

1. Research Question

The oil price is almost entirely determined by external influences

- Supply & Demand
- Oil futures contracts
- Cyclical trends

Then, the property of oil itself can be negligible when predicting the oil price?



2. Method

Assumption: If two different grades of oils have the same average price over the period, property can be negligible in predicting the price.

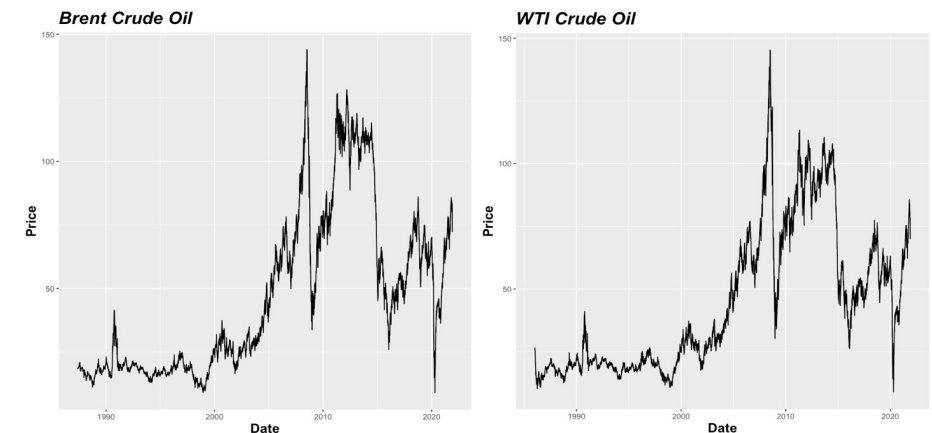
However, due to own properties, the population mean would be different

Hypothesis Testing

$$H_0 : \mu_B = \mu_W \quad \alpha=0.05$$

$$H_1 : \mu_b \neq \mu_W$$

Reject H_0 , in favor of H_1 , if $\bar{X}_B - \bar{X}_W > (\mu_B - \mu_W) + C$ or $\bar{X}_B - \bar{X}_W < (\mu_B - \mu_W) - C$

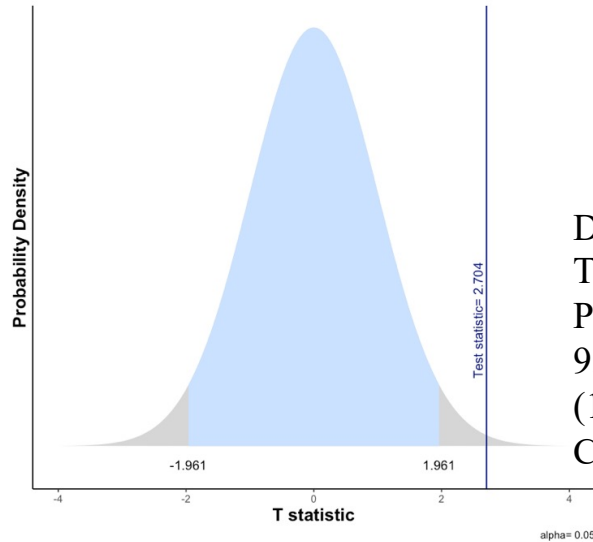


Student t-test.
$$T = \frac{\bar{X} - \bar{Y} - \delta_0}{\sqrt{S_p^2 \left(\frac{1}{n_X} + \frac{1}{n_Y} \right)}} \sim t_{n_X + n_Y - 2}, \text{ where } S_p^2 = \frac{(n_X - 1)S_X^2 + (n_Y - 1)S_Y^2}{n_X + n_Y - 2}$$

Welch's t-test.
$$T = \frac{\bar{X} - \bar{Y} - \delta_0}{\sqrt{\left(\frac{S_X^2}{n_X} + \frac{S_Y^2}{n_Y} \right)}} \approx t_v, \text{ where } v = \frac{\left(\frac{S_X^2}{n_X} + \frac{S_Y^2}{n_Y} \right)^2}{\left(\frac{\left(\frac{S_X^2}{n_X} \right)^2}{n_X - 1} + \frac{\left(\frac{S_Y^2}{n_Y} \right)^2}{n_Y - 1} \right)}$$

Results

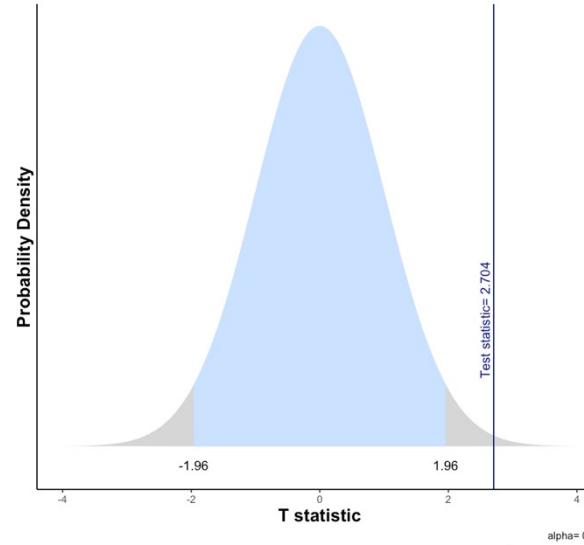
Student t-Test
Alternative hypothesis: two.sided



Df: 1,998
T : 2.704.
P-value : 0.006908
95% C.I.
(1.021212, 6.413058)
C: 2.6943

Reject H_0 , in favor of H_1 , if $\bar{X}_B - \bar{X}_W > 2.6943$ OR $\bar{X}_B - \bar{X}_W < -2.6943$
3.717

Welch's t-Test
Alternative hypothesis: two.sided



Df: 1,972
T : 2.704
P-value : 0.006909
95% C.I.
(1.021192, 6.413078)
C: 2.6944

Reject H_0 , in favor of H_1 , if $\bar{X}_B - \bar{X}_W > 2.6944$ OR $\bar{X}_B - \bar{X}_W < -2.6944$

3. Conclusion

Even though the external influences heavily determine crude oil prices, each oil's own property and characteristics still play a role in determining the oil price.

