Final Project

Momentum Based Trading Strategies for Oil and Gas

In [55]:
```
import pandas as pd
import neaborn as sns
import matplotlib.pyplot as plt
from tiingo import TiingoClient
import numpy as np
from datetime import date
import warnings
import dateline as dt
import pandas_datareader as pdr
warnings.filterwarnings('ignore')
from dateutil.relativedelta import relativedelta
config = {}

config['session'] = True

config['api_key'] = "110ee73e29ec4269f49eb85cfb4b976ea8e73361"

client = TiingoClient(config)
```

In [56]:
```
tickers = ['CL=F','SWN','EQT','OVV','CNX','HES','DINO']
start = dt.datetime(2018, 1, 1)
end = dt.datetime(2022, 6, 1)

df = pdr.get_data_yahoo(tickers, start, end, interval="d")
df.head()
```

Out[56]:

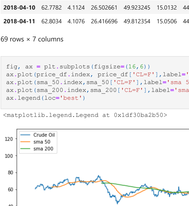
Attributes	Adj Close							Close						Open
Symbols	CL=F	SWN	EQT	OVV	CNX	HES	DINO	CL=F	SWN	EQT	...	CNX	HES	DINO
Date														
2018-01-02	60.369999	5.91	31.070478	61.650295	15.07	44.286499	45.698425	60.369999	5.91	31.910725	...	14.77	47.970001	51.380001
2018-01-03	61.630001	5.91	31.234785	62.009766	15.24	45.721069	45.769699	61.630001	5.91	32.079475	...	15.19	48.040001	51.450001
2018-01-04	62.009998	5.86	31.255989	60.526936	15.00	46.822449	45.404465	62.009998	5.86	32.101254	...	15.24	49.430000	51.500000
2018-01-05	61.439999	5.59	30.641151	59.987728	14.79	48.275524	45.653889	61.439999	5.59	31.469788	...	14.89	51.340000	51.080002
2018-01-08	61.730000	5.73	31.128780	59.807968	14.60	48.580948	46.072571	61.730000	5.73	31.970604	...	14.84	52.259998	51.250000

5 rows × 42 columns

In [57]:
```
price_df = df['Adj Close']
price_df = price_df.dropna()
```

In [58]:
```
fig, ax = plt.subplots()
ax.plot(price_df.index, price_df['CL=F'],label='Crude Oil')
```

Out[58]:
```
[<matplotlib.lines.Line2D at 0x1df30a45640>]
```



In [59]:
```
sma_50 = price_df.rolling(window = 50).mean()
sma_200 = price_df.rolling(window= 200).mean()
```

In [60]:
```
sma_50.head(69)
```

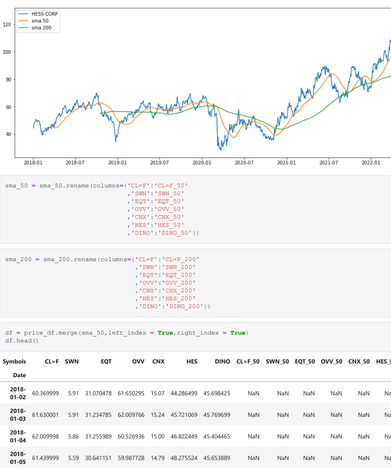
Out[60]:

Symbols	CL=F	SWN	EQT	OVV	CNX	HES	DINO
Date							
2018-01-02	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-03	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-04	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-05	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-08	NaN	NaN	NaN	NaN	NaN	NaN	NaN
...	...	...	...	...	...	...	...
2018-04-05	62.9036	4.1598	26.860546	50.590491	14.9762	44.564041	41.671948
2018-04-06	62.8326	4.1390	26.735135	50.338405	14.9818	44.517261	41.732265
2018-04-09	62.7908	4.1236	26.610040	50.098885	14.9898	44.485337	41.817789
2018-04-10	62.7782	4.1124	26.502661	49.923245	15.0132	44.490448	41.916635
2018-04-11	62.8034	4.1076	26.416696	49.812354	15.0506	44.544175	42.061883

69 rows × 7 columns

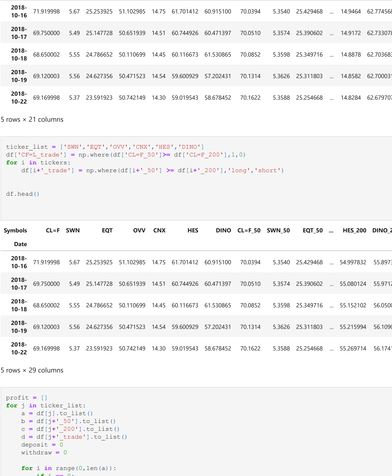
In [61]:
```
fig, ax = plt.subplots(figsize=(16,6))
ax.plot(price_df.index, price_df['CL=F'],label='Crude Oil')
ax.plot(sma_50.index,sma_50['CL=F'],label='sma 50')
ax.plot(sma_200.index,sma_200['CL=F'],label='sma 200')
ax.legend(loc='best')
```

Out[61]:
```
<matplotlib.legend.Legend at 0x1df3ba2b50>
```



In [62]:
```
fig, ax = plt.subplots(figsize=(16,6))
ax.plot(price_df.index, price_df['HES'],label='HESS CORP')
ax.plot(sma_50.index,sma_50['HES'],label='sma 50')
ax.plot(sma_200.index,sma_200['HES'],label='sma 200')
ax.legend(loc='best')
```

Out[62]:
```
<matplotlib.legend.Legend at 0x1df3bd2a90>
```



In [63]:
```
sma_50 = sma_50.rename(columns={'CL=F':'CL=F_50'
                                ,'SWN':'SWN_50'
                                ,'EQT':'EQT_50'
                                ,'OVV':'OVV_50'
                                ,'CNX':'CNX_50'
                                ,'HES':'HES_50'
                                ,'DINO':'DINO_50'})
```

In [64]:
```
sma_200 = sma_200.rename(columns={'CL=F':'CL=F_200'
                                  ,'SWN':'SWN_200'
                                  ,'EQT':'EQT_200'
                                  ,'OVV':'OVV_200'
                                  ,'CNX':'CNX_200'
                                  ,'HES':'HES_200'
                                  ,'DINO':'DINO_200'})
```

In [65]:
```
df = price_df.merge(sma_50,left_index = True,right_index = True)
df.head()
```

Out[65]:

Symbols	CL=F	SWN	EQT	OVV	CNX	HES	DINO	CL=F_50	SWN_50	EQT_50	OVV_50	CNX_50	HES_50	DINO_50
Date														
2018-01-02	60.369999	5.91	31.070478	61.650295	15.07	44.286499	45.698425	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-03	61.630001	5.91	31.234785	62.009766	15.24	45.721069	45.769699	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-04	62.009998	5.86	31.255989	60.526936	15.00	46.822449	45.404465	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-05	61.439999	5.59	30.641151	59.987728	14.79	48.275524	45.653889	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2018-01-08	61.730000	5.73	31.128780	59.807968	14.60	48.580948	46.072571	NaN	NaN	NaN	NaN	NaN	NaN	NaN

In [66]:
```
df = df.merge(sma_200,left_index = True,right_index = True)
df = df.dropna()
df.head()
```

Out[66]:

Symbols	CL=F	SWN	EQT	OVV	CNX	HES	DINO	CL=F_50	SWN_50	EQT_50	...	CNX_50	HES_50	DINO_50
Date														
2018-10-16	71.919998	5.67	25.253925	51.102985	14.75	61.701412	60.915100	70.0394	5.3540	25.429468	...	14.9464	62.774568	63.340921
2018-10-17	69.750000	5.49	25.147728	50.651939	14.51	60.744926	60.471397	70.0510	5.3574	25.390602	...	14.9172	62.733078	63.304520
2018-10-18	68.650002	5.55	24.786652	50.110699	14.45	60.116673	61.530865	70.0852	5.3598	25.349716	...	14.8878	62.703683	63.283719
2018-10-19	69.120003	5.56	24.627356	50.471523	14.54	59.609529	57.202431	70.1314	5.3626	25.311803	...	14.8582	62.700031	63.195458
2018-10-22	69.169998	5.37	23.591923	50.742149	14.30	59.019543	58.678452	70.1622	5.3588	25.254668	...	14.8284	62.679707	63.124820

5 rows × 21 columns

In [69]:
```
ticker_list = ['SWN','EQT','OVV','CNX','HES','DINO']
df['CF=L_trade'] = np.where(df['CL=F_50']>= df['CL=F_200'],1,0)
for i in tickers:
    df[i+'_trade'] = np.where(df[i+'_50'] >= df[i+'_200'],'long','short')


df.head()
```

Out[69]:

Symbols	CL=F	SWN	EQT	OVV	CNX	HES	DINO	CL=F_50	SWN_50	EQT_50	...	HES_200	DINO_200	CF=L_tr
Date														
2018-10-16	71.919998	5.67	25.253925	51.102985	14.75	61.701412	60.915100	70.0394	5.3540	25.429468	...	54.997832	55.897349	
2018-10-17	69.750000	5.49	25.147728	50.651939	14.51	60.744926	60.471397	70.0510	5.3574	25.390602	...	55.080124	55.971213	
2018-10-18	68.650002	5.55	24.786652	50.110699	14.45	60.116673	61.530865	70.0852	5.3598	25.349716	...	55.152102	56.050019	
2018-10-19	69.120003	5.56	24.627356	50.471523	14.54	59.609529	57.202431	70.1314	5.3626	25.311803	...	55.215994	56.109009	
2018-10-22	69.169998	5.37	23.591923	50.742149	14.30	59.019543	58.678452	70.1622	5.3588	25.254668	...	55.269714	56.174132	

5 rows × 29 columns

In [105]:
```
profit = []
for j in ticker_list:
    a = df[j].to_list()
    b = df[j+'_50'].to_list()
    c = df[j+'_200'].to_list()
    d = df[j+'_trade'].to_list()
    deposit = 0
    withdraw = 0

    for i in range(0,len(a)):
        if i == 0:
            if d[i] == 'long':
                deposit += a[i]
        elif i < len(a)-1:
            if d[i] == 'long' and d[i-1] == 'short':
                deposit += a[i]
            elif d[i] == 'short' and d[i-1] == 'long':
                withdraw += a[i]
        elif i == len(a)-1 and d[i] == 'long':
            withdraw += a[i]
    profit.append(round((withdraw - deposit)/deposit) * 100,2))

res = (ticker_list[i]: profit[i] for i in range(len(ticker_list)))
print(res)
```

```
{'SWN': 10.86, 'EQT': 268.75, 'OVV': 70.29, 'CNX': 30.65, 'HES': 15.0, 'DINO': -0.82}
```

In [114]:
```
b=0
print("Annual Returns for momentum trading strategy")
for i in ticker_list:
    a = df[i].to_list()
    yrs = len(a)/250

    b += res[i]/yrs
    print(f"{i}: {round(res[i]/yrs,2)}%")
print(f"\nTotal Annual Returns assuming equal units: {round(b/len(ticker_list),2)}%")
```

```
Annual Returns for momentum trading strategy
SWN: 2.97%
EQT: 73.59%
OVV: 19.25%
CNX: 8.39%
HES: 4.11%
DINO: -0.22%

Total Annual Returns assuming equal units: 18.01%
```