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Price momentum has attracted quite a bit of attention lately not only because of its strong performance in the first quarter but also its recent large oscillations in performance from month to month: up in January, down in February, up in March, down again in April. In this note, we will discuss a couple of drivers behind price momentum, and hopefully shed some light on investment decisions going forward.

One reason we believe price momentum works is that investors are overconfident, causing the stock price to overreact to private information and underreact to public signals (Daniel, Hirshleifer, and Subrahmanyam, 1998). Additionally, when investors receive confirming public information, their confidence rises as they attribute successes to their own skill. Disconfirming information does not have an equal degree of negative impact, however, as investors tend to attribute failure to external noise. In other words, when investors are overconfident and exhibit self-attribution bias, public information can trigger further overreaction to a preceding private signal, leading to momentum in security prices.

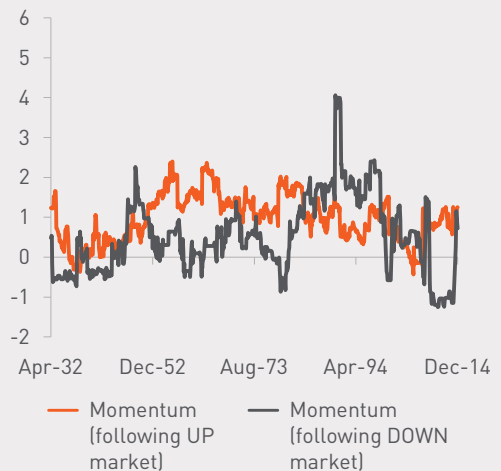
We believe investors routinely make the mistake of evaluating their decisions on an absolute rather than a relative basis. If that is the case, then momentum will depend upon the state of the market, performing best in up markets. Given that investors are long the equity market in aggregate, the amount of confirming information will likely be greater following market gains than losses, leading to higher levels of overconfidence in rising markets. Momentum profits, therefore, tend to be higher following up markets than down markets. Empirical evidence from the past 88 years has, to a large extent, supported this hypothesis (see Exhibit 01).<sup>1</sup> Unsurprisingly, profits

from momentum are significantly less volatile following up vs. down markets. It is worth noting that the market spends roughly 63% of the time in the up state and 37% of the time in the down state.

There is a limit to how far valuations can become stretched, however, beyond which even

## EXHIBIT 01 - ROLLING 5-YEAR RISK-ADJUSTED RETURN MOMENTUM QUINTILE SPREADS FOLLOWING UP VS DOWN MARKETS

(APRIL 1932 - DECEMBER 2014)



Sources: First Quadrant, L.P., Ken French data library: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

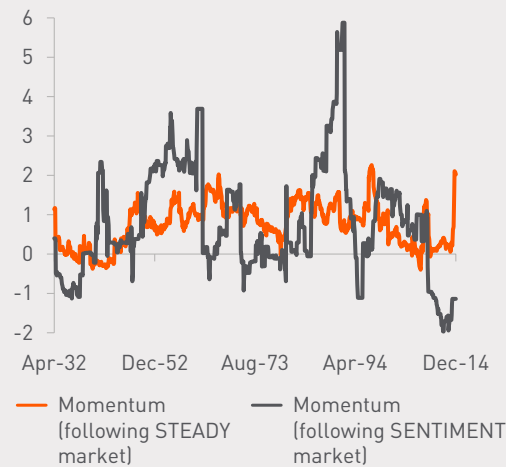
momentum investors grow concerned about fundamentals. This generally leads to price reversals. Such reversals are often gradual and long lasting (Cooper, Gutierrez, and Hameed, 2004), leaving investors enough time to get out of their positions before incurring significant losses. Drastic reversals have occurred, though, and when momentum crashes it can be fast and steep, as we saw in 2009.

We hypothesize that drastic reversals of momentum will likely occur after a significant market rally or sell-off. Both extreme greed and fear will have the tendency to stretch prices to the extent that, when they revert, market participants will run for the exit. One way to define the extreme price formation is to consider jointly the direction of the market and the shape of its return path. In particular, the peak of a market bubble will likely involve both upward trending prices and accelerating returns, exhibiting a convex shape in cumulative return. On the other hand, a market bottom may be preceded by both downward trending prices and accelerating sell-offs,

exhibiting a concave-shaped cumulative return pattern. Based on these insights, we categorize the market into two states, steady and sentiment. The steady state involves a gradual formation of trends, i.e. upward trending with concave cumulative return pattern based on the past 52 weeks of daily prices, and downward trend with convex cumulative return pattern. The sentiment state involves a rapid development of trends, i.e. (upward + convex) and (downward + concave). Since the middle of 1927, the US market was in the steady state 79% of the time and in the sentiment state 21% of the time. Exhibit 02 below shows the rolling 5-year risk-adjusted return of momentum quintile spreads following steady and sentiment markets. It is apparent that momentum profits in the sentiment state are much more volatile and have longer tails than in the steady state.

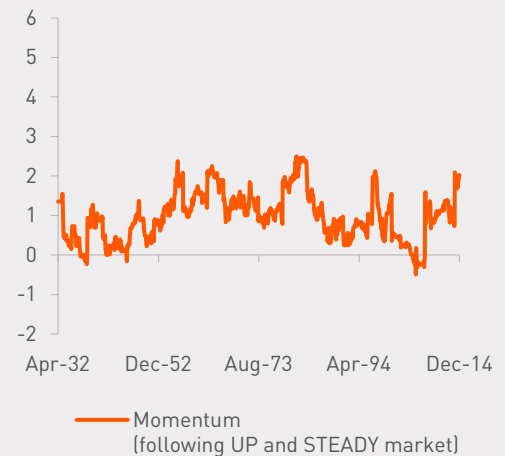
Combining the two hypotheses above, an upward trending and steady market should be the best environment for momentum investing, as it delivers high expected returns with relatively short left tails (see Exhibit 03 below). This is the

**EXHIBIT 02 - ROLLING 5-YEAR RISK-ADJUSTED RETURN MOMENTUM QUINTILE SPREADS FOLLOWING STEADY VS SENTIMENT MARKETS**  
(APRIL 1932 - DECEMBER 2014)



Sources: First Quadrant, L.P., Ken French data library: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

**EXHIBIT 03 - ROLLING 5-YEAR RISK-ADJUSTED RETURN MOMENTUM QUINTILE SPREADS FOLLOWING UP VS STEADY MARKETS**  
(APRIL 1932 - DECEMBER 2014)



Sources: First Quadrant, L.P., Ken French data library: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).



market environment we have been in since the middle of 2014.

Let us now go back to the observation of return oscillation in price momentum. Should it be a concern? Our analysis indicates it should not. Since January 1927, momentum profits have exhibited at least four months of up and down alternation around 8% of the time. The following three- and six-month returns from momentum following such episodes were positive around three-quarters of the time, with a significantly positive mean. A related analysis based on serial correlation in momentum profits yields similar results. In other words, oscillation in profits does not seem to be a “canary in the coal mine” for performance concerns for price momentum.

A key weakness of the above analysis is the backward-looking nature of both the market states and price pattern. Our research shows that momentum tends not to perform well when market risk is high or rising. Currently, we see a mixed picture in terms of risk. The VIX<sup>2</sup>, at around 14, is at the low end of its historical distribution. However, oil volatility (OVX)<sup>3</sup> and macro risk (proxied by the CITI Macro Risk Index)<sup>4</sup> are high, although both have fallen somewhat from a few months ago. Additionally, the Economic Policy Uncertainty Index<sup>5</sup> has been rising since the latter half of last year. Looking towards the future, we can identify some scenarios that could lead to a meaningful increase in market risk. In the past, volatility tended to go up when the Federal Reserve initiated a cycle of interest rate rises, and market participants expect the Fed to raise rates sometime in 2015. New areas of conflict in the Middle East have become active, raising the potential geopolitical risks from this volatile region.

As long as the key drivers of market risk remain dormant, the general market environment will likely continue to be favorable for momentum investing.

## References

Daniel, Kent, David Hirshleifer, and Avanidhar Subrahmanyam, 1998, Investor psychology and investor security market under-and overreactions, *Journal of Finance* 53, 1839–1886.

Cooper, Michael, Roberto Gutierrez Jr., and Allaudeen Hameed, 2004, Market states and momentum, *Journal of Finance* 59, 1345-1365.

## Endnotes

<sup>1</sup> Momentum and market information are from Ken French data library: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). Momentum quintile spread is defined by the difference between the average of the highest two US equity-weighted momentum deciles and the average of the lowest two momentum deciles. Market direction is based by past 12-month US market returns.

<sup>2</sup>The Chicago Board Options Exchange (CBOE) Volatility Index (VIX) shows the market’s expectation of 30-day volatility for the S&P 500 Index. It is constructed using the implied volatilities of a wide range of S&P 500 Index options. This volatility is meant to be forward looking and is calculated from both calls and puts. The VIX is a widely used measure of market risk and is often referred to as the “investor fear gauge. CBOE Volatility Index®, (VIX®) are registered trademarks of CBOE.

<sup>3</sup>The CBOE Crude Oil ETF Volatility Index (Oil VIX, Ticker - OVX) measures the market’s expectation of 30-day volatility of crude oil prices by applying the VIX® methodology to United States Oil Fund, LP (Ticker - USO) options spanning a wide range of strike prices. CBOE® is a registered trademark of CBOE.

<sup>4</sup>The Citi Macro Risk Index measures risk aversion in global financial markets. It is an equally weighted index of emerging market sovereign spreads, US credit spreads, US swap spreads and implied FX, equity and swap rate volatility.

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<sup>5</sup>The Economic Policy Uncertainty Index (EPU) is a proxy for movements in global policy-related economic uncertainty over time developed jointly by Scott R. Baker (Northwestern University), Nicholas Bloom (Stanford University), and Steven J. Davis (University of Chicago). The index is constructed from three types of underlying components. One component quantifies newspaper coverage of policy-related economic uncertainty. A second component reflects the number of federal tax code provisions set to expire in future years. The third component uses disagreement among economic forecasters as a proxy for uncertainty.



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