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Time series momentum and volatility scaling☆

Abby Y. Kim [a], Yiuman Tse [b], John K. Wald [c,*]

[a] Securities and Exchange Commission, 100 F Street NE, Washington, DC 20549, USA
[b] Department of Finance and Legal Studies, College of Business Administration, University of Missouri – St. Louis, One University Blvd., St. Louis, MO 63121, USA
[c] Department of Finance, University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249, USA

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ABSTRACT

Moskowitz, Ooi, and Pedersen (2012) show that time series momentum delivers a large and significant alpha for a diversified portfolio of international futures contracts. We find that their results are largely driven by volatility-scaling returns (or the so-called risk parity approach to asset allocation) rather than by time series momentum. Without scaling by volatility, time series momentum and a buy-and-hold strategy offer similar cumulative returns, and their alphas are not significantly different. This similarity holds for most sectors and for a combined portfolio of futures contracts. Cross-sectional momentum also offers a higher (similar) alpha than unscaled (scaled) time series momentum.

1. Introduction

Moskowitz, Ooi, and Pedersen (2012, MOP henceforth) examine time series momentum (TSMOM) in the futures markets, where the TSMOM strategy is determined only by a security's own past returns. Specifically, the TSMOM strategy involves going long a particular security if it has positive returns in some prior period, and short the security if it has negative returns. MOP find that time

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* Corresponding author. Tel.: +1 210 458 6324.
E-mail addresses: kimay@sec.gov (A.Y. Kim), tseyi@umsl.edu (Y. Tse), john.wald@utsa.edu (J.K. Wald).

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series momentum returns are positive for every one of the 58 contracts they examine. They find that the alpha of a well-diversified futures portfolio with a TSMOM strategy yields an impressive excess return of more than 1% per month over the 1985–2009 period. These significant alphas are consistent with under-reaction stories, and MOP write, "Time series momentum represents one of the most direct tests of the random walk hypothesis and a number of prominent behavioral and rational asset pricing theories." Moreover, whereas prior findings on momentum returns in the stock markets indicate that momentum profits largely appear in the least liquid stocks (e.g., Keim, 2003; Korajczyk and Sadka, 2004; Lesmond, Schill, and Zhou, 2004), MOP find strong momentum returns in the relatively liquid futures market, and they find no correlation between their abnormal returns and measures of liquidity or sentiment.

We revisit the findings of MOP using 55 futures contracts over the 1985–2013 period. One special procedure used by MOP is that they scale the returns of the different futures contracts by a simple lagged estimate of volatility. In particular, an asset with a lower volatility will take a greater position size and have a higher weight in the portfolio. MOP use this procedure so that their returns are not dominated by a particular high-volatility sector. Using the same period as MOP, 1985–2009, and also volatility-scaling returns, we find similar results: a portfolio of 55 futures contracts based on the prior 12-month momentum provides an alpha of 1.08% per month.[1]

Using TSMOM, the alphas of the individual contracts are on average 1.08%, the same as the portfolio alpha. However, if we use unscaled, equal-weighted returns, the portfolio alpha and the average individual alpha drop to 0.39% and 0.40%, respectively. Without scaling, the portfolio alpha is similar in magnitude to (and statistically no different from) the alpha of the buy-and-hold position on the futures portfolio. In addition, similarly scaling a set of buy-and-hold positions also produces a higher alpha, 0.73% per month.

More specifically, MOP scale the volatility of each individual futures contract to correspond to the volatility of an average stock, therefore effectively leveraging the positions. The volatility scale used by MOP is similar to the so-called risk parity approach to asset allocation. A risk parity portfolio is an equally weighted portfolio, where the weights refer to risk (as proxied by MOP with ex ante volatility) rather than dollar amount invested in each asset (Kazemi, 2012). When we scale the futures contracts to a lower (higher) volatility, we obtain smaller (larger) alphas, and scaling the buy-and-hold strategy produces similar results.[2] Thus the magnitude of the TSMOM strategy appears to be largely due to leveraging a strategy that happened to have a positive alpha.

In order to verify that the difference between our results and those of MOP are not due to differences in volatility across sectors, we repeat this analysis for each of the four sectors for which we have futures contracts: commodities, bonds, equities, and currencies. We find that a volatility-scaled TSMOM strategy for the 1985–2009 period generates significant positive alphas for commodities, equities, and currencies; however, the volatility-scaled buy-and-hold strategy also generates significant positive alphas for these three sectors. The difference between a volatility-scaled TSMOM and a volatility-scaled buy-and-hold strategy is significantly different (at the 10% level) from zero only for the currency sector.

We then repeat this analysis considering instead the differences between the unscaled TSMOM and unscaled buy-and-hold strategies. The alphas from the TSMOM strategy are much smaller without volatility scaling for all sectors. Moreover, the unscaled TSMOM strategy does not significantly outperform the unscaled buy-and-hold strategy. Thus, the alphas from both the unscaled TSMOM and buy-and-hold strategies are often significantly greater than zero, suggesting that these futures contracts have generally positive alphas over this period regardless of trading strategy.

MOP also show that time series momentum profits are larger than those from the cross-sectional momentum (XSMOM) strategy of Jegadeesh and Titman (1993). In contrast, examining the foreign

[1] These alpha estimates are based on a seven-factor model that includes the MSCI World Index, the Fama-French and Carhart factors (SMB, HML, and UMD), a global commodity index, a bond index, and a currency index. Our conclusions are stronger if we use the four-factor model (MSCI World Index, SMB, HML, and UMD) reported by MOP.

[2] We refer to the strategy where we go long all of the futures contracts, but buy an amount that scales the expected volatility to the target as a volatility-scaled buy-and-hold position, as this captures the scaling procedure without the time series momentum aspect. However, this strategy is not a pure buy-and-hold as there is rebalancing over time.