SkySERVE

Pollution Movement Signal

Case Study: Building a China Petro Stock Movement Indicator using fused Air Quality data

Background

At the start of the series of global COVID-19 lockdowns was the much-publicized shutdown of the Chinese city of Wuhan, the centre of the novel Coronavirus pandemic. As the world scrambled to verify and calibrate their models, we at SkySERVE found high correlations between air pollution over China and domestic demand for oil. We then tested the resulting index against the movement of oil stock prices, specifically the large petroleum distributors of Mainland China. The results were astounding, proven against observations since the outbreak, and proven against the past 3 years!

Building the Case

Assertion-1: China crude oil imports constitute more than 60% of total domestic consumption.
Assertion-2: Specific air pollutant concentrations measure mobility and transport activity, which can serve as an indicator of oil demand.
Question-1: In a consumption-driven economy, do Petro stocks correlate with domestic demand?
Question-2: Can we predict the impact of domestic demand on Petro stocks?
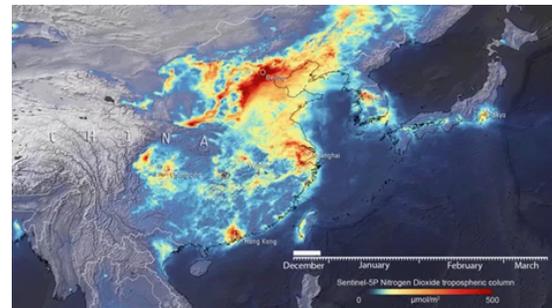
Thesis to Code to Validation

We considered HANG SENG: SINOPEC (0368.HK) & PetroChina (0357.HK) tickers on the Hong Kong Stock Exchange. Pollutant concentration data was pulled from weather stations and satellite measurements, fused and filtered with considering population for urban centres of high mobility.

Stock	Shanghai	Beijing	Tianjin	Guangzhou	Signal
0386.HK	0.59	0.88	0.84	0.64	0.75
0357.HK	0.55	0.87	0.80	0.52	0.69

Days (starting from 1/10/2017 to Sep 2020)

The analysis showed *moderate-to-high positive correlations* between the population-weighted demand and movement of the above two tickers.

The algorithm and correlation were tested for statistical significance on a whole year of historical

data. A strategy using the signal to gauge demand of petroleum products can be used to perform short term forecast of Oil and Gas stocks. The strategy yields significant excess returns (shown in the Figure above right) greater than 40% over the benchmark index HANG SENG over three years.

Features
- Daily update with (a) time stamp, and (b) pollution signal
- Historical data as daily time-series, each signal index computed for the end-of-day pollutant volume aggregate.

Data delivery
- API: register [here](#)
- Separate keys for daily and historical data

Pricing plan
- Daily updates: Monthly subscription, $50
- Multi-year Historical data: One-time purchase for backtest, $9

How can you use this index?
Users can get creative; this dataset can be used as a signal for:
- Assessing per capita pollution
- Traffic and mobility
- Compliance to new emission standards
- Input to further analysis of stocks under the same theme.