Lagrangian function

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$$x = \left[q_{e,m,t},\ \bar{q}_{e',t},\ q_t^{stock,stored},\ q_t^{stock,out},\ q_t^{stock,in},\ \bar{q}_{e',t}^{exp},\ \bar{q}_{e',t}^{rehire} \right]$$

$$\begin{aligned}
\mathcal{L}(x,\lambda,\nu) = & \sum_m \sum_t c_1^{gen} \times q_{1,m,t} + \sum_{e'} \sum_m \sum_t c_{e'}^{gen} \times q_{e',m,t} + \sum_{e'} \sum_t c_{e'}^{main} \times \bar{q}_{e',t} + \sum_t c^{stock} \times q_t^{stock,stored} \\
& + \sum_t \lambda_t^1 \times \left\{ d_{M1,t} - \left[\sum_e q_{e,M1,t} \right] - q_t^{stock,out} + q_t^{stock,in} \right\} \\
& + \sum_t \lambda_t^2 \times \left\{ d_{M2,t} - \left[\sum_e q_{e,M2,t} \right] \right\} \\
& + \sum_e \sum_t \nu_{e,t}^1 \times \left\{ q_{e,M1,t} - \ell \times d_{M1,t} \right\} \\
& + \sum_{t'} \lambda_{t'}^3 \times \left\{ q_t^{stock,stored} - q_{t-1}^{stock,stored} + q_{t-1}^{stock,out} - q_{t-1}^{stock,in} \right\} \\
& + \sum_e \nu_e^2 \times \left\{ \left[\sum_m \sum_t q_{e,m,t} \right] - Q_e \right\} \\
& + \sum_e \sum_t \nu_{e,t}^3 \times \left\{ \left[\sum_m q_{e,m,t} \right] - \bar{q}_{e,t} \right\} \\
& + \lambda^4 \times \left\{ q_{t_start}^{stock,stored} \right\} \\
& + \sum_{e'} \sum_t \nu_{e',t}^4 \times \left\{ \bar{q}_{e',t}^{exp} - \beta^{add} \times \left[\sum_m q_{e',m,t} \right] \right\} \\
& + \sum_{e'} \sum_t \nu_{e',t}^5 \times \left\{ \bar{q}_{e',t}^{rehire} - \beta^{rehire} \times \bar{q}_{e'}^{init} \right\} \\
& + \lambda^{10} \times \left\{ q_{t_start}^{stock,out} \right\} \\
& + \sum_{e'} \sum_{t'} \lambda_{e',t'}^5 \times \left\{ \bar{q}_{e',t'} - \bar{q}_{e',t'-1} - \bar{q}_{e',t'-1}^{exp} + \bar{q}_{e',t'-1}^{rehire} \right\} \\
& + \sum_{e'} \lambda_{e'}^6 \times \left\{ \bar{q}_{e',t_start} - \bar{q}_{e'}^{init} \right\} \\
& + \lambda^7 \times \left\{ q_{t_end}^{stock,out} - q_{t_end}^{stock,stored} \right\} \\
& + \lambda^8 \times \left\{ q_{t_end}^{stock,in} \right\} \\
& + \sum_{\tilde{e}} \sum_{\tilde{t}} \lambda_{\tilde{e},\tilde{t}}^9 \times \left\{ q_{\tilde{e},m,\tilde{t}} \right\}
\end{aligned}$$

$$+ \sum_{\tilde{e}} \sum_{\tilde{t}} \lambda^{5}_{\tilde{e},\tilde{t}} \times \left\{ q_{\tilde{e},m,\tilde{t}} \right\}$$

$$+ \sum_{e} \sum_{m} \sum_{t} \mu^{6}_{e,m,t} \times \left\{ - q_{e,m,t} \right\}$$

$$+ \sum_{t} \mu^{7}_{t} \times \left\{ - q^{\text{Stock, stored}}_{t} \right\}$$

$$+ \sum_{t} \mu^{8}_{t} \times \left\{ - q^{\text{Stock, out}}_{t} \right\}$$

$$+ \sum_{t} \mu^{9}_{t} \times \left\{ - q^{\text{Stock, in}}_{t} \right\}$$

$$+ \sum_{e'} \sum_{t} \mu^{10}_{e',t} \times \left\{ - \bar{q}_{e',t} \right\}$$

$$+ \sum_{e'} \sum_{t} \mu^{11}_{e',t} \times \left\{ - \bar{q}^{\text{exp}}_{e',t} \right\}$$

$$+ \sum_{e'} \sum_{t} \mu^{12}_{e',t} \times \left\{ - \bar{q}^{\text{reine}}_{e',t} \right\}$$