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Trading futures spread portfolios: applications of higher order and recurrent networks

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Abstract

This paper investigates the modelling and trading of oil futures spreads in the context of a portfolio of contracts. A portfolio of six spreads is constructed and each spread forecasted using a variety of modelling techniques, namely, a cointegration fair value model and three different types of neural network (NN), such as multi-layer perceptron (MLP), recurrent, and higher order NN models. In addition, a number of trading filters are employed to further improve the trading statistics of the models. Three different filters are optimized on an in-sample measure of down side risk-adjusted return, and these are then fixed out-of-sample. The filters employed are the threshold filter, correlation filter, and the transitive filter. The results show that the best in-sample model is the MLP with a transitive filter. This model is the best performer out-of-sample and also returns good out-of-sample statistics.

Keywords:

futures spreads | cointegration | trading filters | higher order networks | recurrent networks

Notes

1. See, for example, Tucker (2000) and Ross (2003).

2. See, for example, Girma and Paulson (1998) and Salcedo (2004a, 2004b).

3. See, for example, MacKinlay and Ramaswamy (1988), Yadav and Pope (1990), Chung (1991), and among others.

4. Notable exceptions include Billingsley and Chance (1988), Board and Sutcliffe (1996), Butterworth and Holmes (2002), and Butterworth and Holmes (2003).

5. Leg_1 being the first contract under consideration.

6. Leg_2 being the second contract under consideration.

7. NYMEX Europe has traded the Brent crude oil contracts since September 2005.

8. It has been decided that for ease of calculation, any round turn commission (~0.03%) be ignored.

9. Associative recall is the act of associating two seemingly unrelated entities, such as smell and colour. For more information, see Karayiannis and Venetsanopoulos (1994).

10. Unfiltered – is the model statistics without the application of a filter; Threshold – is the model statistics with the application of the threshold filter, optimized in-sample; Correlation – is the model statistics with the application of the correlation filter, optimized in-sample; Transitive – is the model statistics with the application of the transitive filter, optimized in-sample; Ann. Return – is the annualized percentage returns of the model inclusive of transactions costs; Ann. Stdev – is the annualized standard deviation of returns of the model; Max DD – is the maximum drawdown of the model; Calmar Ratio – is the Calmar ratio of the model as calculated with Equation (2); Ann. Trades – is the annualized round trip trades of the model, per contract.

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