University of Sydney

Business Analytics

QBUS6830: Financial Time Series and Forecasting
Semester 1, 2019

Lab Tutorial Sheet 5

Q1 (PCA and Factor modelling) We use the data from the text by Tsay in Chapter 9 from the file `Tsay_FM_data.txt`, being monthly returns on IBM, HPQ, Intel, JP Morgan and Bank of America, from January, 1990 to December, 2008.

(a) Find the sample correlation matrix and assess whether the data is suitable for a PCA

(b) Perform a PCA on this data and report the results. Form the 2D and 3D biplots of the first 2 and 3 components. Discuss.

(c) How many principal components do you think are adequate to explain these variables? Describe the (relevant) PCs found, do they make sense or have a relevant or useful interpretation?

(d) Perform a Factor Analysis with $m = 1$ factor on these return series.

(e) Describe the factor loadings and factor found: do they make sense or have a relevant or useful interpretation?

(f) Assess whether this 1 factor model is appropriate for this data.

(g) Perform a Factor Analysis with $m = 2$ factors on these return series. Describe the factor loadings and factors found: do they make sense or have a relevant or useful interpretation? Assess whether this 2 factor model is appropriate for this data. How many factors should we choose to use?

(h) How about the un-rotated 2 factors? Do these have a better interpretation?

(i) Compare the PCA, 1 and 2 factor models in terms of model fit, adequacy and usefulness.
