holding period and up to one round-trip trade a year for the strategies with a 12-month holding period. As Table 4 shows, however, style momentum traders may not need to close out their entire positions at the end of each holding period as the winner or loser may continue to win or lose for several consecutive periods. If the momentum strategy retains the winner or loser in the following period, transaction costs are not actually incurred since there is no need to close the initial position and to re-open a new one. To calculate the excess returns after potential transaction costs, we take Strategy 6-6 as an example.

Since Chan and Lakonishok (1997) estimate that an average round-trip cost is 0.9% for large-cap stocks, the maximum transaction costs for Strategy 6-6 would be 1.8% per year. Since transaction costs are not actually incurred if the long and short position remain in the following 6 months, the actual costs would be lower. In addition, transaction commissions charged by brokers have decreased substantially in the last decade due to intensive competition from online brokers. Therefore it is likely that Strategy 6-6 could cost less than

1.5% per year to execute. As Table 6 shows, the payoff to Strategy 6-6 is 6.6% per year. After potential short-sale and transaction costs, the risk-adjusted excess return on Strategy 6-6 would be about 4% per year, remaining economically large.

5.   Conclusion

Stock portfolios are often classified as being valuation oriented (for example, growth, blend, or value funds), or market-cap oriented (for example, small-cap, mid-cap or large-cap funds), but their relative performance is dependent on growth/value and market-cap cycles. Growth may take the lead in the short term and value may retake the lead in the future. Moreover, at times the market favors large-cap while other times the cycle turns in favor of small-cap or mid-cap. This constant swing of the market pendulum could adversely affect portfolio returns, but may also significantly benefit style momentum investors who rotate their styles from time to time.

This paper examines performance of growth/blend/value portfolios, large/mid/small-cap portfolios, and style momentum portfolios using nine S&P style indices over the period June 1995 to March 2009. We find that growth outperforms value while mid-cap outpaces large-cap and small-cap on a buy-and-hold basis. When investors rotate their portfolios based on the past return of each style, they may make profits. 24 out of the 25 style momentum strategies examined in this paper generate positive returns, 10 of which are statistically significant at 1% or 5%. The most significant strategy that buys a previous 6-month winner and short-sells a previous 6-month loser and then holds both positions for the next 6 months produces an economically and statistically significant profit of 80 basis points per month. Further analysis on frequency of winners and losers

reveals that the past winner or loser sometimes stays in the momentum portfolio for several consecutive months, resulting in no transaction costs actually incurred. After adjusting for systematic risks as well as potential short-sale and transaction costs, the payoff to Strategy 6-6 still remains economically plausible with an annual 4% return. Unlike price or earning momentum documented by previous literature, style momentum seems not to exhibit a negative January return. In addition, style momentum strategy performs extremely well when the market performs poorly. This finding suggests that style momentum investors may profit not only in a bull market but also in a bear market. In the recent extremely turbulent market, momentum investors tend to hide in large-cap and value portfolios. However, as the overall market collapses, the style momentum strategies examined here performed well.

Previous researchers propose behavioral theories to explain momentum phenomenon and conjecture that momentum is attributed to investors' under-reaction or over-reaction, but the rotation of investment style could be partly due to the overall market conditions and outlook. Also, investors constantly switch between growth or small-cap stocks for their growth potential and value or large-cap stocks for their relative stability. As a result of these switches, style momentum strategies may profit from the undervalued style over a period of 3 to 12 months. At this point, the style momentum strategies appear profitable, but future research could further examine the trading strategies combining style momentum and sector momentum.

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Figure 1: Cyclicality of Market-Cap (06/1995 – 03/2009)
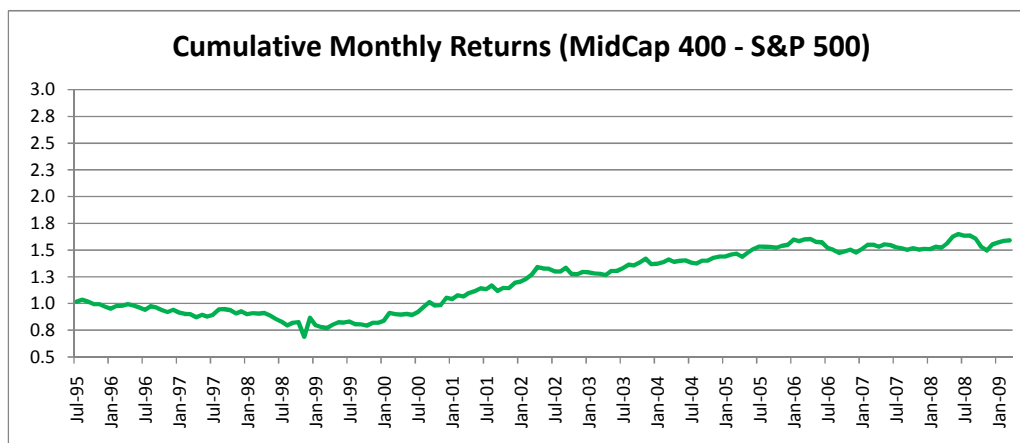
Figure 1.1 Cumulative monthly returns: long MidCap 400 and short S&P 500
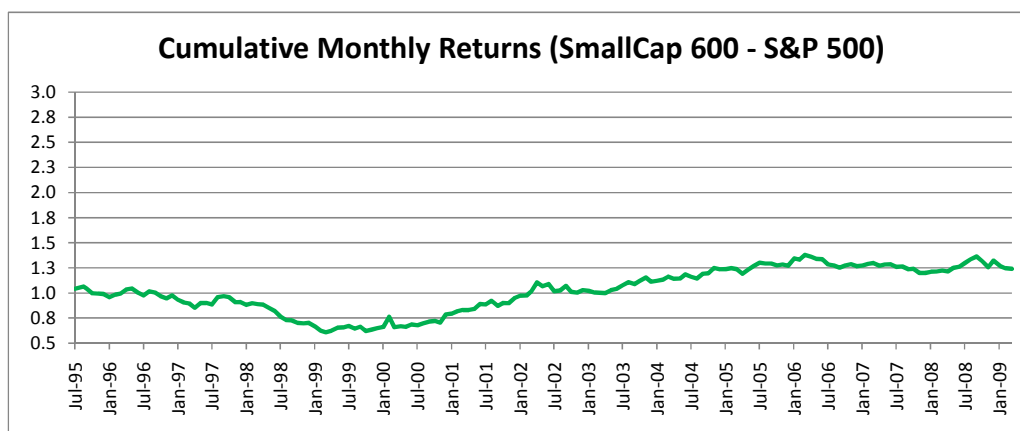
Figure 1.2 Cumulative monthly returns: long SmallCap 600 and short S&P 500
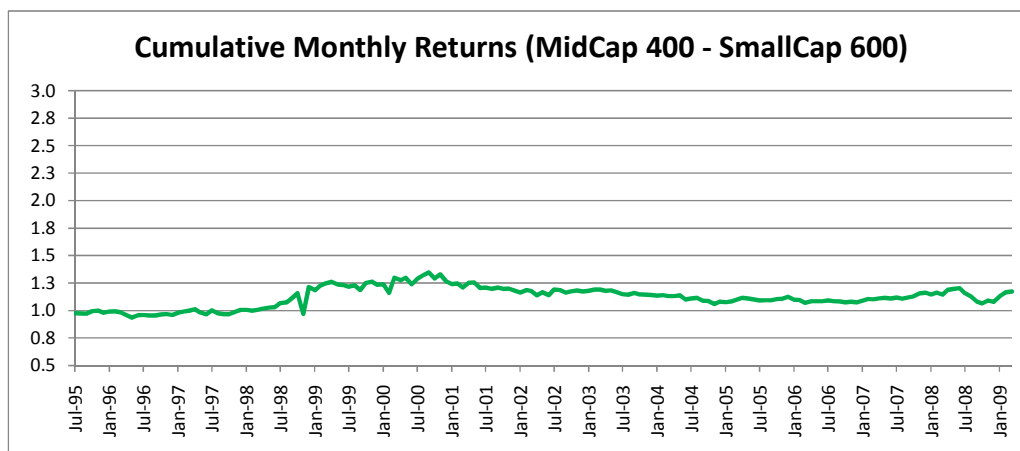
Figure 1.3 Cumulative monthly returns: long MidCap 400 and short SmallCap 600

Figure 2: Cyclicality of Growth / Value (06/1995 – 03/2009)
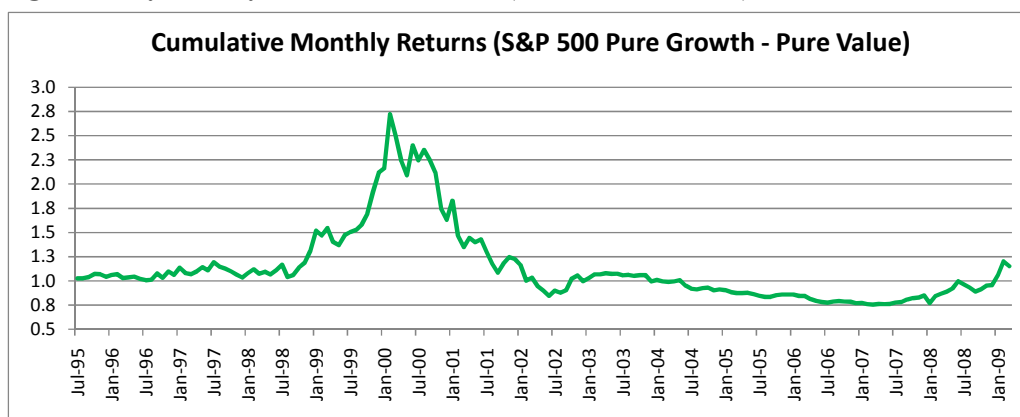
Figure 2.1 Cumulative monthly returns: long S&P 500 Pure Growth and short S&P 500 Pure Value
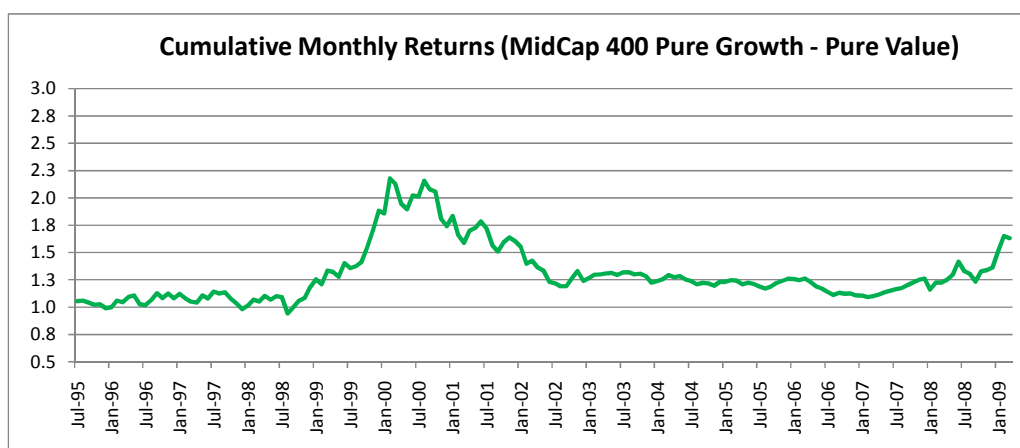
Figure 2.2 Cumulative monthly returns: long MidCap 400 Pure Growth and short MidCap 400 Pure Value
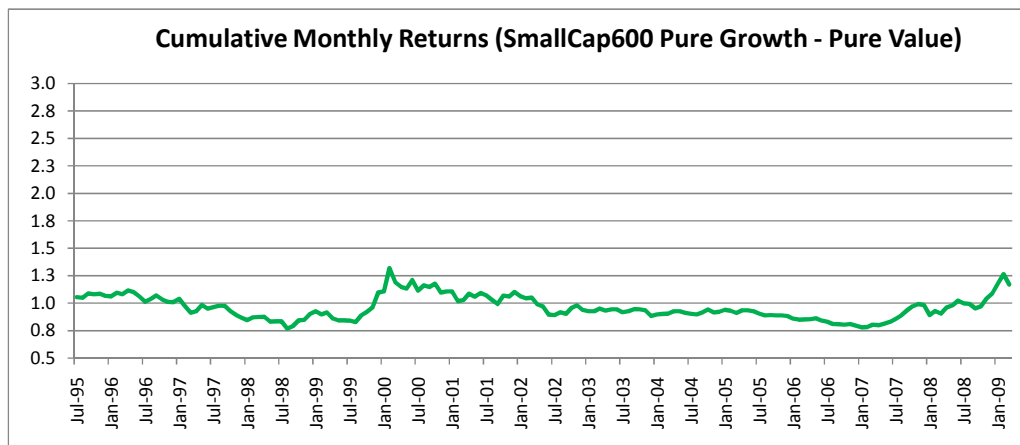
Figure 2.3 Cumulative monthly returns: long SmallCap 600 Pure Growth and short SmallCap 600 Pure Value

Figure 3: Comparison of Winner and Loser Frequency in Strategy 6-6 for Each Index
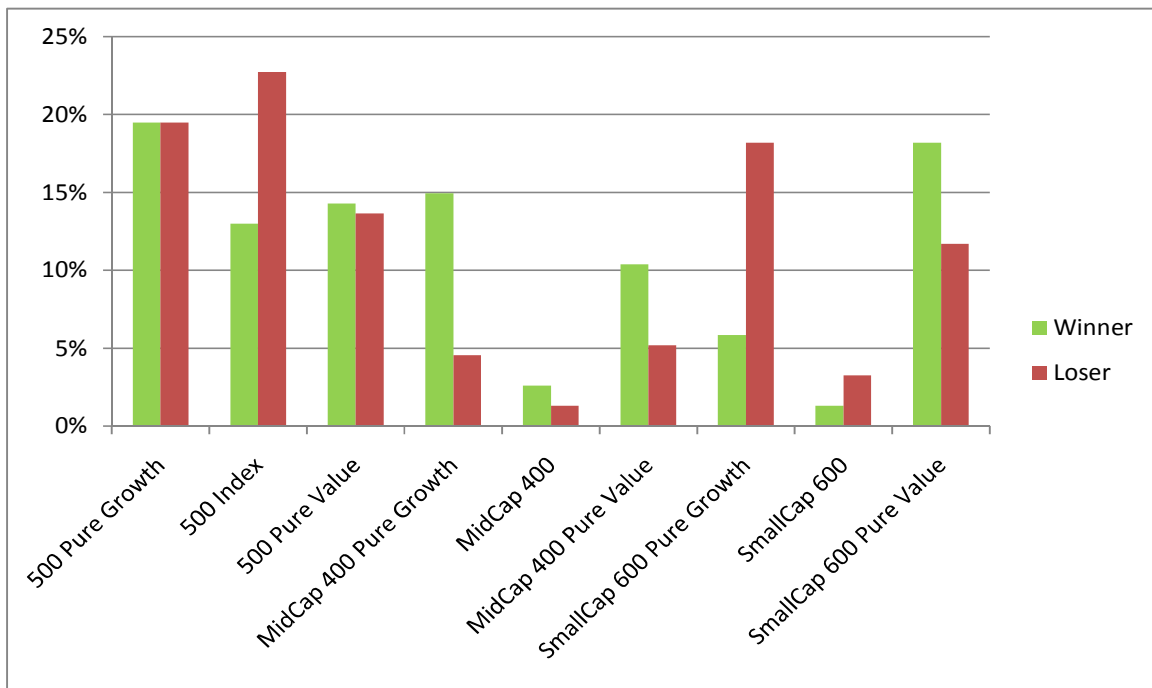
Reported are average payoffs to winner, loser, and momentum (winner-loser) portfolios of Strategy 6-6 in each calendar month over the period June 1995 to March 2009. Strategy 6-6 is designed as detailed in Table 2. It buys the past 6 month winner and short-sells the past 6 month loser and then holds the long and short position for the next 6 months.

Figure 4: Rolling Compounded 12-month Returns of Strategy 6-6 and S&P 500
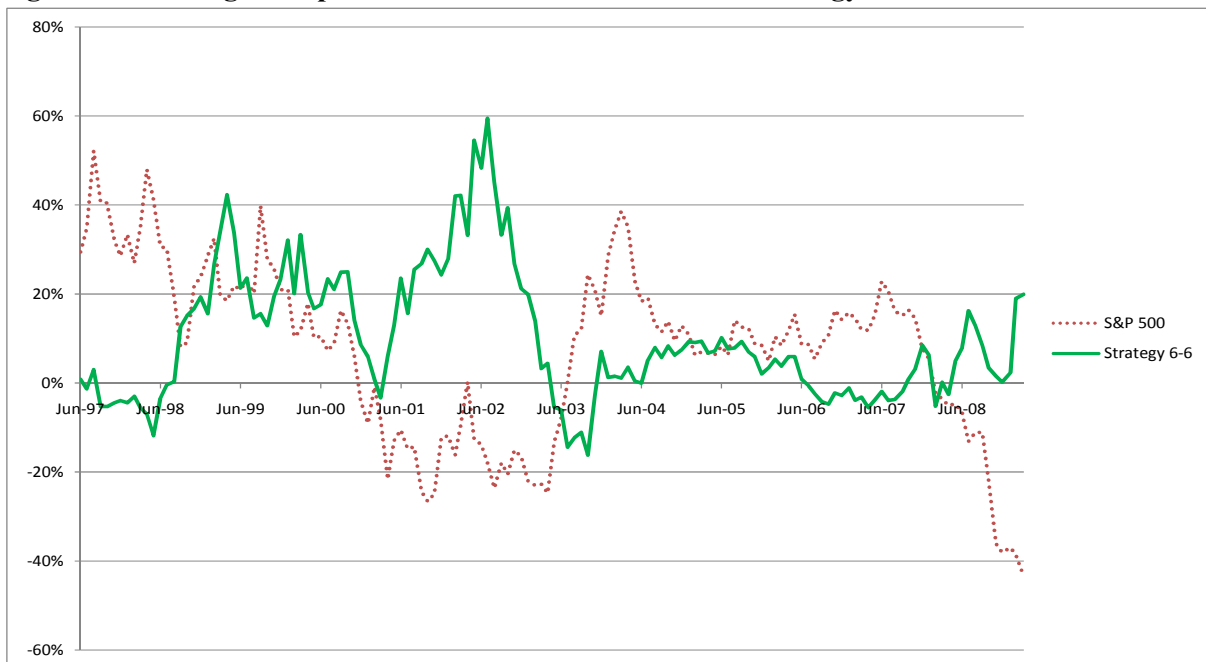
Table 1: Summary Statistics of S&P Indices

Market-Cap Categogy	Market Cap (billion US$)	Total Market Coverage	S&P Index	Raw Returns (%)		Excess Returns (%)		Abnormal Returns (%)	
				Mean	S.D.	Mean	S.D.	Mean	t-stat
			S&P 500 Pure Growth	0.75	6.84	0.45	6.83	0.29	1.82
Large-Cap	> 3	75%	S&P 500	0.49	4.59	0.19	4.57	0.01	0.16
			S&P 500 Pure Value	0.50	5.61	0.20	5.59	-0.34	-2.20
			S&P MidCap 400 Pure Growth	1.01	6.54	0.71	6.53	0.39	2.04
Mid-Cap	0.75 - 3.3	7%	S&P MidCap 400	0.82	5.76	0.52	5.75	0.20	0.87
			S&P MidCap 400 Pure Value	0.60	5.28	0.30	5.26	-0.24	-1.55
			S&P SmallCap 600 Pure Growth	0.75	6.50	0.45	6.49	-0.02	-0.11
Small-Cap	0.2 - 1	3%	S&P SmallCap 600	0.68	5.57	0.38	5.56	-0.08	-0.65
			S&P SmallCap 600 Pure Value	0.57	6.02	0.27	6.01	-0.39	-2.24

This table summarizes firm market-cap, total market coverage, average monthly raw returns, average monthly excess returns in excess of 1-month T-bill rate, as well as average monthly abnormal returns adjusted by Fama-French three factors and t-stat for each of nine S&P style indices. These nine indices divide the largest 1,500 domestic companies into nine portfolios from intersections of three market-cap categories (large-cap, mid-cap and small-cap) and three investment evaluations (growth, blend, and value). All means and standard deviations (S.D.) are computed over the period June 1995 to March 2009 and expressed in percentage.

Table 2: Monthly Returns of Momentum Strategies on S&P Indices

Panel A: Portfolios formed based on past 1 month returns and held over various horizons (1-K)

Portfolio Returns	1-1	1-3	1-6	1-9	1 - 12*
Winner	0.39	0.62	0.62	0.65	0.69
Std Dev.	5.73	5.50	5.55	5.49	5.50
Loser	0.55	0.46	0.49	0.38	0.43
Std Dev.	6.81	6.02	5.72	5.81	5.82
Winner - Loser	-0.16	0.16	0.13	0.27	0.25
Std Dev.	4.97	3.47	2.54	2.16	1.77
t-Stat	-0.42	0.59	0.65	1.57	1.77

Panel B: Portfolios formed based on past 3 month returns and held over various horizons (3-K)

Portfolio Returns	3-1	3-3	3-6*	3-9**	3-12**
Winner	0.56	0.62	0.78	0.82	0.82
Std Dev.	5.85	5.58	5.67	5.57	5.67
Loser	0.47	0.31	0.27	0.22	0.31
Std Dev.	7.14	6.52	6.05	6.08	5.94
Winner - Loser	0.09	0.32	0.51	0.59	0.51
Std Dev.	5.92	4.65	3.53	3.34	3.02
t-Stat	0.19	0.86	1.80	2.21	2.09

Panel C: Portfolios formed based on past 6 month returns and held over various horizons (6-K)

Portfolio Returns	6-1	6-3**	6-6***	6-9***	6-12**
Winner	0.95	1.06	1.00	0.99	0.90
Std Dev.	6.00	5.81	5.70	5.59	5.62
Loser	0.56	0.29	0.19	0.26	0.21
Std Dev.	7.12	6.53	6.46	6.32	6.23
Winner - Loser	0.39	0.77	0.80	0.74	0.69
Std Dev.	5.48	4.76	4.15	3.75	3.65
t-Stat	0.91	2.02	2.41	2.41	2.29

Table 2 (cont'd)

Panel D: Portfolios formed based on past 9 month returns and held over various horizons (9-K)

Portfolio Returns	9-1*	9-3**	9-6**	9-9**	9-12*
Winner	1.03	0.91	0.92	0.86	0.83
Std Dev.	5.79	5.66	5.60	5.63	5.72
Loser	0.23	0.05	0.15	0.07	0.13
Std Dev.	7.38	6.99	6.76	6.66	6.56
Winner - Loser	0.80	0.86	0.77	0.79	0.70
Std Dev.	5.69	5.17	4.66	4.58	4.39
t-Stat	1.76	2.07	2.02	2.09	1.91

Panel E: Portfolios formed based on past 12 month returns and held over various horizons (12-K)

Portfolio Returns	12-1*	12-3**	12-6*	12-9*	12-12*
Winner	0.86	0.95	0.87	0.87	0.77
Std Dev.	5.90	5.80	5.73	5.73	5.79
Loser	0.13	0.17	0.18	0.19	0.17
Std Dev.	6.91	6.76	6.64	6.60	6.50
Winner - Loser	0.73	0.78	0.69	0.68	0.60
Std Dev.	4.95	4.79	4.70	4.44	4.29
t-Stat	1.83	1.99	1.78	1.85	1.66

At the beginning of each month, we select a winner and a loser on the basis of returns over the previous J month (J = 1, 3, 6, 9 or 12). The winner (loser) is the index that has the highest (lowest) return over the previous month(s) among the nine style indices. We then buy the winner, simultaneously short sell the loser, and hold the position for the next K months (K = 1, 3, 6, 9 or 12). When the holding horizon K is longer than one period, an overlap occurs in the holding period. To avoid test statistics based on overlapping returns, we follow Jegadeesh and Titman (1993) to compute the period average return of K strategies, each starting one month apart. The monthly returns (%) of 25 winner-loser portfolios are calculated with standard deviation (%) and t-statistics.

*** Statistical significance at 1% level
** Statistical significance at 5% level
* Statistical significance at 10% level

Table 3: Frequency of Winning or Losing Index in Momentum Portfolios

Panel A: 1 Month Ranking Period

	1-1	1 - 3	1 - 6	1 - 9	1 - 12*
500 Pure Growth	28 (26)	27 (26)	27 (26)	27 (25)	27 (25)
500 Index	18 (24)	18 (24)	16 (24)	16 (23)	16 (23)
500 Pure Value	22 (24)	22 (23)	22 (23)	21 (23)	21 (21)
MidCap 400 Pure Growth	26 (15)	25 (15)	25 (15)	25 (14)	23 (14)
MidCap 400	4 (5)	4 (5)	4 (5)	4 (5)	3 (5)
MidCap 400 Pure Value	17 (16)	17 (16)	17 (15)	17 (15)	17 (15)
SmallCap 600 Pure Growth	16 (22)	16 (22)	16 (22)	16 (22)	16 (22)
SmallCap 600	7 (3)	7 (3)	6 (3)	6 (3)	6 (3)
SmallCap 600 Pure Value	26 (29)	26 (28)	26 (26)	24 (26)	24 (25)

Panel B: 3 Month Ranking Period

	3 - 1	3 - 3	3 - 6*	3 - 9**	3 - 12**
500 Pure Growth	26 (26)	25 (26)	25 (26)	25 (25)	25 (25)
500 Index	22 (29)	22 (29)	20 (29)	20 (29)	20 (29)
500 Pure Value	19 (23)	19 (23)	19 (23)	19 (21)	19 (18)
MidCap 400 Pure Growth	26 (14)	25 (14)	25 (14)	25 (14)	24 (14)
MidCap 400	5 (3)	5 (3)	5 (2)	5 (2)	3 (2)
MidCap 400 Pure Value	13 (14)	13 (14)	13 (13)	13 (13)	13 (13)
SmallCap 600 Pure Growth	17 (25)	17 (25)	17 (25)	16 (25)	16 (25)
SmallCap 600	3 (3)	3 (3)	3 (3)	2 (3)	2 (3)
SmallCap 600 Pure Value	31 (25)	31 (23)	30 (22)	29 (22)	29 (22)

Panel C: 6 Month Ranking Period

	6 - 1	6 - 3**	6 - 6***	6 - 9***	6 - 12**
500 Pure Growth	30 (31)	30 (31)	30 (30)	30 (30)	30 (30)
500 Index	22 (35)	20 (35)	20 (35)	20 (35)	20 (35)
500 Pure Value	22 (23)	22 (23)	22 (21)	22 (18)	22 (15)
MidCap 400 Pure Growth	23 (7)	23 (7)	23 (7)	22 (7)	21 (7)
MidCap 400	4 (2)	4 (2)	4 (2)	4 (2)	2 (2)
MidCap 400 Pure Value	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)
SmallCap 600 Pure Growth	11 (28)	11 (28)	9 (28)	8 (28)	8 (28)
SmallCap 600	3 (5)	3 (5)	2 (5)	1 (5)	1 (5)
SmallCap 600 Pure Value	28 (20)	28 (18)	28 (18)	28 (18)	28 (18)

Panel D: 9 Month Ranking Period

	9 - 1*	9 - 3**	9 - 6**	9 - 9**	9 - 12*
500 Pure Growth	28 (33)	28 (33)	28 (33)	28 (33)	28 (33)
500 Index	15 (35)	15 (35)	15 (35)	15 (35)	15 (35)
500 Pure Value	22 (22)	22 (20)	22 (17)	22 (14)	22 (13)
MidCap 400 Pure Growth	27 (8)	25 (8)	25 (8)	24 (8)	21 (8)
MidCap 400	2 (2)	2 (2)	2 (2)	2 (2)	2 (2)
MidCap 400 Pure Value	10 (8)	10 (8)	10 (8)	10 (8)	10 (8)
SmallCap 600 Pure Growth	10 (25)	10 (25)	9 (25)	9 (25)	9 (25)
SmallCap 600	5 (2)	5 (2)	3 (2)	1 (2)	1 (2)
SmallCap 600 Pure Value	37 (21)	37 (21)	37 (21)	37 (21)	37 (19)

Table 3 (cont'd)

Panel E: 12 Month Ranking Period

	12 - 1*	12 - 3**	12 - 6*	12 - 9*	12 - 12*
500 Pure Growth	29 (31)	29 (31)	29 (31)	29 (31)	29 (31)
500 Index	14 (32)	14 (32)	14 (32)	14 (32)	14 (32)
500 Pure Value	22 (21)	22 (19)	22 (16)	22 (13)	22 (13)
MidCap 400 Pure Growth	29 (5)	27 (5)	27 (5)	25 (5)	22 (5)
MidCap 400	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
MidCap 400 Pure Value	8 (9)	8 (9)	8 (9)	8 (9)	8 (9)
SmallCap 600 Pure Growth	5 (32)	5 (32)	5 (32)	5 (32)	5 (32)
SmallCap 600	5 (1)	5 (1)	2 (1)	1 (1)	1 (1)
SmallCap 600 Pure Value	41 (22)	41 (22)	41 (22)	41 (22)	41 (19)

At the beginning of each month between June 1995 and March 2009, nine S&P indices are ranked and then assigned to momentum portfolios as detailed in Table 2. For example, Strategy 6-6 is constructed based on a 6-month ranking period and a 6-month holding horizon. Reported is the frequency that each index appears in the 25 style momentum portfolios as either a winner or a loser. For a close comparison, the frequency of the loser is shown in parentheses. ****, ** and * indicate momentum portfolio profits statistically significant at 1%, 5% and 10% respectively.

Table 4: Frequency of Winner and Loser in Strategy 6-6 Momentum Portfolio

	Percentage		Number of Months	
	Winner	Loser	Winner	Loser
500 Pure Growth	19%	19%	30	30
500 Index	13%	23%	20	35
500 Pure Value	14%	14%	22	21
MidCap 400 Pure Growth	15%	5%	23	7
MidCap 400	3%	1%	4	2
MidCap 400 Pure Value	10%	5%	16	8
SmallCap 600 Pure Growth	6%	18%	9	28
SmallCap 600	1%	3%	2	5
SmallCap 600 Pure Value	18%	12%	28	18
	100%	100%	154	154

This table focuses on the frequency that each of the nine S&P indices appears in Strategy 6-6 momentum portfolio as either a winner or a loser. Percentage describes how much of time each index becomes a winner or a loser during the 154-month sample period while number of months details how many months out of the total 154 months each index remains in the momentum portfolio as a winner or a loser respectively.

Table 5: Seasonality of Momentum Profits

	Winner		Loser		Winner - Loser	
	Mean (%)	S.D. (%)	Mean (%)	S.D. (%)	Mean (%)	S.D. (%)
January	0.28	5.24	-0.30	5.43	0.58	4.80
February	0.65	6.31	-4.15	7.14	4.80	5.29
March	1.74	3.99	1.73	5.81	0.01	3.13
April	2.08	4.78	2.22	5.43	-0.15	5.65
May	1.55	4.91	1.70	5.39	-0.15	3.21
June	1.49	4.29	-1.14	5.59	2.63	3.47
July	-1.44	6.06	-1.42	5.06	-0.02	3.49
August	0.43	6.45	-0.82	6.95	1.25	4.38
September	-0.97	6.01	-0.84	6.38	-0.13	2.15
October	0.22	7.67	0.70	8.45	-0.48	4.61
November	2.68	6.08	2.15	7.35	0.53	3.17
December	3.15	4.11	2.47	4.40	0.68	2.25

Reported are average payoffs to winner, loser, and momentum (winner-loser) portfolios of Strategy 6-6 in each calendar month over the period June 1995 to March 2009. Strategy 6-6 is designed as detailed in Table 2. It buys the past 6 month winner and short-sells the past 6 month loser and then holds the long and short position for the next 6 months.

Table 6: Correlation Matrix of Monthly Returns on 25 Strategies and 9 S&P Indices

	500 Growth	S&P 500	500 Value	400 Growth	MidCap 400	400 Value	600 Growth	SmallCap 600	600 Value
1-1	-0.09	-0.19	-0.21	-0.14	-0.24	-0.22	-0.09	-0.10	-0.22
1-3	-0.02	-0.17	-0.25	-0.01	-0.05	-0.22	-0.03	-0.04	-0.21
1-6	0.03	-0.11	-0.21	0.05	-0.01	-0.16	0.08	0.07	-0.13
1-9	-0.02	-0.15	-0.26	0.01	-0.04	-0.20	0.00	0.00	-0.20
1-12	-0.04	-0.15	-0.29	-0.02	-0.01	-0.25	-0.06	-0.05	-0.24
3-1	-0.13	-0.25	-0.27	-0.14	-0.25	-0.27	-0.11	-0.12	-0.21
3-3	-0.09	-0.22	-0.26	-0.10	-0.19	-0.24	-0.05	-0.07	-0.18
3-6	0.00	-0.13	-0.22	0.00	-0.08	-0.17	0.05	0.04	-0.11
3-9	-0.01	-0.14	-0.27	-0.01	-0.07	-0.22	0.01	0.01	-0.17
3-12	0.07	-0.08	-0.24	0.04	-0.02	-0.19	0.06	0.06	-0.13
6-1	-0.11	-0.20	-0.20	-0.12	-0.22	-0.20	-0.07	-0.07	-0.17
6-3	-0.09	-0.17	-0.20	-0.05	-0.12	-0.17	-0.04	-0.04	-0.16
6-6	-0.11	-0.20	-0.27	-0.10	-0.12	-0.23	-0.08	-0.07	-0.20
6-9	-0.10	-0.17	-0.28	-0.11	-0.13	-0.26	-0.14	-0.11	-0.24
6-12	-0.06	-0.16	-0.29	-0.07	-0.10	-0.27	-0.10	-0.09	-0.23
9-1	-0.16	-0.25	-0.26	-0.17	-0.28	-0.26	-0.13	-0.11	-0.24
9-3	-0.15	-0.25	-0.29	-0.14	-0.19	-0.26	-0.11	-0.10	-0.23
9-6	-0.13	-0.22	-0.32	-0.13	-0.17	-0.29	-0.13	-0.11	-0.25
9-9	-0.09	-0.21	-0.33	-0.11	-0.15	-0.30	-0.11	-0.09	-0.25
9-12	-0.04	-0.18	-0.33	-0.07	-0.10	-0.29	-0.07	-0.06	-0.23
12-1	-0.09	-0.17	-0.30	-0.12	-0.12	-0.28	-0.14	-0.13	-0.28
12-3	-0.06	-0.15	-0.29	-0.07	-0.10	-0.26	-0.10	-0.08	-0.25
12-6	-0.04	-0.15	-0.31	-0.06	-0.09	-0.28	-0.08	-0.06	-0.24
12-9	-0.05	-0.14	-0.31	-0.07	-0.09	-0.28	-0.12	-0.09	-0.25
12-12	-0.02	-0.13	-0.29	-0.05	-0.08	-0.27	-0.09	-0.07	-0.23

This table presents correlation coefficients of monthly returns on 25 momentum strategies and nine S&P indices. Column 1 represents the 25 momentum strategies constructed based on 5 different ranking periods and 5 different holding horizons. For example, Strategy 6-9 is to buy the past 6-month winner and short-sell the past 6-month loser and then hold the long and short position for the next 9 months. The sample period is from June 1995 to March 2009.

Table 7: Risk-adjusted Monthly Excess Returns of Mometum Strategies on S&P Indices

Panel A: Strategy 6-6

Portfolio Returns	α	Mkt - Rf	SMB	HML	R^2 (%)
Winner	0.43 (2.57)	1.04 (27.30)	0.43 (5.56)	0.29 (4.02)	86.5
Loser	-0.40 (-1.69)	1.21 (23.51)	0.20 (2.49)	0.38 (4.49)	79.2
Winner - Loser	0.55 (1.67)	-0.17 (-2.38)	0.23 (1.67)	-0.09 (-0.67)	7.9

Panel B: Strategy 12-12

Portfolio Returns	α	Mkt - Rf	SMB	HML	R^2 (%)
Winner	0.30 (1.78)	1.01 (24.16)	0.45 (5.89)	0.19 (3.08)	88.6
Loser	-0.42 (-1.68)	1.17 (19.68)	0.37 (4.38)	0.59 (6.19)	79.8
Winner - Loser	0.44 (1.26)	-0.16 (-1.83)	0.09 (0.70)	-0.41 (-2.96)	14.6

At the beginning of each month between June 1995 and March 2009, we calculate the returns on each of the nine S&P indices over the past 6 or 12 months and assign the index with the highest return to the winner portfolio and the index with the lowest return to the loser portfolio. Strategy 6-6 is to buy the past 6-month winner and short-sell the past 6-month loser and then hold the positions for the next 6 months. Similarly, Strategy 12-12 is to buy the past 12-month winner and short-sell the past 12-month loser and then hold the positions for the next 12 months. The three explanatory variables Mkt-Rf, SMB and HML are the Fama-French factors. The risk free rate is the 1 month T-bill rate. We regress the monthly excess returns of the winner portfolio, loser portfolio and winner-loser portfolio on the Fama-French three factors. The coefficients are expressed in percent per month and t-statistics are shown in parentheses.