Homework 5, FRE-6971, due 5/16/2019, 10am

Problem 1 (20 points)

1-Factor Affine model:

$$dr(t) = \{\mu - \kappa r(t)\}dt + \sqrt{\gamma r(t) + \sigma} \ dW(t)$$

1. Initially assume $\gamma = 0$, and derive the expressions for Eurodollar futures rate in the above model

2. Build a Jupyter Notebook to demonstrate your calculations using $\mu = 0.005$, r(0)=0.015, k=0.1, $\sigma = 0.008$, $\gamma = 0.0$

3. What changes if $\gamma \neq 0$? Reason through this case. We will cover this topic more fully at the end of the semester

4. How would your calculation change if the above model was a 2-factor model?

Problem 2 (80 ponts):

Data: Settle prices of first 20 rolling Eurodollar futures on 11/27/2017 (1 day of data)

1. Compute IMM dates for all the futures either manually or using a QuantLib python package (I will email instructions). Explain why you need to know the IMM dates

2. Consider 2 models: ModelA: model from Problem 1.1 & ModelB: DNS model from HW4

3. Carry out a fit of all parameters for Models A & B

4. Check for collinearity and apply collinearity remedies (PCA rank reduction or Ridge regression) if your problems are collinear

5. Explain your work