One Factor model

$$r_{t,i} = \delta_i f_t + \epsilon_{t,i}$$

Estimate the factor f_t by principal components. If we have n time series, $r_{t,i}$ with $i = 1, ..., n$, we can find n principal components. This single factor that we want to estimate will be the first principal component.

Eviews refers to the principal components as scores. The δ_i, are referred to as (factor) loadings.

Identification: The first principal component is approximately the cross-sectional average of the observations.

$$f_t \simeq \sum_{i=1}^{n} r_{t,i}$$

Application of PC to the Term Structure of Interest Rates

First sheet is McCulloch's term structure data. Interpolations to "estimate" missing times to maturity.

Take the time series observations on yields to maturity, write to disk. Reload transposed. Transposed observations show the different yields at a point in time. (i.e., the term structure).

First factor is cross-sectional average of yields. Term structuralists call this the 'level factor.' The factor that describes the overall level of interest rates.

Slope is yield on longest term bond minus yield on shortest term bond. Positive slope means yield curve slopes up. The second principal component (or the second factor) in the term structure is called the slope factor.

The third factor adds just a little explanatory power. Third factor is known as the "curvature factor". It captures the curvature of the yield curve.

Any questions?

other questions?