Journal of Banking & Finance 34 (2010) 2530–2548

Contents lists available at ScienceDirect

Journal of Banking & Finance

journal homepage: www.elsevier.com/locate/jbf

Tactical allocation in commodity futures markets: Combining momentum and term structure signals

Ana-Maria Fuertes [a], Joëlle Miffre [b,*], Georgios Rallis [a]

[a] Cass Business School, City University, London, UK
[b] EDHEC Business School, Nice, France

ARTICLE INFO

Article history:
Received 1 October 2008
Accepted 19 April 2010
Available online 24 April 2010

JEL classification:
G13
G14

Keywords:
Commodity futures
Momentum
Term structure
Double-sort strategy

ABSTRACT

This paper examines the combined role of momentum and term structure signals for the design of profitable trading strategies in commodity futures markets. With significant annualized alphas of 10.14% and 12.66%, respectively, the momentum and term structure strategies appear profitable when implemented individually. With an abnormal return of 21.02%, our double-sort strategy that exploits both momentum and term structure signals clearly outperforms the single-sort strategies. This double-sort strategy can additionally be utilized as a portfolio diversification tool. The abnormal performance of the combined portfolios cannot be explained by a lack of liquidity, data mining or transaction costs.

1. Introduction

Commodity futures have become widespread investment vehicles among traditional and alternative asset managers. They are now commonly used for strategic and tactical asset allocations. The strategic appeal of commodity indices comes from their equity-like return, their inflation-hedging properties and their role for risk diversification (Bodie and Rosansky, 1980; Erb and Harvey, 2006; Gorton and Rouwenhorst, 2006; Chong and Miffre, 2010; Baur and McDermott, 2010). Recent research has also established that commodity futures can be used to generate abnormal returns. For example, Erb and Harvey (2006) exploit the term structure signals of 12 commodities and implement a simple long-short strategy that buys the six most backwardated commodities and shorts the six most contangoed commodities. In a similar vein, Erb and Harvey (2006) and Miffre and Rallis (2007) follow momentum signals and tactically allocate wealth towards the best performing commodities and away from the worst performing ones. These simple active strategies have been shown to be capable of generating attractive returns.[1]

This paper digs deeper into the tactical opportunities of commodity futures by introducing an active double-sort strategy that combines momentum and term structure signals. This novel strategy aims at consistently buying the backwardated winners whose prices are expected to appreciate, and shorting the contangoed losers whose prices are expected to depreciate. While doing this, we expand on the term structure-only (hereafter, TS-only) strategy of Erb and Harvey (2006) by assessing the sensitivity of the TS profits to the roll-return definition, the frequency of rebalancing of the long-short portfolios and the date of portfolio formation. We also provide an in-depth analysis of the risk, performance and trading costs of the single-sort (momentum-only and TS-only) and double-sort portfolios.

Three contributions to the empirical literature on commodity futures markets are worth noting. First, we show that combining the momentum and term structure signals enhances the abnormal performance of either of the individual single-sort strategies. On a yearly basis, while the profitable momentum-only and TS-only strategies earn on average an abnormal return of 10.14% and 12.66%, respectively, the combined double-sort strategies, with an average annualized alpha of 21.02%, clearly provide the best signal on which to allocate wealth. A robustness analysis suggests that the superior profits of the double-sort strategies are not an artifact of lack of liquidity or data mining, and are robust to alternative specifications of the risk-return relationship. They are also robust to the high level of volatility experienced since January

* Corresponding author. Tel.: +33 (0)4 93 18 32 55; fax: +33 (0)4 93 83 08 10.
E-mail addresses: A.Fuertes@city.ac.uk (A.-M. Fuertes), Joelle.Miffre@edhec.edu (J. Miffre), g.rallis@city.ac.uk (G. Rallis).

[1] Other references on active management in commodity markets include Jensen et al. (2002), Wang and Yu (2004), Marshall et al. (2008), Szakmary et al. (2010).

0378-4266/$ - see front matter © 2010 Elsevier B.V. All rights reserved.
doi:10.1016/j.jbankfin.2010.04.009

2007. Second, the new commodity-based relative-strength portfolios emerge as excellent candidates for inclusion in well-diversified portfolios given the very low correlations between their returns and those of traditional asset classes. Hence, commodity futures may be tactically added to the asset mix of institutional investors not exclusively to earn abnormal returns but also to diversify the total risk of their global equity and/or fixed-income portfolios. Third, the proposed double-sort strategies are implemented on a small cross-section of contracts that are cheap to trade, liquid and easy to sell short. Net of reasonable transaction costs, they still generate a yearly net alpha of 20.41% on average.

The article proceeds as follows. Section 2 presents the dataset. Sections 3 and 4 analyze the profits of the individual momentum strategies and term structure strategies, while Section 5 studies the performance of strategies that jointly exploit momentum and term structure signals. Section 6 provides robustness checks and Section 7 concludes.

2. Data

The dataset from *Datastream International* and *Bloomberg* spans the period January 1, 1979 to January 31, 2007. It consists of the daily closing prices on the nearby, second-nearby and distant contracts of 37 commodities: 13 agricultural futures (cocoa, coffee, corn, cotton, oats, orange juice, soybean meal, soybean oil, soybeans, sugar, wheat Kansas City, wheat CBOT, white wheat), 4 livestock futures (feeder cattle, frozen pork bellies, lean hogs, live cattle), 10 metal futures (aluminum, copper, gold, lead, nickel, palladium, platinum, silver, tin, zinc), 6 energy futures (Brent crude oil, crude oil, gas oil, heating oil, natural gas, unleaded gasoline), the futures on milk and lumber and two non-overlapping diammonium phosphate contracts. To avoid survivorship bias, we include contracts that started trading after January 1979 or were delisted before January 2007. The total sample size ranges from a low of 22 contracts at the beginning of the sample period to a peak of 35 contracts from July 1997 onwards.

This study investigates the sensitivity of the TS profits to the date at which futures returns are measured. Two approaches are used to compile time series of futures returns. First, we assume that we hold the nearby contract up to the month prior to maturity. At the end of that month (EOM hereafter), we roll our position over to the second nearest-to-maturity contract and hold that contract up to one month prior to maturity. The procedure is then rolled forward to the next set of nearest and second nearest contracts when a new sequence of futures prices is compiled. Second, we repeat this approach but, this time, the roll date is set to the 15th of the maturity month (15M hereafter) if the contract is traded on that day or to the 15th of the month prior to maturity otherwise. In both cases, futures returns are computed as the percentage change of the closing prices. Note that the rolling procedure used ensures that problems related to lack of liquidity are kept to a minimum since the nearest or second-nearest contracts are always used in the returns calculation.

Investors earn a total return on a fully-collateralized position in futures markets equal to the sum of the collateral return (e.g. treasury-bill rate earned on the notional amount of the futures contract) and the futures return (i.e. percentage change in the futures price).[2] We assume therefore that investors hold unlevered positions in futures markets. Our long and short active strategies examined in isolation are fully collateralized. By construction, our combined long-short active strategies are therefore 50% collateralized.[3] The leverage is kept constant over time and the strategies are marked to market daily. Our combined long-short strategies could become fully collateralized if half of the trading capital was invested in the strategies and the rest held as collateral. The advantages of assuming fully-collateralized positions are twofold. First, the collateral can be used to pay for any margin calls and thus there should not be any liquidation of the futures positions before the end of the holding period because of a margin call. As liquid assets are available if and when needed, the unlevered positions have the merit of bearing little to no liquidity risk. Second, the single and double-sort strategies will generate a total return that includes not only the futures returns reported below (in Sections 3 to 6), but also the return earned on the collateral in excess of any margin call. This article only reports the excess return of the active strategies and thus under-estimates the total performance of the active portfolios by an amount equal to the collateral return (minus any margin call).

3. Single-sort strategies based on momentum

3.1. Methodology

A growing literature establishes that momentum strategies generate significant abnormal returns in equity markets (Jegadeesh and Titman, 1993, 2001).[4] In a recent paper, Miffre and Rallis (2007) extend this finding to futures markets. This paper follows the same approach and, accordingly, at the end of each month futures contracts are sorted into quintiles based on their average return over the previous R months (ranking period). The futures contracts in each quintile are equally weighted. The performance of both the top (winner) and bottom (loser) quintiles is monitored over the subsequent H months (holding period). The resulting R–H momentum strategy buys the winner portfolio, shorts the loser portfolio and holds the long-short position for H months.

Following Moskowitz and Grinblatt (1999), Jegadeesh and Titman (2001) and Miffre and Rallis (2007) *inter alia*, the relative-strength portfolios are overlapping. For instance, with the 6–3 momentum strategy, the winner portfolio in, say, December is constructed by equally-weighting the top three quintile portfolios that were formed at the end of September (using March–August returns), October (using April–September returns) and November (using May–October returns). Hence, its December return is equal to the average return of those three overlapping portfolios. Likewise for the loser portfolio but with reference to the bottom three quintile portfolios. The return of the momentum strategy is then defined as the difference in the December returns of the winner and loser portfolios. Therefore an R–H momentum strategy implies forming portfolios at two distinct levels: at the end of each month individual commodity futures contracts are sorted into a winner (top quintile) portfolio and a loser (bottom quintile) portfolio based on the returns over the previous R months; then, effectively, at any point in time (month t) an equally-weighted portfolio is held (shorted) that combines the H overlapping winner (loser) portfolios formed at the end of months $t-1, t-2, \ldots, t-H$. This procedure is rolled forward monthly.

[2] In line with the asset pricing literature, the futures return is often called 'excess return' as the collateral return is taken out of the total return to calculate the futures return.

[3] In line with Gorton and Rouwenhorst (2006), the returns of the combined long-short strategies have been computed by subtracting the returns of the shorts from the returns of the longs. In futures markets this implies a gross exposure that is double that of our trading capital.

[4] The profitability of momentum strategies has been shown to be related to different factors such as, for example, behavioral biases, industry effect, the business cycle, liquidity risk, trading costs, or time-varying unsystematic risk (Barberis et al., 1998; Daniel et al., 1998; Hong and Stein, 1999; Moskowitz and Grinblatt, 1999; Chordia and Shivakumar, 2002; Lesmond et al., 2004; Sadka, 2006; Li et al., 2008).