$$y_t = \begin{bmatrix} x_{1t}, x_{2t}, \ldots, x_{nt} \end{bmatrix} \begin{bmatrix} \beta_{1t} \\ \beta_{2t} \\ . \\ . \\ . \\ \beta_{nt} \end{bmatrix} + e_t$$

A digression to show an example.

$$5 = \begin{bmatrix} 1, 7, -3 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix}$$

$$\begin{bmatrix} \beta_{1t} \\ \beta_{2t} \\ . \\ . \\ . \\ \beta_{nt} \end{bmatrix} = \begin{bmatrix} \mu_1 \\ \mu_2 \\ . \\ . \\ . \\ \mu_n \end{bmatrix} + \begin{bmatrix} f_{11} & f_{12} & \ldots & f_{1n} \\ f_{21} & f_{22} & \ldots & f_{2n} \\ . \\ . \\ . \\ f_{n1} & f_{n2} & \ldots & f_{nn} \end{bmatrix} \begin{bmatrix} \beta_{1(t-1)} \\ \beta_{2(t-1)} \\ . \\ . \\ . \\ \beta_{n(t-1)} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \\ . \\ . \\ . \\ v_{nt} \end{bmatrix}$$

$$\begin{bmatrix} v_1 \\ v_2 \\ . \\ . \\ . \\ v_n \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \\ . \\ . \\ . \\ 0 \end{bmatrix}, \begin{bmatrix} cov(v_1,v_1) & cov(v_1,v_2) & \ldots & cov(v_1,v_n) \\ cov(v_2,v_1) & cov(v_2,v_2) & \ldots & cov(v_2,v_n) \\ . \\ . \\ . \\ cov(v_n,v_1) & cov(v_n,v_2) & \ldots & cov(v_n,v_n) \end{bmatrix} \right)$$

$e_t \sim N(0,R)$

$m = E(x)$

$E \qquad E\left((x-m)(x-m)\right) = E((x-m)^2)$

$b_t = miu + F B_{t-1} + v_t$

$E(b_t) = mu + F E(b_{t-1}) + E(v_t) = 0$

$E(b_t) \mid t-1 = b_t \mid t-1$

$E(b_t) \mid t-1 = mu + F E(b_{t-1} \mid t-1)$

$b_t \mid t-1 = mu + F b_{t-1} \mid t-1$