ARC
Asset Risk Company

Pairs Trades Based on ARC Commodity Factor Model

Equity factor models are widely used in the financial industry for risk and portfolio construction. But in the early days, before a crowding effect, factor models like APT and Barra could be used for statistical arbitrage. After building the first commercial commodity factor model we wanted to see if history would repeat itself in the commodity world. We find there is much to suggest that it does!

As a disclaimer we are not selling a strategy. ARC is a model vendor. We are taking this opportunity to highlight one of many applications of our commodity factor model. We will show that we can detect a fairly high number of pairs on a daily basis for which we see a (theoretically) profitable opportunity to trade. These trades can be used in a systematic way or as a complement to an existing process, be it quantitative or quantamental.

How are the pairs selected?

The model contains 50 of the most traded commodity products with approximately 1,200 futures in total over all maturities. All futures in the model have exposures to sectors and sub-sectors (1 or 0), and z scores (between -3, and 3) to style factors such as basis, momentum, open interest, volatility. The model is estimated daily with 20 years of history.

A soybean contract and a corn contract with maturity in September will have exposures of 1 to Agriculture and Grain & Oilseeds. They will also have exposures (or z-scores) to our 7 styles factors. Finally they will each have an idiosyncratic return/risk. This is the clear advantage of a factor model since each asset is represented with respect to the same “axis” of factors. A factor model allows for a quick comparison between assets.

We then calculate a measure of the “distance” between pairs. It is the square root of the sum of the square of the difference of exposures. Intuitively we see that calendar spreads and pairs from the same sectors (inter) will tend to be selected. Each day when

we release the daily model (morning US Eastern time), we select the top five with the smallest distance. We impose that each leg of the pair (contract + maturity) has open interest greater than 100.

How is a trade initiated?

Once a pair is selected we compute the one year time series of historial idiosyncratic returns of the pairs. We standardize the times series and look at the value of the idiosyncratic return of the pair of the day (long minus short). If the relative return is larger in absolute value than 1, we initiate a trade. Depending on the sign we select the long/short legs of the trade. Trades are closed if an opposite signal happens later, or closed after 5 days.

Analysis of all the trades:

We compute daily a P&L of the trades. We do not compute fees or slippage. Though the trades are provided in the morning US time we used settlement prices to compute P&L, so “handicapping” the program.

We ran the program from 2000 to August 2021. A total of 312 pairs were traded, 28 of them calendar spreads. There were 572,000 trades in total or 10 trades on average per day.

For the period 2001/2021, we observe the following:

- Sharpe ratio of 0.78 for all pairs vs 0.86 excluding calendar spreads.
- 15 positive years for all pairs vs 16 years excluding calendar spreads

We do not anticipate actual trading on 310 pairs, but it is noticeable that a positive signal comes out of the program. The thrust of this report is that practitioners could use signals on specific pairs as an add-on to their existing process.

Out of sample test:

Though the previous analysis was done using “actual trades” and not selected ex-post, we are often asked about out of sample tests. In this spirit we decided to look at the data over a fairly long period of time (2001 to 2016), so as to capture different regimes, and rank the pairs by their number of trades. We did not select by returns, risk or Sharpe. Some of the pairs do trade lightly. So we put a threshold at 1000 trades minimum over 16 years. We then look at the results over the next 5 years.

For all the pairs selected between 2001-2016 with more than 1000 trades (67 pairs with calendar spreads and 38 without), we observe the following for the period 2017/2021:

- Sharpe ratio of 1.2 for all pairs vs 1.6 without the calendar spreads
- Positive each year for both for pairs with and without calendar spreads

Once again we do not recommend a strategy here, but want to highlight the potential for signals to be used.

Data is available upon request at info@assetriskcompany.com