

GUIDE TO MATLAB CODE

M-files available at www.kris-nimark.net

The Steady State filter. The m-file `Steady.m` takes the matrices $A, C, D1, D2, R$ as inputs and returns the steady state Kalman gain K_t and $P_{t+1|t}$ for $t = \infty$.

$$[K, P] = \text{steady}(A, C, D1, D2, R)$$

The Log-Likelihood. The m-file `logl.m` takes the matrices $A, C, D1, D2, R$ and the data matrix $Z \equiv \begin{bmatrix} Z_1 & Z_2 & \cdots & Z_T \end{bmatrix}$ as inputs and returns the log-likelihood $LL = \mathcal{L}(Z \mid A, C, D1, D2, R)$.

$$[LL] = \log l(A, C, D1, D2, R, Z)$$

The Kalman Smoother. The m-file `smooth.m` takes the matrices $A, C, D1, D2, R$ and the data matrix $Z \equiv \begin{bmatrix} Z_1 & Z_2 & \cdots & Z_T \end{bmatrix}$ as inputs and returns the smoothed estimate $X = \begin{bmatrix} X_{1|T} & X_{2|T} & \cdots & X_{T|T} \end{bmatrix}$

$$[X] = \text{smooth}(A, C, D1, D2, R, Z)$$

The Kalman Simulation Smoother. The m-file `sim.m` takes the matrices $A, C, D1, D2, R$ and the data matrix $Z \equiv \begin{bmatrix} Z_1 & Z_2 & \cdots & Z_T \end{bmatrix}$ as inputs and returns a draw X from $p(X^T \mid Z^t)$.

$$[X] = \text{sim}(A, C, D1, D2, R, Z)$$

The State Distribution Plotter. The m-file `plotdist.m` takes the matrices $A, C, D1, D2, R$ and the data matrix $Z \equiv \begin{bmatrix} Z_1 & Z_2 & \cdots & Z_T \end{bmatrix}$ as inputs together with the percentiles (`upper` and `lower`), the number of draws `ndraws`, and two indicators `plotplease` and `legendplease`.

$$[M, U, L] = \text{plotdist}(A, C, D1, D2, R, Z, \text{upper}, \text{lower}, \text{ndraws}, \text{plotplease}, \text{legendplease})$$

The output M, U, L are $n \times (T + 1)$ matrices containing respectively the median and the upper and lower percentile of the smoothed distribution of X^T . `Upper` and `lower` should be of the form 0.975, 0.025 etc, `plotplease` and `legendplease` should be set to 1 if plots and legends are desired.

To use the code for the standard filter, simply set $D2$ equal to (the scalar) 0.