06/28/2019 {bpc}

MSCI 261 Project Guidelines

The goal of this project is to integrate economics into our software engineering degree and skillset. In class, we were shown an Excel sheet with a bulk exporter that we will be taking inspiration from for this project. You can find that Excel sheet on Learn.

We will be doing a 2-stock comparison application in Python, Java Script, or C++ (you pick which one) where you will pick any two company stock codes. You will need to make an API request to Yahoo Finance (see https://blog.rapidapi.com/how-to-use-the-yahoo-finance-api/) to receive the market data for the last year only (June 1st 2018 to June 1st 2019).

Part I.
After you have the time-series data (remember to convert to returns), calculate the mean, variance and standard deviation for both stocks. Then, do a portfolio returns calculation to determine which proportion of the two stocks gives the minimum variance portfolio (you can check at a 2.5% intervals, see page 256 of ch08 notes). Return to the user the ideal stock proportions (weights), the portfolio variance, standard deviation, and expected return of the portfolio.

```
Sample input (these are pretend stocks):
      HYY
      ZNY

Sample output:
      MVP proportion HYY: 77.78%
      MVP proportion ZNY: 22.22%
      MVP standard deviation: 7.23%
      MVP expected portfolio return: 8.78%
```

Part II.
Here we assume the return on the risk-free asset is 2%. There are three cases to consider.

CML Case 1: Find the tangency of the CML and the efficient frontier. In other words, you invest 100% of your wealth in the market portfolio. Find the proportions of each stock in the market portfolio, then find the expected portfolio return, portfolio standard deviation.

CML Case 2: Given that 50% is invested in r_f asset and 50% in market portfolio find the expected portfolio return, portfolio standard deviation

CML Case 3: Given that -50% is invested in r_f asset and 150% in market portfolio find: Expected portfolio return, portfolio standard deviation

```
Sample input (these are pretend stocks):
      HYY
      ZNY
      Risk-free = 2%

Sample output:
Case 1:
      Given-Proportion invested in risk-free asset: 0%
      Given-Proportion invested in market portfolio: 100%

      Maximum Sharpe ratio: 1.0716
      Market portfolio proportion HYY: 51.81%
      Market portfolio proportion ZNY: 48.19%
      Market portfolio expected return: 10.65%
      Market portfolio standard deviation: 8.26%

Case 2:
      Given-Proportion invested in risk-free asset: 50%
      Given-Proportion invested in market portfolio: 50%

      Portfolio expected return:
      Portfolio standard deviation:

Case 3:
      Given-Proportion invested in risk-free asset: -50%
      Given-Proportion invested in market portfolio: 150%
      Portfolio expected return:
      Portfolio standard deviation:
```

Bonus (5%):
Assemble a 5-10 Market portfolio that (if split with even proportions) comes out to a portfolio expected return of >=10% and a portfolio standard deviation <=5%. You may use the tool that you created for this project to compare stocks and find ones with those desired features.

Group size: no more than 3 students
Marks: out of 100%
Due date: Friday, 02 August, 2019 (before 11 p.m.)
Functionality: Brian will test the program from his desktop to see how it works with two randomly chosen stocks.
Submission: Send a zip file, with the code and any instructions to: brian.cozzarin@gmail.com; also for safety, upload to the Learn drop box called “Project”.