financial-plot-1

October 13, 2023

[24]:
```
import yfinance as yf
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

[31]:
```
! pip install mplfinance
```

```
Requirement already satisfied: mplfinance in /usr/local/lib/python3.10/dist-
packages (0.12.10b0)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-
packages (from mplfinance) (3.7.1)
Requirement already satisfied: pandas in /usr/local/lib/python3.10/dist-packages
(from mplfinance) (1.5.3)
Requirement already satisfied: contourpy>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->mplfinance) (1.1.1)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-
packages (from matplotlib->mplfinance) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->mplfinance) (4.43.1)
Requirement already satisfied: kiwisolver>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->mplfinance) (1.4.5)
Requirement already satisfied: numpy>=1.20 in /usr/local/lib/python3.10/dist-
packages (from matplotlib->mplfinance) (1.23.5)
Requirement already satisfied: packaging>=20.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->mplfinance) (23.2)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.10/dist-
packages (from matplotlib->mplfinance) (9.4.0)
Requirement already satisfied: pyparsing>=2.3.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->mplfinance) (3.1.1)
Requirement already satisfied: python-dateutil>=2.7 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->mplfinance) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-
packages (from pandas->mplfinance) (2023.3.post1)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-
packages (from python-dateutil>=2.7->matplotlib->mplfinance) (1.16.0)
```

[32]:
```
import mplfinance as mpf
```

[27]:
```
dataset = ['BAC']
for datasets in dataset :
    Ticker = yf.Ticker(datasets)
    data = Ticker.history(start='2023-09-01', end='2023-10-13')
    filename=f'{dataset}_data.csv'
    data.to_csv(filename)
    print(f'Download data for {dataset} and saved as {filename}')
```

```
Download data for ['BAC'] and saved as ['BAC']_data.csv
```

[28]:
```
data_start = '2023-09-01'
data_end= '2023-10-13'
Ticker = 'BAC'
data = yf.download(Ticker, start=data_start, end=data_end)
```

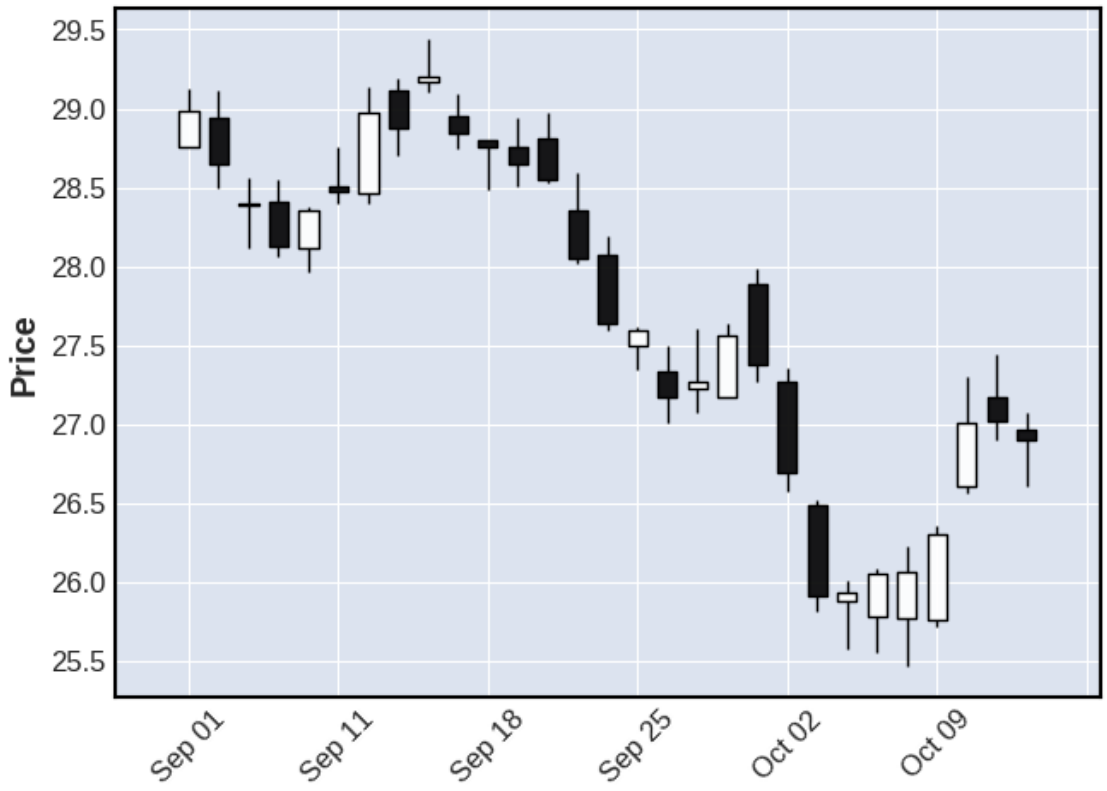
```
[**********************100%%**********************]  1 of 1 completed
```

[29]:
```
data[:2]
```

[29]:

Date	Open	High	Low	Close	Adj Close	Volume
2023-09-01	28.760000	29.129999	28.76	28.98	28.98	35192000
2023-09-05	28.940001	29.120001	28.50	28.65	28.65	46543600

[38]:
```
mpf.plot(data, type='candle')
plt.show()
```



[39]:
```
strike = np.linspace(50, 150, 24)
ttm = np.linspace(0.5, 2.5, 25)
strike, ttm = np.meshgrid(strike, ttm)
```

[40]:
```
strike[:2]
```

[40]:
```
array([[ 50.        ,  54.34782609,  58.69565217,  63.04347826,
         67.39130435,  71.73913043,  76.08695652,  80.43478261,
         84.7826087 ,  89.13043478,  93.47826087,  97.82608696,
        102.17391304, 106.52173913, 110.86956522, 115.2173913 ,
        119.56521739, 123.91304348, 128.26086957, 132.60869565,
        136.95652174, 141.30434783, 145.65217391, 150.        ],
       [ 50.        ,  54.34782609,  58.69565217,  63.04347826,
         67.39130435,  71.73913043,  76.08695652,  80.43478261,
         84.7826087 ,  89.13043478,  93.47826087,  97.82608696,
        102.17391304, 106.52173913, 110.86956522, 115.2173913 ,
        119.56521739, 123.91304348, 128.26086957, 132.60869565,
        136.95652174, 141.30434783, 145.65217391, 150.        ]])
```

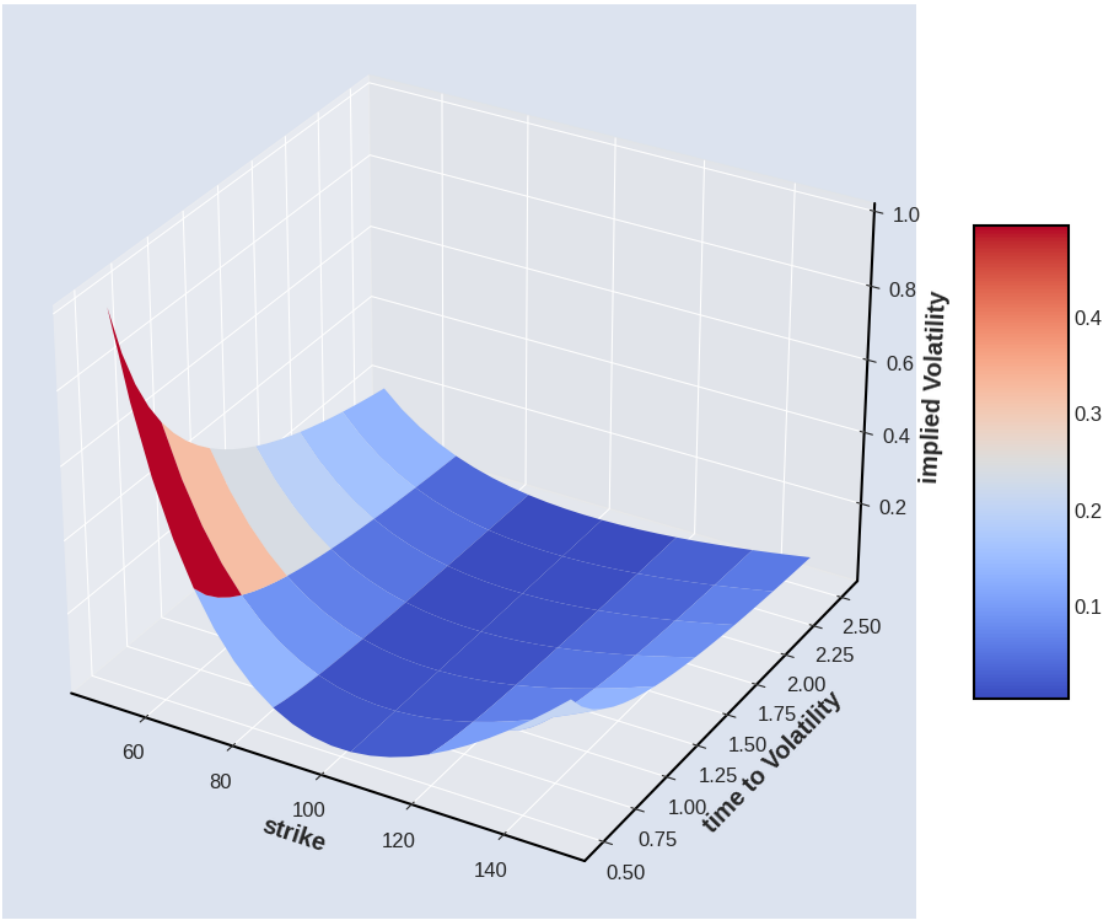
[41]:
```
iv = (strike  - 100) ** 2 /(100 * strike) / ttm
```

[44]:
```
from mpl_toolkits.mplot3d import Axes3D
```

[51]:
```
fig = plt.figure(figsize=(12, 10))
ax = fig.add_subplot(111, projection='3d')

surf = ax.plot_surface(strike, ttm, iv, rstride=4, cstride=4,
                       cmap = plt.cm.coolwarm, linewidth=0.5,
                       antialiased=True)
ax.set_xlabel('strike')
ax.set_ylabel('time to Volatility')
ax.set_zlabel('implied Volatility')
fig.colorbar(surf, shrink=0.5, aspect=5)
```

[51]:
```
<matplotlib.colorbar.Colorbar at 0x7bb5fd8e16f0>
```



[56]:
```
fig = plt.figure(figsize=(12 ,10))
ax = fig.add_subplot(111, projection='3d')
ax.view_init(30, 60)
```

```
ax.scatter(strike, ttm, iv, zdir='z', s=25, c='b', marker='^')
ax.set_xlabel('strike')
ax.set_ylabel('time-to-maturity')
ax.set_zlabel('implied Volatility')
```

[56]: Text(0.5, 0, 'implied Volatility')