

Understanding Momentum

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What is Momentum?

“Momentum” refers to the tendency of stock prices to continue moving in the same direction for several months after an initial impulse. The most basic form of momentum is price momentum, where the initial impulse is simply a change in the price itself. Price momentum was noted in aggregate US stock prices in the late 1980’s (Poterba and Summers 1988), in individual US stock prices in the early 1990’s (Jegadeesh and Titman 1993), and in international markets later in the 1990’s (Rouwenhorst 1998, 1999). Other forms of momentum have been measured using different initial impulses. Post-earnings-announcement drift is momentum following a surprise earnings announcement (Ball and Brown 1968, Bernard and Thomas 1989, 1990), while earnings momentum is momentum following a revision in analysts’ earnings forecasts (Chan, Jegadeesh, and Lakonishok 1996).

Momentum is inherently challenging to explain within a traditional asset pricing model. Such a model requires that high average returns are simply compensation for some form of risk; but stocks that have risen recently, or have had positive earnings surprises, typically seem to have lower risk, not higher risk as would be required for risk to explain momentum (Grundy and Martin 2001, Griffin, Ji, and Martin 2003). Certainly the equity of a leveraged company becomes safer when good news increases the market value of the company relative to the burden of its debt.

Momentum arises more naturally within a behavioral asset pricing model. Such a model explains momentum as the result of the interaction of imperfectly rational investors, many of whom are individuals lacking professional investment expertise, with rational arbitrageurs.

Underreaction and overreaction

Behavioral explanations of momentum fall in two main categories. The first category stresses a process of gradual adjustment to news. Stock prices initially underreact to the news, then adjust over time so that the long-term response is the appropriate rational one. The second category stresses that irrational investors may overreact to stories of dubious relevance. If overreaction develops gradually, then stock prices may display momentum for a period of time but will eventually reverse and return to fundamental value.

Underreaction is most likely to occur when fundamental news arrives that has important implications for the future cash flows of a stock. It is caused by the limited ability of most investors to access and process information, and by overconfidence that leads investors to cling to their original views even in the face of relevant new information (Daniel, Hirshleifer, and Subrahmanyam 1998). Rational arbitrageurs do respond to fundamental news, but they do not trade aggressively enough to drive prices all the way to the level that would be justified by fundamentals. Instead, on good news they drive the price up to a level at which it is still profitable to hold the stock, while on bad news they drive the price down to a level at which it is still profitable to short the stock. Over time, as all investors absorb fundamental news, the price adjusts fully to the news and this allows arbitrageurs to unwind their positions profitably. This story is consistent with the strong evidence for momentum in response to fundamental impulses such as earnings announcements or analysts' forecast revisions.

Overreaction is more likely to be associated with "soft" or qualitative information (Daniel and Titman 2004). Investors may for example place undue credence in stories about a "new era" of productivity growth or "Japan Inc." as a new economic model. Irrationality of this sort generates mispricing that can be exploited by value investors. It may also generate momentum in the short run if irrational investors respond gradually to soft information, if they copy each others' trades, or if they tend to buy stocks that have performed well recently. These behavior patterns are sometimes described as *herding*. Evidence on flows into mutual funds does suggest that individual investors are attracted to funds, fund categories, and fund families that have performed well recently, consistent with the herding hypothesis (Sirri and Tufano 1998).

There is less evidence that herding generates short-run momentum that eventually reverses. One suggestive piece of evidence is provided by Brunnermeier and Nagel (2004), who show that hedge funds rode the technology bubble through the late 1990's even after technology stocks became wildly overpriced on any conventional measure. These funds appeared to believe that positive short-term momentum would overcome poor long-term value, and their strategy was quite successful. Overall, however, the evidence for momentum generated by overreaction is weaker than the evidence for momentum generated by underreaction to fundamentals.

Refinements

The behavioral model of momentum has several further implications that researchers have tested and that quantitative investors can use to refine their momentum strategies. First, momentum should be stronger when fundamental news is less obvious and harder to analyze; for in this case irrational investors will be particularly likely to ignore the news, and only the most sophisticated arbitrage capital will be employed to exploit it. There is considerable evidence to support this prediction. Momentum is stronger in stocks that are hard to value, such as young stocks, small stocks, stocks that are covered by relatively few analysts, stocks with widely dispersed analyst earnings forecasts, and stocks with volatile returns and cash flows (Zhang 2004). Momentum is stronger when the fundamental news is bad and therefore not publicized by company management (Hong, Lim, and Stein 2000). Momentum is stronger when news comes out slowly over several months than when there is a large disclosure that is obvious even to inattentive investors (Grinblatt and Moskowitz 2004). Momentum effects exist not only within stocks but across stocks, particularly from large-cap and high-volume stocks to small-cap low-volume stocks, and from stocks in one industry to their suppliers and customers (Chordia and Swaminathan 2000, Lo and MacKinlay 1990, Menzly and Ozbas 2004).

Second, momentum should be stronger when other behavioral forces push in the same direction. Many individual taxable investors delay tax-loss selling until the end of the year. At the end of the year, therefore, they are particularly likely to sell poor performers and hold onto good performers; this effect strengthens momentum in December and weakens it in January (Grinblatt and Moskowitz 2004).

Third, momentum should be stronger when rational investors face high transactions costs in their arbitrage trading. During the 1990's, simple forms of momentum such as earnings momentum and post-earnings-announcement drift weakened in liquid markets such as the US and the UK (Johnson and Schwartz 2000), but remained stronger in less liquid international markets.

Finally, the behavioral model of momentum implies that rational arbitrageurs tend to buy stocks on good fundamental news, but tend to sell stocks when their prices rise in the absence of good fundamental news. This implication is hard to test since the portfolios of arbitrageurs are hard to observe, but recent research on the aggregate holdings of US institutional investors is consistent with this prediction (Cohen, Gompers, and Vuolteenaho 2003).

Pitfalls

Momentum investing can generate substantial profits, but it is important to implement momentum strategies with a due regard for the pitfalls. First, momentum trading increases turnover and thus cannot be profitably implemented in extremely illiquid stocks (Korajczyk and Sadka 2004). Second, monthly and weekly returns on individual stocks show a strong tendency to reverse rather than continue. This may result in part from immediate overreaction to some impulses, but it also reflects market illiquidity as stock prices bounce between bid and ask quotes. Third, stocks with extremely strong price momentum may well be overpriced stocks with poor value. Arrowstreet avoids these pitfalls by modelling stock-level reversals and reversals in the extremes; by exploiting momentum across countries, sectors, and country-sector baskets rather than just momentum in individual stocks; by trading off momentum characteristics against value characteristics in the return forecasting model; and by optimizing with a high sensitivity to transactions costs.

In the last twenty years simple momentum strategies have performed well on average but have been highly inconsistent, generating large profits in some years and losses in others. In the period 2000-2003, momentum performed relatively poorly. To some extent this is what one would expect given the strong returns to value in 2000-2002, because momentum profits are generally negatively correlated with value profits. In 2003, however, both momentum and value performed relatively poorly.

Despite this recent experience, Arrowstreet believes that momentum remains a worthwhile investment strategy. Declines in transactions costs may have weakened the momentum effect somewhat, and they may continue to do so in the future, but they also make it cheaper to exploit. The consistency of momentum profits can be improved by using fundamental information, not only within companies but across related companies, to measure the impulses that are most likely to escape the attention of individual investors and thus are most likely to generate consistent momentum. Much of Arrowstreet's current research effort seeks to use fundamental information to refine our momentum measures in this way.

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