Python for finance and optimization
Assesment I: Portfolio strategies

The assessment is based on the Excel file `https://www.oliviergueant.com/uploads/4/3/0/9/4309511/sbf120_as_of_end_2018.xlsx` that contains prices of SBF 120 components (as of end 2018) over the period 2011-now (used in lectures 1 and 2).

We consider an investment universe of 10 stocks corresponding to those having the highest market capitalization as of end 2018.

Propose a notebook (please start from the notebook available on the EPI) that compares, in terms of Sharpe ratio and maximum drawdown, the respective performance of the three following portfolios over the year 2019:

- an equally-weighted portfolio with the above 10 stocks (weights are considered on a daily basis).
- a Markowitz minimum-variance portfolio (with the above 10 stocks), the covariance matrix being computed over 2017-2018 and not updated – using the empirical covariance matrix is enough for the assessment.
- an ERC portfolio (with the above 10 stocks), the covariance matrix being computed over 2017-2018 and not updated – using the empirical covariance matrix is enough for the assessment.[1]

The last cell of the notebook should plot a graph with the three PnL trajectories (with an initial wealth of 1 million euros). The legend of the plot must contain the name of the strategies and the two above performance metrics for each strategy.

[1] If Σ is the covariance matrix of returns and $\sigma : w \mapsto \sqrt{w'\Sigma w}$, ERC weights verify

$$\sum_i w_i = 1 \qquad \text{and} \qquad \forall i,j, w_i \frac{\partial \sigma}{\partial w_i}(w) = w_j \frac{\partial \sigma}{\partial w_j}(w).$$

If you missed the last lecture, you can find a method to build ERC portfolios in the book "Introduction to risk parity and budgeting" by T. Roncalli.