Sentiment-based momentum strategy☆

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ABSTRACT

In this paper, we examine whether momentum profits can be predicted by sentiment and whether the momentum profit predictability is exploitable for investors. To this end, we use a novel approach by proposing a new momentum strategy that relies on the ability of sentiment to predict future momentum profits. We apply the new strategy to actual equity data and find that the new momentum strategy significantly outperforms the conventional momentum strategy. Our result more strongly supports the momentum profit predictability than usual linear predictive regressions suggest. We also present evidence that the outperformance of the new method over the conventional one is robust to various specification changes.

1. Introduction

A momentum strategy is a strategy to buy past winners and to sell past losers, among a cross section of assets, which is a bet on the ability of past returns to predict future returns. Academic literature has documented evidence that momentum profits are significantly positive and pervasive across multiple time periods, in many markets, and in numerous asset classes.[1] Momentum strategies are also widespread among practitioners (e.g., Grinblatt & Titman, 1989, 1993).

Several explanations have been offered for momentum profits, ranging from time-varying expected returns (e.g., Johnson, 2002) to rationales based on market frictions and investor psychology (Hong & Stein, 1999; Daniel, Hirshleifer, & Subrahmanyam, 1998). In particular, Hong and Stein (1999) argue that momentum can arise from an interplay between boundedly rational and heterogenous agents and slowly diffusive private information. As private information gradually diffuses among "newswatchers" who make forecasts based on private information but do not condition on current or past prices, there is underreaction that prices slowly adjust to new information. This underreaction, however, cannot be fully arbitraged away by "momentum traders" who can condition on past prices because they use simple strategies and do not condition on all public information. This

framework leads to "momentum cycle": while momentum traders earn profits shortly after news arrival, they lose money late in the cycle as prices have already overshot long-run equilibrium values.

Antoniou, Doukas, and Subrahmanyam (2013) recently extended Hong and Stein's (1999) argument by examining the relationship between momentum profits and sentiment and showed that the momentum strategy offers positive profits only when investor sentiment is optimistic. They argue that sentiment affects information diffusion due to "cognitive dissonance": newswatchers will underreact more strongly when they receive information that contradicts their sentiment. This implies that optimistic (pessimistic) sentiment will make bad (good) news among loser (winner) stocks diffuse slowly. Although this argument alone predicts symmetric momentum across sentiment periods, as a practical matter short selling of loser stocks is costly, which hampers arbitraging cognitive dissonance in optimistic sentiment state, and thus momentum may be more pronounced in that sentiment state.

Motivated by the sentiment-based argument about momentum profits, in this paper we examine whether sentiment helps to forecast momentum profits and whether the predictability of momentum profits is exploitable for investors. From Antoniou et al. (2013), we may infer that future momentum profits can be predicted by current sentiment state as information diffuses gradually and sentiment affects
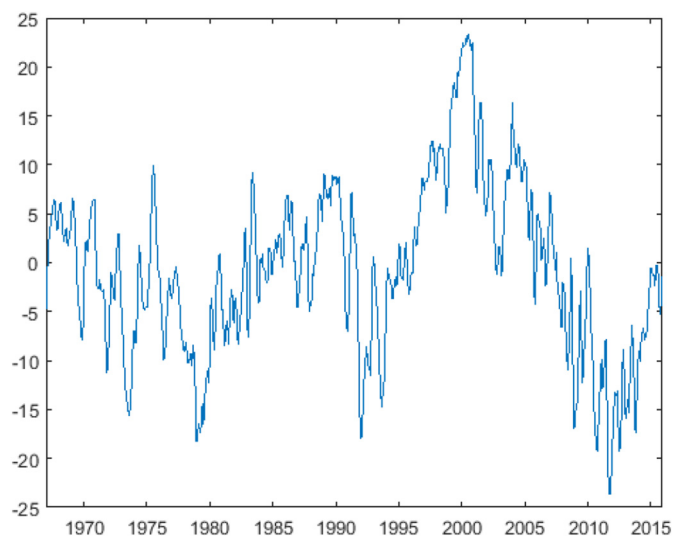
Fig. 1. Rolling-weighted sentiment index. This figure shows the time trend of the consumer sentiment index by the University of Michigan (MCSI) which is orthogonalized to six macro variables and rolling-weighted for the previous three months. Refer to the text for the detailed explanation about the index

information diffusion. While this momentum profit predictability has not been formally examined yet, this issue is important not only for offering another way to test the sentiment-based argument but also for providing profit opportunities exploitable for investors.

As a preliminary analysis, we conduct in-sample and out-of-sample linear predictive regressions of momentum profits on sentiment index and find that current sentiment can predict momentum profits only for a short horizon in the in-sample prediction. Moreover, in the out-of-sample prediction, current sentiment cannot predict momentum profits or possesses predictability only for a very short horizon. When we interpret this test result, we should notice that it is a joint hypothesis test as this test is based on a specific linear predictive regression model and thus subject to errors in modeling. One way to overcome this joint hypothesis test problem is to consider more sophisticated predictive regression models (e.g., Dangl & Halling, 2012 and Johannes, Korteweg, & Polson, 2014). In this paper, we depart from that approach and try to develop a new momentum strategy (called "sentiment-based" momentum strategy) that relies on the argument that sentiment affects momentum profits. By judging whether the new strategy offers higher momentum profits than the conventional momentum strategy, we can test both the sentiment-based argument and whether momentum profits can be predicted by sentiment. This approach has some advantages relative to the predictive regression approach. First, while the predictive regression approach is contaminated by arbitrary choices of predictor variables and regression model specification, the portfolio strategy approach is relatively free from these problems. Indeed, the new momentum strategy does not consider predictor variables other than sentiment and is an adjustment of the usual momentum strategy. Second, the new portfolio strategy approach offers profit opportunity exploitable for investors, and thus the relative profit gains can be interpreted as an economic value of momentum profit predictability. In contrast, the predictive regression approach can provide only statistical results about momentum profit predictability which is not immediately exploitable for investors.

We apply the new "sentiment-based" momentum strategy for U.S. individual stocks and find that the new strategy can offer significantly higher momentum profits than the conventional momentum strategy. We also consider alternative sentiment indexes, the effect of transaction costs on momentum profits, and market states. We find that the results are robust to various specification changes. Our result confirms not only the argument that sentiment affects momentum profits but also the conjecture that momentum

profits can be predicted by sentiment. Our result also deepens the puzzle related with momentum anomalies.

As our new strategy offers investors an effective way of enhancing momentum profits, our paper is related to literature that aims to improve momentum profits. For example, a double sort strategy combining momentum with reversal was examined in commodity futures contracts (Bianchi, Drew, & Fan, 2015) and in international equity market indices (Malin & Bornholt, 2013). Balvers and Wu (2006) parametrically combined momentum and mean reversion and applied it into international equity market indexes. Rachev, Jašić, Stoyanov, and Fabozzi (2007) and Choi, Kim, and Mitov (2015) modified the momentum strategy by sorting based on reward-risk measures. De Groot, Karstanje, and Zhou (2014) used term-structure information to implement momentum strategy in commodity futures contracts. Blitz, Huij, and Martens (2011) proposed sorting stocks according to their past residuals instead of gross returns to produce more stable momentum profits. Barroso and Santa-Clara (2015) and Daniel and Moskowitz (2016) proposed new momentum strategies to manage momentum crash risks. Our paper proposes a new way to use sentiment-based signals for improving momentum profits.

Our paper is also related to a large body of literature suggesting that investor sentiment and stock market returns are closely related.[2] Our result illustrates that sentiment is useful not only to explain momentum profits but also to improve momentum strategy. In a related paper, Cooper, Gutierrez, and Hameed (2004) suggest that investor biases will be more accentuated after market gains, and they show that momentum is profitable only after market increases. We also apply our new strategy into this relation between momentum profits and market states. We believe that this idea is also applicable to other sentiment-related anomalies.

The rest of this paper is organized as follows. Section 2 introduces the new "sentiment-based" momentum strategy and compares it with the usual momentum strategy. Section 3 explains the data to be used in our empirical analysis, provides linear predictive regression results about the predictive ability of sentiment on future momentum profits, and presents performance results of the new strategy relative to the conventional one. In Section 4, we provide results for some robustness checks and from additional analyses. We consider the effect of transaction costs on momentum profits, alternative sentiment indexes, market state, alternative cutoffs to identify sentiment states, momentum crashes, and long and short legs of momentum profits. Section 5 concludes the paper.

2. Methodology

2.1. Momentum portfolios

We follow the methodology of Jegadeesh and Titman (1993) to construct momentum portfolios. In each month t, we sort all stocks in ascending order based on their returns for the past J months (from $t - J - 1$ to $t - 2$). Note that month $t - 1$ is skipped to avoid microstructure biases by allowing one month between the end of the formation period and the beginning of the holding period. We use these sorts to form ten equal-weighted portfolios. The tenth decile ($P10$) is termed the "winners" portfolio, and the first decile ($P1$) is the "losers" portfolio. Every month, the momentum (MOM) strategy forms a long-short portfolio by going long in the winner portfolio and short in the loser portfolio. This long-short portfolio is held for K months. We construct overlapping portfolios by revising $1/K$ of the stocks; that is, we close the positions in the winner and loser portfolios initiated in month $t - K$, open those initiated in month $t - 1$, and carry over the

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[2] See, e.g., Kamstra, Kramer, and Levi (2000), Hirshleifer and Shumway (2003), Dowling and Lucey (2005), Edmans, Garcia, and Norli (2007), Bradley, Gonas, Highfield, and Roskelley (2009), Palomino, Renneboog, and Zhang (2009), Kaplanski and Levy (2010), Białkowski, Etebari, and Wisniewski (2012), and Chen, Chen, and Lee (2013).