Introduction to Jupyter Notebooks

The objective of this class was to quickly introduce to Python students who have never used it before, and to show some interesting financial applications.

Libraries

We started loading some of the typical libraries that we will use in the class.

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import yfinance as yf
import seaborn as sns

import warnings
warnings.simplefilter(action='ignore', category=FutureWarning)
```

A very useful library for finance applications is `yfinance`. This library allows us to download data from Yahoo Finance and use it to perform analyses on stock prices for example.

The library `yfinance` downloads the data as a Pandas dataframe. If we want then to use Pandas functions on the dataframe then we need to load the library `pandas`. Each `pandas` dataframe allows us to plot its content. To plot something else, we need the library `matplotlib`. The library `seaborn` is just a nice plotting library that has additional feature.

Since `yfinance` has had many changes recently, you typically get some warnings that I disable using the `warnings` library.

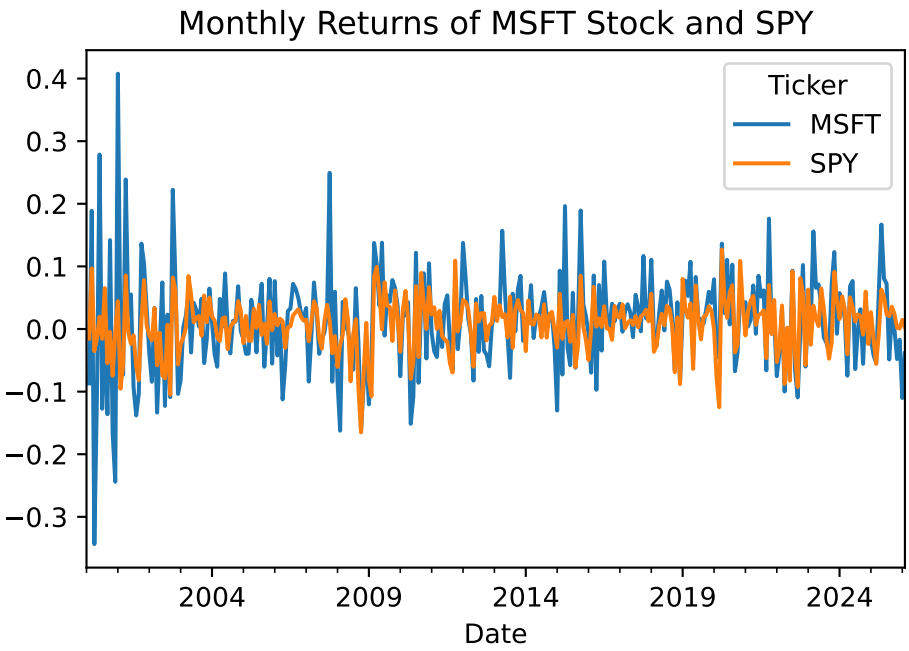
As an example of using `yfinance`, let's compute the monthly rate of return of Microsoft (MSFT) and an ETF on the S&P 500 (SPY).

```
df = (yf
      .download(['MSFT', 'SPY'], progress=False, start='2000-01-01')
      .loc[:,'Close']
      .resample('ME')
      .last()
      .pct_change()
      )
```

The code above uses `yfinance` to download data for `['MSFT', 'SPY']` starting in January 1, 2000. It then extracts the `Close` column, which is adjusted close data by default in `yfinance`. The resulting `pandas` dataframe is resampled monthly, and `pct_change` computes the required returns.

We can now plot the monthly returns of MSFT and SPY.

```
ax = df.plot(title = 'Monthly Returns of MSFT Stock and SPY')
```



We can clearly see from the picture that the returns of the `SPY` are less volatile than the returns

on MSFT. This makes sense, as the SPY is a well diversified portfolio of stocks whereas MSFT is a single name stock.

There is, however, a strong co-movement between the returns of MSFT and SPY. To see this, we could regress the monthly MSFT returns on the monthly SPY returns as:

$$R_{MSFT} = \alpha + \beta R_{SPY} + e.$$

The graph below shows the result of this regression.

```
ax = sns.lmplot(df, x = 'SPY', y = 'MSFT')
```