Assignment 3.

1. Exercise: Asset Swap

Given the discounting curve vs Euribor 3m on the 31st of January 2023 at 10:45 C.E.T. and knowing that a 3y bond price for an issuer YY is 101 (101% of the *face value*) with an annual coupon equal to 3.9% (*annual bond*) with coupons paid on the same swap dates, compute the *Asset Swap Spread Over Euribor3m*.

2. Case Study: CDS Bootstrap

Given values for discounts on the case-study on curve bootstrap on the 31st of January 2023 at 10:45 C.E.T. consider the obligor ISP with a recovery π equal to 40% and CDS spreads (annual bond): 1y 30 bps, 2y 34 bps, 3y 37 bps, 4y 39 bps, 5y 40 bps, 7y 40 bps.

a. Build a complete set via a spline.
b. Build $\lambda(t)$ piecewise constant for the issuer, neglecting the "accrual" term.
c. Which is the impact of the "accrual" term? Show that this term is really negligible.
d. Consider Jarrow-Turnbull approximation (a constant λ and continuously paid CDS spread) and compare the result with the one previously obtained.

JUST ONE

3. Exercise: Credit Simulation

Given *survival probability* at time t up to T (30 years): $P(t,T) = e^{-\int_t^T \lambda_s \, ds}$;
with $\lambda_s = \lambda_1 \, 1_{s \le \theta} + \lambda_2 \, 1_{s > \theta}$ and $\lambda_1 = 4$ bps, $\lambda_2 = 10$ bps, $\theta = 5 \, years$.

a. Simulate the *default time* τ.
b. Fit the survival probability.

Fit the distribution of default times using a sample of M=10^5 points. Provide Estimator and Confidence Interval (CI) on the Estimator (only for λ_1 and λ_2, not for θ).
Hint: A possibility (not binding) is to consider a plot of the "experimental" survival probability and the one obtained from the fit (in a loglinear scale) with a CI. Another one is to consider the ML estimator and its CI.

Function signatures
[datesCDS, survProbs, intensities] =
bootstrapCDS(datesDF, discounts, datesCDS, spreadsCDS, flag, recovery).

dates and discounts are the same outputs of bootstrap function; datesCDS do not include the settlement date; function outputs are vectors with the same length; flag = 1 (approx), 2 (exact) or 3 (JT).

All vectors are column vectors.

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