

Momentum from underreaction

Less risky and more sustainable



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- The momentum effect is the tendency of stocks that performed well in the past months to continue to do well in the following period and vice versa for stocks with a poor performance
- Both over- and underreaction to news may explain the momentum effect
- Generic momentum strategies predominantly benefit from overreaction, as a result of which they aggravate mispricing and are prone to reversals
- The momentum factor in Robeco's quantitative equity models, on the other hand, benefits from underreaction, thereby improving market efficiency and resulting in more consistent returns

Introduction

This note lists different explanations for the momentum effect and divides them into the categories 'overreaction' and 'underreaction'. We argue that underreaction is a less risky and more sustainable source of momentum and show that Robeco's residualization technique is highly effective for selecting momentum stocks driven by underreaction. The momentum effect, first documented by Jegadeesh and Titman for the US stock market in 1993,¹ is the tendency of stocks to show persistence in performance: the winner stocks, i.e. stocks that performed well in the recent past, on average outperform other stocks in the subsequent period, while the opposite holds for the loser stocks with poor returns.

Overreaction versus underreaction explanations

While there is a vast amount of evidence on the existence of the momentum effect, there is still an on-going academic debate on the source of the momentum premium. Some argue that the momentum premium is a compensation for risk, although several studies show that the momentum effect cannot be justified with a risk-based explanation.² Therefore, we will focus on alternative theories based on investors' behavioral biases or consequences of the market design of the institutional money management industry.

We can divide these alternative theories into two groups. One group consists of theories that are consistent with stock prices drifting away from intrinsic values. Examples are investors' delayed overreaction to stock-specific news;³ investors' herding behavior;⁴ and investors' return chasing behavior.⁵ These explanations are based on investor *overreaction*. The second group consists of theories that are consistent with stock prices moving closer towards intrinsic values. Examples are investors' underreaction to stock-specific news, which is either due to an anchoring bias or due to slow information diffusion;⁶ and the disposition effect, i.e. holding on to losers to avoid admitting mistakes while quickly selling winners to show success.⁷ These explanations are based on investor *underreaction*. As is often the case, the truth lies somewhere in the middle; i.e., some stocks will show persistence in performance due to investors' overreaction, while other stocks gain momentum caused by an initial underreaction of investors to stock-specific news.

Momentum from underreaction is preferable

Identifying the source of a stock's momentum, i.e. over- or underreaction, matters, because it gives insights into the expected risk and sustainability of a strategy profiting from that stock's momentum. A momentum strategy that buys a winner stock which suffers from overreaction causes upward price pressure on that stock, makes the price drift even further away from its intrinsic value and hence aggravates the mispricing. Sooner or

The momentum effect cannot be justified with a risk-based explanation

Momentum can be explained by investors' over- or underreaction to stock-specific news

¹ Jegadeesh and Titman, 1993, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency", *Journal of Finance*.

² See, e.g., Fama and French, 1996, "Multifactor Explanations for Asset Pricing Anomalies", *Journal of Finance*; Moskowitz, 2003, "An Analysis of Covariance Risk and Pricing Anomalies", *Review of Financial Studies*; Cooper, Gutierrez and Hameed, 2004, "Market States and Momentum", *Journal of Finance*; and Liu, Warner and Zhang, 2004, "Economic Fundamentals, Risk, and Momentum Profits", *Working Paper*.

³ See, e.g., Daniel, Hirshleifer and Subrahmanyam, 1998, "Investor Psychology and Investor Security Market Under- and Overreactions", *Journal of Finance*; Hong and Stein, 1999, "A Unified Theory of Underreaction, Momentum Trading, and Overreaction in Asset Markets", *Journal of Finance*; and Barberis, Shleifer and Vishny, 1998, "A Model of Investor Sentiment", *Journal of Financial Economics*.

⁴ See, e.g., Grinblatt, Titman, and Wermers, "Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior", *American Economic Review*.

⁵ See, e.g., Sirri and Tufano, 1998, "Costly Search and Mutual Fund Flows", *Journal of Finance*.

⁶ See, e.g., Chan, Jegadeesh, and Lakonishok, 1996, "Momentum Strategies", *Journal of Financial Economics*; and Grinblatt and Han, 2004, "Prospect Theory, Mental Accounting and Momentum", *Journal of Finance*.

⁷ See, e.g., Odean, 1998, "Are Investors Reluctant to Realize Their Losses?" *Journal of Finance*.

later though, the market will realize the stock price deviates from its intrinsic value and the price of the stock will revert towards its fundamental value. Hence, a momentum strategy that invests in stocks whose momentum is driven by overreaction is exposed to the risk of reversals in stock prices.

This is different, however, for a momentum strategy that invests in stocks for which price dynamics are driven by underreaction. A momentum strategy that buys a winner stock that is exposed to underreaction will actually lead to price pressure that diminishes the mispricing instead of aggravating it and as such, is not prone to subsequent reversals in stock prices. So when we compare over- with underreaction as the source of a momentum strategy, we can conclude that underreaction is less risky in the sense that it is not exposed to price reversal in the stocks it selects. Furthermore, underreaction is more sustainable, because its return comes from making the market more rather than less efficient. For these reasons, we prefer underreaction as a source of a momentum strategy.

Capturing momentum from underreaction

How can investors capture momentum that arises specifically from underreaction? In a study by Gutierrez and Pirinsky,⁸ it is shown that generic momentum strategies, which are based on total stock returns relative to other stocks, suffer from price reversals three to five years after formation. Moreover, the authors show that the returns of momentum strategies based on stock-specific returns, i.e. returns adjusted for exposures to systematic risk factors, do not reverse in the long-run. They relate the differences between the long-term performance of total return and stock-specific return momentum to agency issues in the financial industry. Institutional investors keep portfolios near their benchmark to minimize reputation and career risks and are more inclined to buy total return winners generating an overreaction to such a momentum. Stocks that have a good firm-specific return, however, are neglected, generating an underreaction to this kind of momentum.

Intrigued by these insights and the findings from a large in-house research project on the momentum effect, we developed our 'residualization' technique that isolates the stock's momentum that can be attributed to the stock-specific component and eliminates the part of a stock's momentum that is due to its systematic component.⁹ This technique is applied to the momentum factor in all quantitative stock selection models we use at Robeco. To show that Robeco's residual, stock specific, momentum does not suffer from the price reversal of total return momentum and thus captures underreaction, we compare the two strategies in the graph below. The blue line shows the average cumulative long-short performance of the residual momentum strategy. We find that the residual momentum portfolio generates positive returns up to the first 18 months after portfolio formation. The long-term returns for the months thereafter are, on average, flat. Hence, there is no evidence of a reversal in the momentum profits; this is consistent with an underreaction explanation for the residual momentum effect.

The grey line in the graph represents the cumulative outperformance of a generic, total return momentum strategy. The generic momentum strategy is only profitable over the

Momentum from overreaction risks price reversals

Momentum from underreaction makes the market more efficient

Our proprietary residualization technique captures momentum from underreaction

⁸ See Gutierrez and Pirinsky, 2007, "Momentum, Reversal, and the Trading Behavior of Institutions", *Journal of Financial Markets*.

⁹ Our research has shown that generic momentum strategies incur high risks that are not properly rewarded. A generic momentum strategy can be enhanced by eliminating these unrewarded risks by means of our proprietary residualization technique. Residual momentum returns are comparable to generic momentum returns but at half the volatility, doubling the Sharpe ratio. For more information on residual momentum we refer to Blitz, Huij and Martens, 2011, "Residual Momentum", *Journal of Empirical Finance*; or Jellema, Huij and Lansdorp, 2013, "The momentum factor: the basics and Robeco's solution", *Robeco whitepaper*.

first nine months after portfolio formation. From month t+10 onwards a clear reversal pattern emerges that even extends beyond the initial starting value at time of the formation of the portfolio. After two years the initial outperformance has been lost completely and after five years the strategy has incurred a cumulative loss. This strong and significant reversal pattern demonstrates that the main source of generic momentum profits is investors' overreaction and it illustrates that the alpha driven by overreaction is less sustainable than the alpha which is driven by investor's underreaction.

Momentum driven by underreaction is more sustainable

Cumulative long-short momentum performance

Average cumulative performance after formation of long-short portfolios that start each month in the period January 1986 to December 2012 and are held for 60 months. The universe consists of the largest 3,000 constituents of the S&P Broad Market Index each month. A residual (generic) momentum portfolio consists of equal long/short positions in the top/bottom decile residual (generic) momentum stocks of the universe.

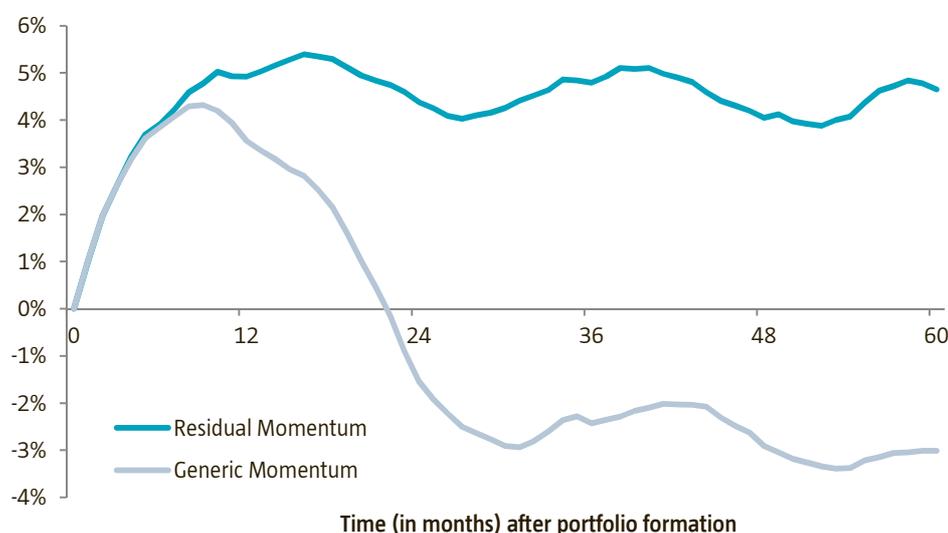


Illustration: the dot-com bubble

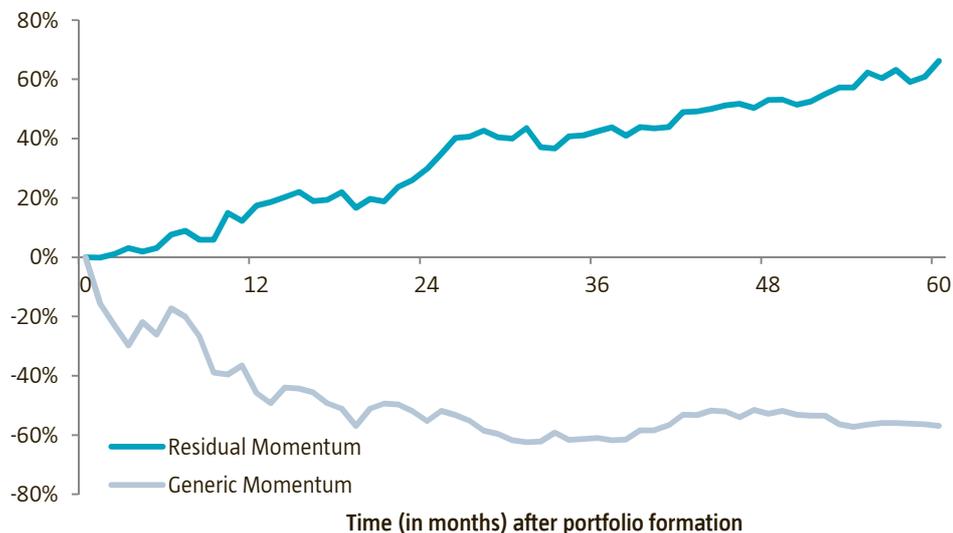
A classic example of overreaction in stock prices is the dot-com stock-market bubble from roughly 1997 to 2000, during which many investors were overly optimistic about the future profits of internet-based and related companies. Can a residual momentum strategy protect against the subsequent drawdown? To answer this question, we create two momentum portfolios at the end of February 2000 (ten days before the Nasdaq market peaked and the bubble began to burst), one comprised of the residual and one of the total return winners. The graph below shows the cumulative outperformance of these two momentum portfolios.

It is clear that generic momentum suffers after the IT bubble bursts: after 60 months, a dollar invested in this portfolio is worth less than half of a dollar invested in the market. Instead, residual momentum is not subject to this large drawdown, but continues to deliver the momentum premium over the market. This supports our earlier conjecture that a residual momentum strategy is not concentrated in stocks that have momentum due to investor's overreaction, even in a large stock-market bubble. This protects a residual momentum strategy against the reversal from which a momentum strategy based on overreaction suffers.

Even during the dot-com bubble, residual momentum avoids stocks driven by overreaction

Cumulative outperformance of momentum winners after burst dot-com bubble

Cumulative outperformance of residual (generic) momentum winner portfolio (equal weights in top 10% of largest 3,000 constituents of the S&P Broad Market Index at end of February 2000) relative to the MSCI World Index.



Conclusion

It is unlikely that the source of the momentum premium has a risk-based explanation. Academic evidence points more towards an explanation for the momentum effect in the area of behavioral finance and agency issues. The two different categories that one can use to describe these explanations are investors' over- and underreaction to stock-specific news.

Buying momentum stocks driven by overreaction aggravates mispricing and so is prone to reversal. As underreaction is not exposed to this reversal in stock prices and actually gets its return from eliminating mispricing, we prefer this as source for a momentum strategy. The momentum factor in Robeco's quantitative stock selection models applies a residualization technique that selects stocks based on their stock-specific instead of total returns. Contrary to a generic total return momentum strategy, the performance of a residual momentum strategy does not revert in the long-run. This finding is consistent with residual momentum exploiting investor's underreaction to stock-specific news and profiting from making the market more rather than less efficient. By applying the residualization technique, Robeco's momentum factor can therefore deliver less risky and more sustainable momentum returns.

Our momentum factor can deliver less risky and more sustainable momentum returns



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