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Combining momentum with reversal in commodity futures

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ABSTRACT

This paper examines profitable trading strategies that jointly exploit momentum and reversal signals in commodity futures. While the single-sort momentum strategies returns 11.14% per annum, on average, a consistent reversal pattern of momentum profits is pronounced from 12 to 30 months after portfolio formation. Combining the observed reversal pattern with the momentum signal, our double-sort strategy returns 20.24% per annum, which significantly outperforms single-sort strategies. The proposed strategy is robust to seasonality effects and sample adjustments in commodity futures. The profitability of the double-sort strategy cannot be explained by standard risk factors, term structure, market volatility, investor sentiment, data-mining or transaction costs, but appears to be related to global funding liquidity. As a consequence, the double-sort strategy in commodity futures may be employed as a portfolio diversification tool.

1. Introduction

Investments in commodities have become increasingly important due to their portfolio diversification benefits. Commodity returns are driven by factors that are very different from those affecting stocks and bonds, resulting in low correlations with traditional asset classes, and this helps reduce the overall risk associated with traditional portfolios (Bodie and Rosansky, 1980; Bodie, 1983; Ankrim and Hensel, 1993; Anson, 1999; Jensen et al., 2000, 2002; Erb and Harvey, 2006; Gorton and Rouwenhorst, 2006; You and Daigler, 2010). Furthermore, these studies estimate the annualized rate of return of a long-only commodity futures portfolio at 10% to 14% per annum (depending on the sample period) which delivers mean returns similar to those of stocks. As a result, an unprecedented amount of capital has flowed into commodities investments during the 2005–2008 period (referred to by the media, World Bank and IMF as the 'Commodity Investment Boom').[1]

Investors not only allocate capital to commodities over the long term, but studies by Fung and Hsieh (2001) and Spurgin (1999) show that alternative investment managers employ trend-following strategies in these markets. The idea of return continuation in commodities has led to the development of momentum studies in this literature. A limited number of momentum studies, including Miffre and Rallis (2007, MR thereafter) and Shen et al. (2007), focus specifically on commodity futures. MR show that momentum strategies generate an average return of 9.38% per annum and conclude that the profitability of momentum strategies is not a compensation for bearing risks but appears to be related to commodity term structure information. Shen et al. (2007) present supporting evidence; however, they argue that commodity momentum is more consistent with investor overreaction. Given the importance of commodities in the investment management industry, the lack of research attention given to commodity futures presents a major limitation to our understanding of momentum in these markets.

This study examines profitable trading strategies that jointly exploit momentum and reversal signals in commodity futures. The single-sort momentum strategies, on average, return 11.14% per annum. However, for the first time in the commodities literature, we document a consistent reversal pattern of momentum profits from 12 to 30 months after portfolio formation. By jointly combining the observed reversal effects and the momentum signal, our novel double-sort strategy returns 20.24% per annum,

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[1] From 2003 to 2010, commodity related institutional investments have grown from less than $20 billion to more than $250 billion according to a Barclays Capital survey of over 250 institutional investors. Moreover, AUM (assets under management) for managed futures and CTAs has grown from $45 billion to $334 billion in the period of 2002–2012 (see http://www.barclayhedge.com/).

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significantly outperforming the single-sort strategies. The profitability of the double-sort strategy cannot be explained by standard asset pricing factors, market volatility, investor sentiment, data-mining, transaction costs or commodities seasonality, but appears to be related to global funding liquidity.

This study makes three major contributions to the literature. First, our extensive post-holding analysis reveals that commodity momentum profits consistently reverse from 12 to 30 months after portfolio formation and trend back up again from 30 to 60 months. The findings imply that commodity momentum may be better explained in behavioral terms, but the market correction for overreaction (i.e. reversal) in commodity futures is more rapid than in the equities market, which typically takes up to five years after portfolio formation.[2] However, the profit accumulation from 30 to 60 months also implies that commodity momentum is uniquely distinctive from that of the equities market.[3]

Second, we document that allocating wealth tactically towards *medium-term winner but long-term loser* commodities and *medium-term loser but long-term winner* commodities generates economic and statistically significant profits. The double-sort strategy substantially outperforms the single-sort strategies on a risk-adjusted basis. Furthermore, the low correlations between returns from double-sort strategies and those of traditional investments (stocks, bonds and currencies) suggest that the proposed strategy can be an important tool in portfolio diversification. Third, we demonstrate that global funding liquidity risk plays a vital role when momentum and reversal are being examined in a unified framework. The factor loadings in our study reveal that returns from the proposed strategy exhibit little exposure to standard risk factors, slope of term structure, market volatility and investor sentiment. However, the evidence suggests that the profitability of the combined strategy is at least partially related to global funding liquidity. A decomposition of returns reveals that the interactions between momentum and reversal exhibit a link with extreme global liquidity events.[4]

Our study is also related to two strands of literature. First, the apparent profitability of the single-sort momentum and double-sort momentum/reversal strategy presents challenges to the random walk hypothesis, which asserts that past price movements do not indicate any form of future directions in price. Stevenson and Bear (1970), Cargill and Rausser (1975), Leuthold (1972) and Cochrane (1999) demonstrate that commodity futures prices do not follow random walks, and that profitable trading rules may be applied to exploit predictable price patterns in these markets. Our findings complement this literature by demonstrating that profitable trading strategies can be developed using past commodity prices. While the random walk hypothesis is clearly rejected, the findings do not suggest the rejection of the more complex efficient market hypothesis (Fama, 1970). Although the profitability of the proposed strategy is unrelated to standard asset pricing factors, market volatility and sentiment, we cannot rule out the existence of an alternative risk-based framework that the literature has not identified to explain the findings. Second, our finding that cross-sectional commodity momentum is similar to equity momentum premium is related to recent studies (Novy-Marx, 2012; Moskowitz et al., 2012; Asness et al., 2013) which present evidence that momentum exists in all major asset classes. Asness et al. (2013) also show that despite the very different market mechanisms, momentum and value seem to carry a common component across asset classes. In this study, we demonstrate that single-sort commodity momentum is indeed related to the momentum anomaly in the U.S. stock market.

The reminder of the paper proceeds as follows. Section 2 provides a description of the data sources. Section 3 reports the detailed performance of single-sort momentum strategies, post-formation analysis and the reversal signal unique to the commodity futures market. Section 4 provides a detailed description of the construction of double-sort strategies, followed by discussions on strategy performance, robustness checks, factor loadings, transaction costs and diversification benefits. The paper provides concluding remarks in Section 5.

2. Data

This study employs data from the constituents of the S&P GSCI (*Standard and Poor's Goldman Sachs Commodity Index*) and DJ-UBSCI (*Dow-Jones UBS Commodity Index*). The data on the GSCI constituents are available from December 1969 (January 1991 in the case of UBS).[5] However, in the early part of the sample, a very limited number of commodities were traded with sufficient liquidity. To maintain a reasonable level of volatility, we require at least three commodities to be traded in both long and short portfolios. As a result, the sample period for the S&P GSCI and DJ-UBSUBS data is January 1977 to December 2011 and January 1991 to December 2011, respectively. For these two periods, we obtain daily excess returns of 27 GSCI and 26 UBS commodity futures price time series. The end-of-month prices are used to construct the aggregated monthly time-series price. The GSCI data are obtained from *Datastream International* and the UBS data are sourced from *Bloomberg*.[6]

While the use of Datastream and Bloomberg is common in the commodity futures literature, the specific use of the GSCI and UBS individual futures data is limited. Because of contract maturity reasons, prior momentum studies have employed raw futures contracts to compile the continuous time-series price. To achieve this, the nearest or the next nearest futures contract is often selected to be the 'roll' contract. Thus, when a futures contract expires, the

[2] Another possible explanation of the observed reversal pattern may lie within the term structure of commodity futures. MR conclude that momentum strategies buy backwardated contracts and short sell contangoed contracts and conjecture that 'commodity futures markets do not switch over horizons of 2–5 years from backwardation to contango (or conversely)'. The conclusion of MR does not rule out the possibility that the switches could take place more quickly within 2 years.

[3] Shen et al. (2007, p.253) also show similar findings despite that their analysis focuses only on one ranking period (2-month) and the first 30 months of the standard 60-month post-formation period. Thus, we argue that the findings of Shen et al. (2007) are ambiguous and potentially incomplete.

[4] Asness et al. (2013) show that momentum (value) is positively (negatively) related to liquidity risk *only* when these strategies are formed globally across asset classes. Moreover, a global multi-asset class momentum and value combination strategy is related to global liquidity risk. Our finding that single-sort momentum is not related to liquidity is consistent with Asness et al. (2013) as we focus only on commodity futures. Since the reversal/contrarian signal in this study closely resembles the value strategy implemented by Asness et al. (2013), our results reinforce their findings, given that the double-sort momentum and reversal strategy in commodity futures is related to global funding liquidity effects.

[5] The S&P GSCI and its constituents were first launched in 1991 (UBS from 1998). Prior data were back calculated by S&P and Dow Jones.

[6] Compared to stocks, commodity markets exhibit three key advantages for the study of momentum. First, the trading costs of futures contracts are much lower than those of stocks. Lesmond et al. (2004) estimate a cost of 2.3% per trade, and Jegadeesh and Titman (1993) use a more conservative 0.5% per trade in the equities market. However, as Locke and Venkatesh (1997) and Marshall et al. (2012) show, transaction costs in futures markets range from 0.0004% to 0.033% per trade. Second, short selling in the equities market is often subject to special constraints. In commodity futures, however, there are no such constraints to prevent the short-selling of commodities. Third, momentum strategies in the equities market require the purchase and sale of a large number of stocks across the entire market (or a segment of the market) which puts pressure on the net profit of momentum trades (Korajczyk and Sadka, 2004). Compared to the tens of thousands of stocks, the cross-sectional size of commodity futures is only a tiny fraction of the stock market, thus the trading intensity necessary for commodity momentum strategies is reduced.