Interview
Case Studies

INSTRUCTIONS

- We ask to complete case 1 and 2, noting that case 2 requires only one of the alternatives

- Choose a programming language or tool that you are most comfortable with. R would be preferable; python works as well.

- Feel free to make assumptions about missing information and data. Comments can be kept sparse

- Submit the code along with the results.

EVALUATION CRITERIA

- Robustness, elegance and efficiency of the code

- Good use of available options in visualisation (use of ggplot2 in R)

Case 1 – Yield Curve analysis

Information:

a. Download all the zip files (*"Monthly Technical Information"*) since December 2022 from Risk-free interest rate term structures - European Union (europa.eu)

Questions:

a. Programmatically unzip and extract country and tenor wise interest rates from the **excel** (*"EIOPA_RFR_YYYYMMDD_Term_Structures"*) and **sheet** (*"RFR_spot_no_VA"*)

b. Visualise the changes in US and Euro yield curve across tenors since 2022

c. Compute and visualise the correlation between US/Euro/UK/China rates focusing only on 2/5/10/20/30y tenor points

d. Compute and visualise 2 year – 10 year and 2 year – 30 year slope for US and Euro rates

Case 2 – Value-at-Risk or Regression

Information:

a. USD 500k of equity portfolio split between Google (45%), Facebook(32%), Nvidia (10%) and Equinix Inc (13%)

b. Use stock/index prices from yahoo (can even read the data using api)

Questions:

a. Compute historical simulation VaR and ES (qtl:99%, holding: 1month, lookback: 10y). Need to address insufficient stock return of Equinix. Also, compute the contribution to total VaR of each stock

b. Implement a simulated version of Monte-Carlo VaR for the whole portfolio (qtl: 99%, holding: 1m)

OR

Information:

a. Download US 10-year break-even inflation rate (ticker:*T10YIE*), US 10-year and 5-year Treasury yield (*DGS10/DGS5*) from FRED (https://fred.stlouisfed.org/) since 2008

Questions:

a. Process data to handle missing values (e.g. average, carry forward last observation) and explore the statistical properties

b. Regress US 10y against the US Break-even. 1. Evaluate assumptions of Linear Regression 2. Perform Regression 3. Run diagnostics on model residuals to identify potential issues

c. Compute historical simulation VaR (qtl:99%, holding: 1month, lookback: 10y) for a portfolio with 10y Zero-Coupon (ZC) bond and 5y ZC bond (each with a face: USD 1m). Also, compute the contribution to total VaR of each bond

THANK YOU