**“Oil Trading & Temperature Dispersion”**

A research funded by the Undergraduate Research Support Scheme at the University of Warwick

Student researcher: Bogdan-Remus Pintilie

Supervisor: Prof.

Repository:

September 2024

© Bogdan-Remus Pintilie, 2024

I used OpenWeather’s API to request data on the temperature, humidity, and wind speed of three cities (i.e., London, Texas, and Dubai) and the point in time when the data was collected using Python. I then automated the running of the script using Task Scheduler so that each hour, the code will be executed and I will get hourly data.

I collected data on the price of crude oils (Dubai, WTI, Brent) in the 3 locations and the temperature recorded at stations. Manipulated the data and merged it in one data frame. I then analysed the spread between Dubai and WTI and realised that it is mean reverting (mean of $2.22). I then coded a simplistic strategy having mean reversion in mind. It entails going long the spread when below a threshold (one standard deviation below the mean) and shorting the spread when above a threshold (one standard deviation above the mean). Here is a visual representation of the spread, thresholds and mean:

A graph showing a graph

Description automatically generated with medium confidence

The reason I wanted to see the performance of this strategy is because the mean reversion over the past 4 years has been quite strong. If this phenomenon will carry on in the future then the strategy will be quite useful. Here is the performance of the strategy:

A graph showing a growth

Description automatically generated with medium confidence

The code liquidates all positions whenever the spread value reaches the 4-year mean. To buy or sell the spread means that you are not exposed to either crude, but you are exposed to the difference in price between them. Even though Dubai and WTI are both crude oils, there are objective reasons why one is worth more than the other. Supply and demand are the single most important factors that justify the market price of any crude. I will tackle the reasons for the existence of the spread and how these reasons impact supply and demand.

First,

**Temperature prediction**

Temperature is seasonal, and to model it, I used a SARIMA (0,1,0) (1,0,1,52). I then used the model to predict the temperature in Texas over the next 6 months. I used a rolling method where the training set consisted of everything up to and excluding the point of prediction. I did this because the predictions are more accurate, which is reflected in the lower RMSE. The reason for the 52 is that I am working with weekly data, and that is because I tried working with daily data, but then the seasonal argument would have to be 365, which makes it computationally difficult to first fit the model and then predict values. Besides, I would have had to predict more observations because, in 6 months, there are about 183 daily observations. Here is the error I encountered, which more or less says that I don’t have enough memory to perform the task:

A screenshot of a computer

Description automatically generated

So, I must work with weekly values. Also helps given that prices are not displayed during weedends.