$$
\begin{aligned}
\mathbf{y}_{tg} &= \lambda_g \mathbf{W}\mathbf{y}_{tg} + \mathbf{X}_{tg}\boldsymbol{\beta}_g + \mathbf{W}\mathbf{X}^*_{tg}\gamma_g + \mathbf{u}_{tg} \\
\mathbf{u}_{tg} &= \rho_g \mathbf{W}\mathbf{u}_{tg} + \boldsymbol{\varepsilon}_{tg}
\end{aligned} \tag{1}
$$

$$
\begin{aligned}
E\left[\boldsymbol{\varepsilon}_{tg}\right] &= 0 \\
E\left[\boldsymbol{\varepsilon}_{tg}\boldsymbol{\varepsilon}'_{sh}\right] &= \begin{cases} \sigma_{gh}\mathbf{I}_N & t = s \\ \mathbf{0}_N & t \neq s \end{cases}
\end{aligned}
$$

$$
\begin{array}{l}
\mathbf{y}_{tg} = \lambda_g \, \mathbf{W} \, \mathbf{y}_{tg} + \mathbf{X}_{tg} \, \boldsymbol{\beta}_g + \mathbf{W}\mathbf{X}^*_{tg}\gamma_g + \mathbf{u}_{tg} \\
\mathbf{u}_{tg} = \rho_g \, \mathbf{W} \, \mathbf{u}_{tg} + \boldsymbol{\varepsilon}_{tg} \\
\quad E\left[\boldsymbol{\varepsilon}_{tg}\right] = 0 \quad E\left[\boldsymbol{\varepsilon}_{tg} \, \boldsymbol{\varepsilon}'{}_{sh}\right] = \left\{ \begin{array}{ll} \sigma_{gh} \, \mathbf{I}_N & t = s \\ \mathbf{0}_N & t \neq s \end{array} \right.
\end{array} \quad (\#eq:sure) \tag{2}
$$