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Trend following, risk parity and momentum in commodity futures

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ABSTRACT

We show that combining momentum and trend following strategies for individual commodity futures can lead to portfolios which offer attractive risk adjusted returns which are superior to simple momentum strategies; when we expose these returns to a wide array of sources of systematic risk we find that robust alpha survives. Experimenting with risk parity portfolio weightings has limited impact on our results though in particular is beneficial to long–short strategies; the marginal impact of applying trend following methods far outweighs momentum and risk parity adjustments in terms of risk-adjusted returns and limiting downside risk. Overall this leads to an attractive strategy for investing in commodity futures and emphasises the importance of trend following as an investment strategy in the commodity futures context.

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1. Introduction

The benefits of investing in commodities as an asset class both as a portfolio diversifier and as an inflation hedge have been increasingly of interest to academics and investors especially since the wide-ranging study by Gorton and Rouwenhorst (2006). However, investment in commodities is not straightforward and is generally accessed in financial markets by liquid futures' contracts traded on organised exchanges. In this paper we contribute to the growing evidence that applying a trend following investment strategy to a variety of asset classes leads to enhanced risk adjusted returns. In particular we show that combining momentum and trend following strategies for individual commodity futures can lead to portfolios which offer attractive risk adjusted returns; when we expose these returns to a wide array of sources of systematic risk we find that robust alpha survives. Experimenting with risk parity portfolio weightings has limited impact on our results though it is beneficial to long–short strategies; the marginal benefit of applying trend following methods far outweighs momentum and risk parity adjustments in terms of risk-adjusted returns and limiting downside risk.

Momentum strategies involve ranking assets based on their past return (often the previous twelve months) and then buying the winners and selling the losers. Momentum is one anomaly in the financial literature that has been demonstrated to offer enhanced future returns. Many studies since Jegadeesh and Titman (1993) have focussed on momentum at the individual stock level. More recently Asness, Moskowitz, and Pedersen (2013) find momentum effects within a wide variety of asset classes. In terms of commodity futures, Miffre and Rallis (2007) and Erb and Harvey (2006) were amongst the first to show that momentum strategies earn significant positive excess returns. The purpose of this paper is to show how a momentum strategy for commodity futures which also employs a trend following overlay can significantly enhance investment performance relative to both long only and long–short momentum strategies.

Trend following has been widely used in futures markets, particularly commodities, for many decades (see Ostgaard, 2008). Trading signals can be generated by a variety of methods such as moving average crossovers and breakouts with the aim of determining the trend in prices. Long positions are adopted when the trend is positive and short positions, or cash, are taken when the trend is negative. As trend following is generally rule-based it can aid investors since losses are mechanically cut short and winners left to run. This is frequently the reverse of investors' natural instincts. The return on cash (in this case the 3-month US Treasury Bill rate) is also an important factor either as collateral in futures or as the risk-off asset for long-only methods. Examples of the effectiveness of trend following for commodity futures, amongst others, are Szakmary, Shen, and Sharma

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(2010) and Hurst, Johnson, and Ooi (2010); Hurst, Ooi, and Pedersen (2010). As with momentum strategies, much of the research is focussed on equities with Wilcox and Crittenden (2005) and ap Gwilym, Clare, Seaton, and Thomas (2010) as examples. Recent attempts at explaining the success of trend following include Faber (2007) who uses trend following as a means of tactical asset allocation and demonstrates that it is possible to form a portfolio that has equity-level returns with bond-level volatility. Ilmanen (2011) offers a variety of explanations as to why trend following may have been successful historically, including investor under-reaction to news and herding behaviour.

A few studies have sought to combine the momentum and trend-following strategies in equities. Faber (2010) examines momentum and a form of trend following in equity sector investing in the United States. Antonacci (2012) analyses the returns from momentum trading of pairs of investments and then applies a quasi-trend following filter to ensure that the winners have exhibited positive returns. This is based on the argument that extreme (positive) past returns or volatility should be taken account of in identifying a risk factor to increase momentum profitability. Past positive performance of individual assets is a good signal for future returns. The risk-adjusted performance of these approaches appears to be a significant improvement on benchmark buy-and-hold portfolios. Bandarchuk and Hilscher (2013) present a similar strategy arguing that many of the characteristics that have been identified as being correlated with, or explanations for, the presence of enhanced momentum profits are just related to extreme past returns. Conditioning on this effect, they find no role for characteristics such as book to market (Sagi & Seasholes, 2007), forecast dispersion (Verardo, 2009) and credit rating (Avramov, Chordia, Jostova, & Philipov, 2007) in raising momentum profitability. In this paper we direct attention to the ability of a trend following rule to enhance momentum profitability in commodity futures.

Behavioural and rational asset pricing explanations for momentum and trend following have been offered in the literature. Hong and Stein (1999) is representative of behavioural approaches which could generate momentum or trend following behaviour whilst Sagi and Seasholes (2007) examines trend behaviour in single risky assets which could be applicable to the construction of a momentum portfolio.

Momentum studies for a range of markets typically weight equally all assets chosen in the winners (or losers) portfolio. Following Ilmanen (2011), we argue that this is not the ideal approach, especially in the case of commodity futures, and that investors would be better served by volatility weighting past returns. Failing to do this leads to the most volatile assets spending a disproportionate amount of time in the highest and lowest momentum portfolios. Finally, in this paper we also examine how risk parity weighting affects strategy performance.

Section 2 contains a description of our data whilst in Section 3 we examine the role of momentum and trend following investment strategies along with different portfolio formation techniques using both risk parity and equal weighting portfolio construction methods; Section 4 presents the empirical results for applying these methods to our commodities data whilst in Section 5 we control for both transactions' costs and explore sources of systematic risk which may be present in our analysis. Section 6 concludes.

2. Data and methods

The commodity futures data examined in this paper are the full set of 28 DJ-UBS commodity excess return indices. These returns series are inclusive of spot and roll gains but assume no returns on collateral put up.[1] We choose these assets since they are all easily and actively traded through commodity Exchange Traded Funds (ETF or CETF) on stock markets around the world. The Commodity Futures Trading Commission (CFTC) estimates the size of the overall commodity index market, consisting of trading in the individual commodity futures that we analyse and the overall liquidity-weighted indices such as the DJ-UBS CI, at over $200bn, worldwide.[2] The long-term time series of futures return indices that we analyse are created following common practice by rolling adjacent individual futures contracts between monthly returns observations. The rolling together of the underlying futures contracts to form an index return follows transparent, public and fixed rules. In the DJ-UBS case the adjacent futures contracts are rolled together proportionally over trading days 5 to 9 in the relevant month, increasing the weight of the new contract in the return index by 20% per day. This smoothing dilutes the impact of choosing any particular day of the month to roll a contract and hence leads to a more robust measure of underlying return on the contracts.[3] Alternative versions of this rolling method are employed by Gorton and Rouwenhorst (2006) and Asness et al. (2013) where they focus on higher frequency data but perform monthly rolls of contracts. A further issue is whether the fully publicised 'rolling' rules impact the futures' contract returns. Stoll and Whaley (2010, p 65) state categorically that their estimates show that 'Commodity index rolls have little futures price impact, and inflows and outflows from commodity index investment do not cause futures prices to change' Stoll and Whaley (2010), Basak and Palova (2013), Irwin (2013) and Hamilton and Wu (2013), amongst others, examine the relationship between commodity index trading and futures contract prices with a major question relating to the merits of the hypothesised impact of the 'financialisation of commodities', i.e. does the volume of investing in commodities via indices lead to destabilising behaviour for the underlying futures prices? The evidence from these papers is that they find no causal relationship.[4] We focus our empirical analysis on the investment properties of the returns to the individual DJ-UBS indices as an investable portfolio strategy.

The full data period runs from January 1991 to June 2011. The period of study is 1992–2011 with all observations being monthly data. The first year of data is used to calculate trend-following signals and momentum rankings. Throughout the paper all values are total returns (unless specified) and are in US dollars.

The 28 commodities are:

Aluminium	Heating oil	Soybean oil	Platinum
Coffee	Lean hogs	Sugar	Tin
Copper	Live cattle	Unleaded gas	Brent crude
Corn	Natural gas	Wheat	Feeder cattle
Cotton	Nickel	Zinc	Gas oil
Crude oil	Silver	Cocoa	Orange juice
Gold	Soybean	Lead	Soybean meal

A summary of the properties of the returns series is shown in Table 1. The spread of variability and return is notable with some commodities such as natural gas and coffee showing a volatility of returns substantially higher than others, along with severe drawdowns and often negative risk-adjusted returns. The Sharpe ratios are generally unattractive as individual asset investments. There is also clear evidence of non-normality in returns.

3. Investment strategies in commodity futures: portfolio weighting, momentum and trend following

We begin by reviewing two key aspects of portfolio formation for commodity futures, namely the justification for using trend following

[1] A full description of the construction of the indices can be found in Dow-Jones (2012) and at http://www.djindexes.com/commodity/.

[2] An example of a provider of commodity ETF's based on the indices analysed in this paper is ETF Securities, http://www.etfsecurities.com/institutional/uk/en-gb/products.aspx.

[3] An explanation of the practical issues involved in rolling returns can be found at http://www.followingthetrend.com/futures-charts/futures-data-adjustments/.

[4] These studies mostly focus on the impact of trading a commodity index constructed from a number of individual commodity return indices. We treat each commodity separately.

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