

Risk and Return: The Sharpe Ratio

Below are the tasks completed in Jupyter Notebook –

Task 1:

Read in the stock data for Facebook, Amazon and the S&P 500.

- Load in the stock data from `datasets/stock_data.csv` and assign it to `stock_data`.
- Load in the benchmark data from `datasets/benchmark_data.csv` and assign it to `benchmark_data`.
- When reading in the data change the `parse_dates` parameter to set the 'Date' column to `datetime64`, set the `index_col` parameter to set the 'Date' column as the index, and use `.dropna()` to get rid of missing values.

Task 2:

Take a peek at the data you loaded in the last task.

- Display a summary of each `DataFrame`'s content using `.info()`
- Show the first few lines of each `DataFrame` using `.head()`

Task 3:

Plot and summarize the `stock_data`.

- Use the `pandas.plot()` method on `stock_data` to show a line plot.
- Set the parameter `subplots=True` to show two plots since the stock prices are at different levels.
- Set 'Stock Data' as the `title` for the plot.
- Apply the `.describe()` method to the stock data to produce summary statistics.

Task 4: Instructions

Plot and summarize the `benchmark_data`.

- Use the `pandas.plot()` method on `benchmark_data` to show a line plot.
- Set 'S&P 500' as the `title` for the plot.
- Apply the `.describe()` method to the benchmark data to produce summary statistics.

Task 5: Instructions

Calculate, plot and summarize the `stock_data` *returns*.

- Apply pandas method `.pct_change()` method to the `stock_data` to calculate the daily returns.
- Use the `.plot()` method on the result to show a line plot of the daily returns.
- Apply the `.describe()` method to your daily returns to take a look at summary statistics.

Task 6: Instructions

Calculate, summarize, and plot daily returns for the `benchmark_data`.

- Select the S&P 500 prices as a `Series` from the `benchmark_data` using single brackets `[]` and apply `.pct_change()` as in the last task.
- Use `.plot()` to display a line plot of the result.
- Take a look at the summary statistics using `.describe()`

Task 7: Instructions

Calculate, plot and describe the difference between `stock_returns` and `sp_returns`.

- Use the `.sub()` method to subtract the `sp_returns` from the `stock_returns` and assign the resulting `DataFrame` to `excess_returns`. Make sure to set the parameter `axis=0` to align the dates for both time series.
- Calculate `excess_returns` summary statistics using `.describe()`.

Task 8: Instructions

Calculate and plot the mean of `excess_returns`.

- Calculate the average of `excess_returns` using `.mean()` and assign the result to `avg_excess_return`
- Plot the result using the pandas method `.plot.bar()` and set 'Mean of the Return Difference' as the title.

Task 9: Instructions

Calculate and visualize the standard deviation of `excess_returns`.

- Calculate the standard deviation of `excess_returns` using `.std()` and assign the result to `sd_excess_return`.
- Visualize the result as a bar chart and set `'Standard Deviation of the Return Difference'` as the `title` for the plot.

Task 10: Instructions

Use `avg_excess_return` and `sd_excess_return` to calculate the Sharpe ratio, then annualize.

- Apply `.div()` to divide `avg_excess_return` by `sd_excess_return` and assign the result to `daily_sharpe_ratio`.
- Calculate the square root of 252 using `np.sqrt()` and assign the result to the variable `annual_factor`.
- Use `.mul()` to multiply `daily_sharpe_ratio` by `annual_factor` and assign the result to `annual_sharpe_ratio`.
- Display the result as a bar plot, setting `'Annualized Sharpe Ratio: Stocks vs S&P 500'` as the `title`.

Task 11: Instructions

- Select the stock you would have picked in 2016 based on the Sharpe Ratio by setting either `buy_amazon` or `buy_facebook` to `True`.
- More Sharpe Ratio means greater return per unit risk, therefore we would choose the one with greater Sharpe Ratio.