

VAR Lag Length Selection Criteria

EVIDENCE:

The determinant of the residual variance-covariance matrix is

$$|\hat{\Omega}| = \det\left(\frac{1}{T-p} \sum_{t=1}^T \hat{\varepsilon}_t \hat{\varepsilon}_t'\right)$$

where p = the equal lag length chosen

The log likelihood value assuming a multivariate normal (Gaussian) distribution is

$$\ell = -\frac{T}{2} \left\{ k(1 + \log 2\pi) + \log |\hat{\Omega}| \right\}$$

where T = number of useable observations, k = number of endogenous variables making up the VAR.

The system-wide information criteria that EVIDENCE calculates is then

$$AIC = -2\ell/T + 2n/T$$

$$SC = -2\ell/T + n \log(T)/T$$

where $n = k(d + pk)$ is the total number of estimated

parameters in the VAR and d = the number of deterministic variables (constant term, trend, seasonal dummies, etc., usually $d=1$ for constant term).

SAS calculates their information criteria as follows:

$$AIC = \log(|\hat{\Sigma}|) + 2n/T$$

$$AICC = \log(|\hat{\Sigma}|) + 2n/(T - n/k)$$

$$FPE = \left(\frac{T + n/k}{T - n/k} \right)^k |\hat{\Sigma}|$$

$$HQc = \log(|\hat{\Sigma}|) + 2n \log(\log(T))/T$$

$$SBC = \log(|\hat{\Sigma}|) + n \log(T)/T$$

The AIC and SBC measures differ only in whether they drop ~~constants~~ constants that have no effect on comparison of goodness of fit.