EDHEC Business School **Laurent E. Calvet**
Ph.D. Program **March 2023**

Empirical Methods in Finance

ASSIGNMENT #1
Due on May 30, 2023 at 9 am CEST

- You can complete the assignment with at most two other students.
- Please submit a single solution per group.
- Please provide the code you use to estimate the preference parameters.
- The text and tables should be self-contained. You are encouraged to read one or two papers in *Journal of Finance* for examples of good presentation, which will prepare you for writing the thesis.
- Please e-mail a **PDF** file containing your solution and the code to laurent.calvet@edhec.edu and brigitte.bogaerts-chevillotte@edhec.edu

You are encouraged to read the following:

[1] Cochrane, John (2005). *Asset Pricing*, ch. 10 and 11.

[2] Hansen, Lars Peter (1982). "Large sample properties of generalized method of moments estimators." *Econometrica* 50, 1029-1054.

[3] Hansen, Lars Peter, and Kenneth J. Singleton (1982). "Generalized instrumental variables estimation of nonlinear rational expectations models." *Econometrica* 50, 1269-86.

Questions

Under the Consumption CAPM, the real return $r_{i,t+1}$ on every asset i satisfies:

$$\delta \mathbb{E}_t \left[\left(\frac{C_{t+1}}{C_t} \right)^{-\alpha} (1 + r_{i,t+1}) \right] = 1,$$

where δ denotes the representative agent's discount factor, α denotes the representative agent's coefficient of relative risk aversion, and C_t denotes real consumption per capita in every period t. The expectation is taken conditionally on the information available to the agent in period t.

1. Download from Prof. Robert Shiller's website[1] the following data at the annual frequency for the longest period available:

- the real one-year interest rate,
- the real return on the S&P composite stock price index,
- real per capita consumption.

Download from Prof. Ken French's website[2] the yearly returns on the following 5 industry portfolios: consumer, manufacturing, high tech, healthcare, and others.

2. Estimate α and δ by GMM on the real interest rate and S&P real return series over the longest period over which all required series are available.

3. Estimate α and δ by GMM on the real interest rate, S&P return and industry portfolio real returns.

4. Interpret the results. Do the estimates of α and δ seem reasonable? Why?

[1] `http://www.econ.yale.edu/~shiller/data.htm`

[2] `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`