

**To be completed as part of the course Portfolio Management and Performance Measures
(to be returned before January 23, 2023)**

Exercises to be carried out by groups of *no more than 2 students*: the portfolios analyzed and the comments on the results must be different for each group.

You must submit the following elements:

- To Felicina Cafici's secretariat: the paper file of results, graphs and comments.
- By email (marcel.aloy@univ-amu.fr):
 1. The file in PDF (results, graphs and comments)
 2. The EXCEL sheet containing the data and calculations
 3. The .inp file of the GRETl programme used

Questions (you will present methods and discuss on the results obtained in each question):

Download historical DATA of 3 ETFs (from *Yahoo Finance* for instance) of your choice and the corresponding benchmark (a large index representative of the Market Portfolio)

You can choose some ETF from the following table (or other ETF's of your choice).

Example of smart beta ETF's (and corresponding benchmarks)

Strategies	Europe (en Euro)	Etats-Unis (en Dollars)
Multi-Factor	SMRT.PA Amundi	VTV Vanguard
Momentum	CEU.PA Amundi	PDP Invesco
Dividend	CD9.PA Amundi	IDV Ishare International
Value	CV9.PA Amundi	IVE Ishare International
Size	CEM.PA Amundi	SIZE Ishare International
Minimum Volatility	MVAE.PA Lyxor	LGLV State street global Advisory
Equal weight	S6EW.L Ossian	RSP Invesco
Rafi	REU.PA Lyxor	PRF Invesco
Growth	CG9.PA Amundi	IWF Ishare International
BENCHMARK	SX5E (Eurostoxx 50)	GSPC (SP500)

Please note: Choose ETFs that have been listed for at least 10 years and not too closely correlated with each others.

You will use weekly quotes, over the longest common period.

The following exercises must be done for each of your three ETFs.

Exercise 1

- a- Present in a few lines the characteristics of the selected ETFs.
- b- Graphically represent the evolution of the value of your ETFs and the corresponding benchmark, normalizing the initial value to 100 euros (or \$ in the case of US).
- c- Calculate the descriptive statistics of the returns and the autocorrelation function.
Comment on the results.

Exercise 2

a- Estimate the Jensen equation for your ETFs using a GARCH(1,1) model. Give the interpretation of the estimated alpha, beta and R^2 .

b- Estimate the time varying beta model using the multivariate-GARCH model (MGARCH).

Comment on the results.

Exercise 3

Calculate :

a- the Sharpe ratio and the Sharpe ratio corrected for autocorrelation (or long-run variance)

b- the Sharpe-VaR ratio and the Sharpe-CVaR ratio

Comment on the results.

Exercise 4

a- Calculate and graphically represent the Drawdowns (based on a 2-years moving window)

b- Calculate the Ulcer Index and Ulcer Performance Index

c- Calculate the 95% Drawdown at risk (DaR), the Average Drawdown and the 95% Conditional Drawdown at Risk (CDaR).

d- Calculate the Pitfall Index, the Penalized Risk and the Serenity Ratio.

Comment on the results.