HOMEWORK 5

1. The file tsdata.txt has 16 columns. The first three are the date, ignore the fourth, columns five through ten are CMS(.25), CMS(2), CMS(3), CMS(5), CMS(7), and CMS(10). Columns 11 through 16 are CMT(.25), CMT(2), CMT(3), CMT(5), CMT(7), and CMT(10).

2. Assume that the CMT(.25) and CMT(10) rates are fit exactly by the 2 factor Vasicek model discussed in class.

3. Using all 650 weeks of data, fit the 2-factor model to the data by solving for the parameters α_X, β_X, σ_X, β_Y and σ_Y (set $\alpha_Y = 0$).

4. In doing this, you need to solve for the values of X and Y that fit the CMT(.25) and CMT(10) rates each week. You may want to use an approximation to linearize CMT(10) in terms of X and Y in order to avoid having to solve numerically for X and Y each week; feel free to make some simplifying assumptions.

5. Graph the values of X and Y and check how well their sample moments (means, standard deviations) match those implied by the (risk neutral) parameter estimates.

6. Analyze the time series properties of deviations between the CMT rates and the fitted model.

7. Assume that only a two-year and a ten-year par bond can be used as hedging vehicles (for example, because of their liquidity). For par bonds with maturities ranging from one year to 30 years, solve for the hedging portfolios of two-year and ten-year bonds. Contrast these hedging portfolios with those given by matching the duration and convexity of the bonds.