Homework 4, due 5/2/2023, 10pm, FRE-6971

Problem 1 (50 ponts):

Read Diebold & Li paper on Dynamic Nelson-Siegel (DNS) model, focusing on Chapters 1,2,3 (through 3.3).

Dataset: CMT rates, sample: January-2013 through January-2017

Carry out estimation of DNS parameters in the following way:

1. Step 1: Assume a value of λ, and fit $\beta_1(t), \beta_2(t), \beta_3(t)$ to a set of yields observed on day t (repeat for all days in the dataset)

2. Step 2: Find λ that bests fits the whole dataset (Step1 needs to be repeated on each iteration, as you search for optimal λ). You can use an optimization package, or write your own code

Problem 2 (50 ponts):

Use results of DNS estimation you carried out in Problem 1.

Estimated model: DNS (optimal λ+time series of $\beta_1(t), \beta_2(t), \beta_3(t)$)

Perform the following analysis of results:

1. Step 1: Compute RMSE for each day in the sample and pick 20 days with largest RMSE

2. Step 2: Use 4m of data prior to each of the 20 days to fit AR(1) to each of $\beta_1(t), \beta_2(t), \beta_3(t)$ time series and compute half-lives (HL). Generate t+5d forecast for each yield on each of the 20 days, using the corresponding set of AR(1) models (combined with the DNS model yield formula) for each forecast.

3. Step 3. Do these forecasts perform better than those generated under the random walk assumption?