

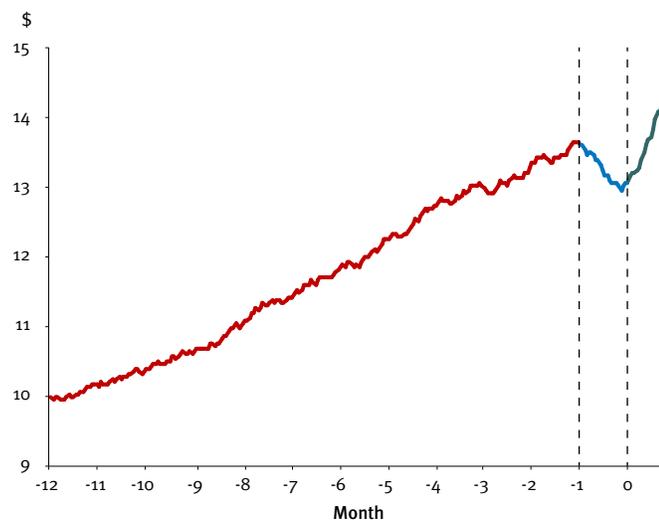
## Do Past Returns Predict Future Returns? Evidence from Momentum and Short-Term Reversals

*The weak form of the Efficient Market Hypothesis<sup>1</sup> explains that stock prices reflect all available information, and that past price movements should be unrelated to future average returns. Contrary to that theory, academic research by Narasimhan Jegadeesh and Sheridan Titman suggests that prior movements in price are related to expected stock returns. Specifically, Jegadeesh (1990) finds evidence of short-term reversals, or stocks that have risen relative to the rest of the market in the **past month** underperform those that have fallen relative to the rest of the market. Jegadeesh and Titman (1993, 2001) find evidence of momentum in stock returns, or the tendency for stocks that have outperformed the market over the **past year** to continue to outperform when compared to stocks that have underperformed over the previous year. These two phenomena, while related, reflect how movements in past stock prices predict expected returns over different horizons: **Short-term reversal** focuses on returns over the previous month, while **momentum** focuses on returns over the past three months to one year. To avoid confounding effects, momentum is often measured skipping the most recent month,  $t-1$ , or using data from months  $t-12$ ,  $t-11$ ,  $t-10$ ... $t-2$ .*

To illustrate, the below graphic displays a hypothetical price path for a stock with an initial price of \$10 one year ago. In this example, momentum is very positive as the price increases in the red region, while one-month reversal is very negative as the price falls in the blue region. These past returns have implications for expected return in the next period; i.e., the green region.

Time is expressed in months. Red, blue and green regions reflect the time periods in which momentum, short-term reversal and future returns are measured, respectively.

**Exhibit 1. Hypothetical stock price chart.**



In this article, we consider the practical implications for momentum and short-term reversal investment strategies. When evaluating whether a factor that reflects a particular firm characteristic such as past one-year return (momentum) or past one-month return (short-term reversal) is relevant for portfolio construction, the following criteria may be useful:

- Are these investment strategies robust and do they explain differences in average stock returns across countries, industries, and different time periods?
- How do these investment strategies explain differences in expected returns, and do we expect these return premia to persist in the future?
- What are the tax and turnover implications for these investment strategies?
- How should each investment strategy be used to complement other factors in the portfolio?

In our view, short-term reversal and momentum strategies reflect genuine return premia that can benefit an investor if implemented in a way that does not substantially increase portfolio turnover.

<sup>1</sup> See for example Fama (1970) and Fama (1991).

## Academic Research on Past Stock Returns

There is considerable evidence that momentum and short-term reversal strategies explain differences in expected stock returns. We will first discuss those papers related to momentum, or past one-year return, and then discuss papers related to short-term reversal.

In a seminal study on momentum investing, Jegadeesh and Titman (1993) show that buying past winners and selling past losers generates over 1% per month in average profits over the period January 1965-December 1989. Past winners and losers are determined on a relative basis – the authors rank each stock by past momentum and then construct value-weighted portfolios for both winner and loser stocks. The authors use an overlapping portfolios approach, and show that their results are robust to changes in the momentum definition (using past stock returns going back three to 12 months prior to portfolio formation). Rouwenhorst (1993) finds evidence of momentum in most countries in Europe. Griffin, Ji and Martin (2003), and Fama and French (2012) show that momentum profits can be earned in most major markets, with the exception of Japan. Asness, Moskowitz and Pedersen show the return premium (excess return earned by going long stocks with desirable characteristics and short stocks with undesirable characteristics) associated with value and momentum strategies within a country are negatively correlated (when value works, momentum does not work, and vice versa). They explain that the weak momentum premium in Japan is potentially due to the strong value premium recorded in that country. Chui, Titman and Wei (2010) explain that countries in which investors display “individualism”, reflecting the degree people focus on their internal attributes, have higher momentum profits. They link individualism to overconfidence, theorizing that the low individualism of investors in Japan explains why there is a lack of a momentum premium in that country.

Several papers extend momentum investing to markets other than individual equities. Asness, Liew and Stevens (1997) report momentum profits for a country-timing strategy that buys country equity indices with high relative past returns. Okunev and White (2003) find momentum effects among currencies; Erb and Harvey (2006) show commodities display momentum; and Moskowitz, Ooi and Pedersen (2012) find evidence of momentum using a variety of managed futures strategies. These papers suggest more broadly that the momentum effect is robust and exists in a variety of financial markets.

In one of the first papers on short-term reversal, Jegadeesh (1990) finds that stocks that have fallen relative to the broader market in the past month tend to outperform those that have risen over the previous month. Dai, Liu and Schaumburg (2014) find stronger one-month reversals when they are unaccompanied by news related to cash-flow prospects. Hameed and Miun (2010) show that intra-industry, one-month reversals, calculated as the past one-month return after controlling for the industry return, are much stronger than the standard one-month reversal strategy.

How well do simple strategies based on one-month reversal or momentum perform historically? The graphs that follow display the compound annualized return associated with investing in different portfolios formed on either momentum or short-term reversal. Investing in those stocks with the lowest past one-month return generates 13.5% per year, while investing in the highest past one-month stocks (most negative short-term reversal) returns only 3.2% per year. Similarly, investing in the highest past one-year return (highest momentum) stocks earns 16.9% per year, while the lowest decile of momentum has a loss of 1.5% per year. Another important observation in both graphs is that: moving from left to right, the portfolio returns decline for short-term reversal and increase for momentum.

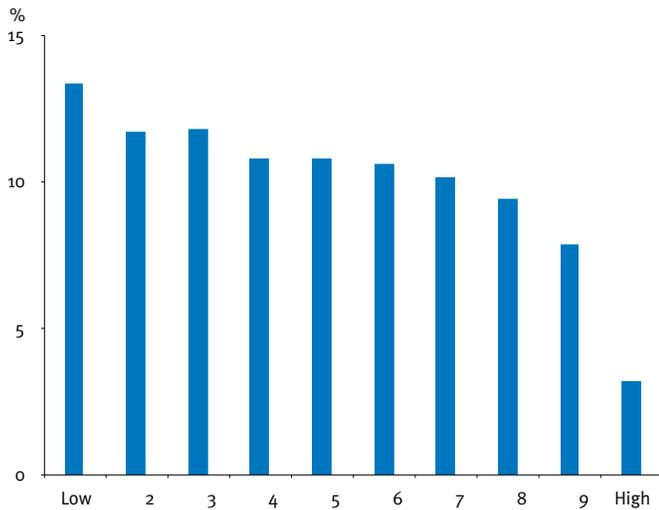
Exhibits 2 and 3 report compound annualized returns for 10 value-weighted portfolios over the period January 1927-December 2014. Exhibit 2 displays portfolios formed on short-term reversal (past one-month), while exhibit 3 shows portfolios formed on momentum (one-year return skipping the most recent month).

## Explanations for Momentum and Short-Term Reversal

Financial economists generally have difficulty reconciling both of these strategies based on past returns with a risk-based explanation that implies that both stocks with positive momentum and poor past one-month returns are more risky. The more accepted explanations for momentum center on behavioral biases such as the disposition effect, investor herding, and general over- and under-reaction to news. Hong, Lim and Stein (2000) find that momentum is stronger among stocks with greater information asymmetries, defined as those that are smaller and with lower analyst coverage. They explain that momentum occurs in financial markets due to a slow diffusion of information, particularly negative information. In this explanation, investors are irrational, since they fail to incorporate certain news into stock prices, creating price momentum.

## Exhibit 2: Portfolios Formed on Short-Term Reversal

Jan. 1, 1927 – Dec. 31, 2014



Sources: CRSP (Center for Research in Security Prices), Gerstein Fisher Research

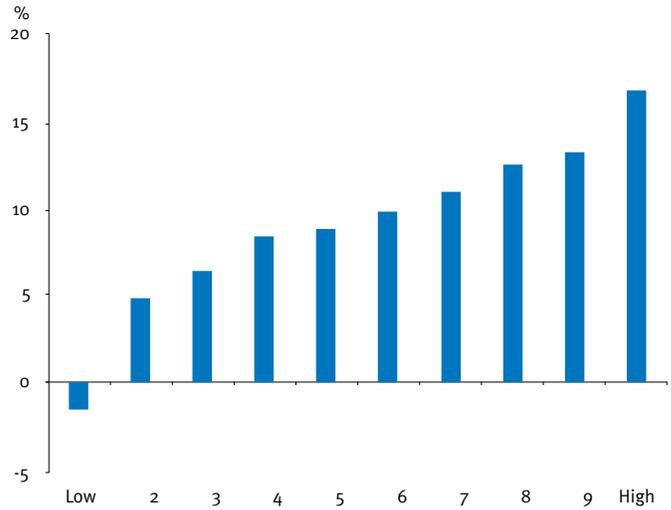
Jegadeesh and Titman (1995) suggest that short-term reversals are explained by dealer-inventory-related issues associated with trading stocks. In their paper, they suggest that a large investor liquidating a large block of stock artificially reduces the stock price, which partially reverses over the next month. Both of these explanations for why movements in past price are related to future returns exploit a cognitive bias associated with news information and propose that investors can profit from these anomalies when the market corrects such pricing errors.

### Taxes and Turnover Implications

Another explanation for why one-month reversal and one-year momentum strategies persist is that the phenomena cannot easily be captured by an investor due to transaction costs. A monthly rebalanced, long-only momentum strategy may have a turnover of around 300%, so on average securities remain in the up-momentum portfolio for around four months. The short-term reversal strategy turns over even more rapidly; a long-only strategy based on this factor may have turnover of 800%-1000% per year, so on average securities remain in the negative past-one-month portfolio for only 1-2 months. All of this trading entails significant transaction costs. Another related concern is the impact of taxes on these different investment styles. If a security that appreciates in price is bought and then sold within a year, short-term capital gains are incurred. The higher the turnover of the strategy, the greater are the tax implications.

## Exhibit 3: Portfolios Formed on Momentum

Jan. 1, 1927 – Dec. 31, 2014



Sources: CRSP (Center for Research in Security Prices), Gerstein Fisher Research

In our view, investors can still improve their portfolio construction process by leveraging information in both short-term reversals and momentum. Fisher, Shah and Titman (2015) explore how to best combine value (defined by the book-to-market ratio, or ratio of fundamental to price) and momentum from the perspective of a long-only investor. In their paper, they show that momentum can improve portfolio performance while reducing turnover if investors use momentum information to dictate when they trade. Thus, a stock that migrates from growth to value due to a falling price will not be purchased due to negative momentum exposure. By extension, this insight can be applied to using short-term reversal to slow down trading.

### Conclusion

Short-term reversal and momentum can be important quantifiable factors that an investor should pay attention to when designing equity portfolios, despite the lack of a risk-based explanation for either phenomenon. Academic research has shown that both phenomena persist within a variety of financial markets and geographies. In our view, the benefits of including short-term reversal and momentum in a multi-factor investment process outweigh the costs associated with increased turnover or taxes.

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