

SMF PROBLEMS 3. 31.10.2014

The purpose of this handout is to perform a Principal Components Analysis (PCA) on the US treasury rates between Jan. 2 2003 and Apr. 11 2013.

1. **Loading the data:** Use the function *read.csv* to load the data contained in it and the command *data.frame* to convert it to numerical values
2. **Treating the missing values:** Replace the missing values (i.e. equal to “NA”) e.g. by replacing them by the average between of previous and next value. *Hint: For all the maturities, the missing values happen to be on the same days*
3. **Taking the centred returns:** Create the matrix of the centred returns (i.e. the first order difference of the series minus its mean) and, using the *pairs* function, inspect for correlation between the different variables.
4. **PCA:** Use the *princomp* function to run a PCA on the data. (*Hint: the **summary** function gives the components weights, the loadings functions gives the components...*) and comment on what components to retain.
5. **Conclusion:** Interpret the meaning of the significant components.

NHB/PMBF