

Predictions

$$\begin{aligned}\hat{D}_{p,t_p,k} &= \rho^{(t_p,k-t_{p,1})} D_{p,t_{p,1}} + \sum_{b=t_{p,1}+1}^{t_p,k} \rho^{(t_p,k-b)} X_{p,b} \beta \\ &= \rho^{(t_p,k-t_{p,k-1})} \hat{D}_{p,t_{p,k-1}} + \sum_{b=t_{p,k-1}+1}^{t_p,k} \rho^{(t_p,k-b)} X_{p,b} \beta\end{aligned}$$

MeasurementError

$$\begin{aligned}\text{Cov}(\varepsilon_{t_p,k}^*, \varepsilon_{t_p,l}^*) &= \sigma^2 \sum_{b=1}^k \rho^{(t_p,l+t_{p,k}-2t_{p,b})} \\ &= \rho^{(t_p,k-t_{p,k-1})} \text{Cov}(\varepsilon_{t_p,k-1}^*, \varepsilon_{t_p,l}^*) + \sigma^2 \rho^{(t_p,l-t_{p,k})}\end{aligned}$$

ProcessError

$$\begin{aligned}\text{Cov}(\varepsilon_{t_p,k}^*, \varepsilon_{t_p,l}^*) &= \sigma^2 \sum_{b=t_{p,1}+1}^{t_p,k} \rho^{(t_p,l+t_{p,k}-2b)} \\ &= \rho^{(t_p,k-t_{p,k-1})} \text{Cov}(\varepsilon_{t_p,k-1}^*, \varepsilon_{t_p,l}^*) + \sigma^2 \sum_{b=t_{p,k-1}+1}^{t_p,k} \rho^{(t_p,l+t_{p,k}-2b)}\end{aligned}$$