$$\begin{bmatrix} \phi_{t+1} \\ w_{t+1} \end{bmatrix} = \underbrace{\begin{bmatrix} 1 & 3 \\ -2 & 1 \end{bmatrix}}_{A} \begin{bmatrix} \phi_t \\ w_t \end{bmatrix}$$

$$l_i(\underbrace{\phi, w}_{\theta}) = \frac{1}{2}(Y_i - M_i^T \theta)^2$$

$$\begin{bmatrix} \phi_t \\ w_t \end{bmatrix} = \theta_{t+1} = A\theta_t + \xi_t \qquad \left(\underbrace{\begin{bmatrix} M_i^{\phi} \\ M_i^{w} \end{bmatrix}}_{M_i}, y_i\right)$$

$$\underline{Y_i} = \bar{M}_i \theta_t$$

$$= M_{\phi_i}^T \phi_t + M_{w_i}^T w_t$$