1 Models

1.1 SVMALD

$$\begin{bmatrix} Y_{1,t+1}-Y_{1,t} \\ Y_{2,t+1}-Y_{1,t} \\ V_{1,t+1}-V_{1,t} \\ V_{2,t+1}-V_{2,t} \end{bmatrix} = \begin{bmatrix} \mu_1\Delta \\ \mu_2\Delta \\ \kappa_1(\theta_1 - V_{1,t})\Delta \\ \kappa_2(\theta_2 - V_{2,t})\Delta \end{bmatrix} + \sqrt{\Delta}\Sigma_t^{\frac{1}{2}} \begin{bmatrix} \epsilon_{y_1,t+1} \\ \epsilon_{y_2,t+1} \\ \epsilon_{v_1,t+1} \\ \epsilon_{v_2,t+1} \end{bmatrix} + \begin{bmatrix} N_{t+1}(M_{y_1,t+1}\xi_{y_1,t+1} + M_{c,t+1}\xi_{y_1,c,t+1}) \\ N_{t+1}(M_{y_2,t+1}\xi_{y_2,t+1} + M_{c,t+1}\xi_{y_2,c,t+1}) \\ 0 \\ 0 \end{bmatrix}, \tag{1}$$

where $\Sigma_t = \begin{bmatrix} V_{1,t} & \rho_y\sqrt{V_{1,t}V_{2,t}} & \rho_1\sigma_{v,1}V_{1,t} & 0 \\ \rho_y\sqrt{V_{1,t}V_{2,t}} & V_{2,t} & 0 & \rho_2\sigma_{v,2}V_{2,t} \\ \rho_1\sigma_{v,1}V_{1,t} & 0 & \sigma_{v,1}^2V_{1,t} & \rho_v\sigma_{v,1}\sigma_{v,2}\sqrt{V_{1,t}V_{2,t}} \\ 0 & \rho_2\sigma_{v,2}V_{2,t} & \rho_v\sigma_{v,1}\sigma_{v,2}\sqrt{V_{1,t}V_{2,t}} & \sigma_{v,2}^2V_{2,t} \end{bmatrix}$,
$\epsilon_{k,t+1} \overset{iid}{\sim} N(0,1), k = \{y_1, y_2, v_1, v_2\}$, $\xi_{y_1,t+1} \overset{iid}{\sim} \mathcal{AL}_1(\mu_{y_1}, \nu_{y_1}^2)$, $\xi_{y_2,t+1} \overset{iid}{\sim} \mathcal{AL}_1(\mu_{y_2}, \nu_{y_2}^2)$,
$\boldsymbol{\xi}_{c,t+1} = [\xi_{y_1,c,t+1}, \xi_{y_2,c,t+1}]' \overset{iid}{\sim} \mathcal{AL}_2(\boldsymbol{\mu}_c, \boldsymbol{\nu}_c)$, $\left[M_{y_1,t+1}, M_{y_2,t+1}, M_{c,t+1} \sim Multinomial(1; \frac{\lambda_{y_1}}{\lambda}, \frac{\lambda_{y_2}}{\lambda}, \frac{\lambda_c}{\lambda})\right]$,
and $N_{t+1} \sim Bernoulli(\lambda\Delta)$

1.2 SVLD

1.3 SVMVN

1.4 SVIND

$$\begin{bmatrix} Y_{t+1}-Y_t \\ V_{t+1}-V_t \end{bmatrix} = \begin{bmatrix} \mu\Delta \\ \kappa(\theta - V_t)\Delta \end{bmatrix} + \sqrt{V_t\Delta} \begin{bmatrix} 1 & 0 \\ \rho\sigma_v & \sqrt{1-\rho^2}\sigma_v \end{bmatrix} \begin{bmatrix} \epsilon_{y,t+1} \\ \epsilon_{v,t+1} \end{bmatrix} + \begin{bmatrix} N_{y,t+1}\xi_{y,t+1} \\ 0 \end{bmatrix}, \tag{2}$$

$$\epsilon_{k,t+1} \overset{iid}{\sim} N(0,1), k = \{y, v\}$$

$$\xi_{y,t+1} \overset{iid}{\sim} \mathcal{AL}_1(\mu_y, \nu_y^2)$$

$$N_{y,t+1} \sim Bernoulli(\lambda\Delta)$$