$$T_{f,j} = \alpha_j + \beta_j + \omega_j \pi_{f,j} \tag{1}$$

$$A_{f,j,s,t+1} = (1 - \phi_{j,s}) A_{f,j,s,t} + \phi_{j,s} \pi_{f,j,s,t} \tag{2}$$

$$P(F)_{f,j,s,t} = \frac{F_{f,j,s,t} + \alpha_{j,s,t}}{t_{j,s} + K} \tag{3}$$

$$F_{f,j,s,t} = F_{f,j,s,t-1} + 1 \tag{4}$$

$$\alpha_{j,s,t} = F_{j,s,t} + \alpha_{j,s,t-1} \tag{5}$$

$$\text{Prob}(S)_{j,s=11,t} = \frac{\exp\left(\lambda_{j,s=11,t} \cdot P(F)_{f,j,s=11,t} \cdot A_{f,j,s=11,t}\right)}{\exp\left(\lambda_{j,s=11,t} \cdot P(F)_{1,j,s=11,t} \cdot A_{1,j,s=11,t}\right) + \exp\left(\lambda_{j,s=11,t} \cdot P(F)_{2,j,s=11,t} \cdot A_{2,j,s=11,t}\right)} \tag{6}$$

$$\text{Prob}(S)_{j,s=11,t} = \frac{\exp\left(\lambda_{j,s=11,t} \cdot P(F)_{f,j,s=11,t} \cdot A_{f,j,s=11,t}\right)}{\sum_{m=1}^{2} \exp\left(\lambda_{j,s=11,t} \cdot P(F)_{m,j,s=11,t} \cdot A_{m,j,s=11,t}\right)}$$