

$$rfEXP = \omega^P r^f_{t+1} + (1 - \omega^P) r^f_t$$

$$tauC\_1EXP = \omega^P \tau^C_{r\ t+1} + (1 - \omega^P) \tau^C_{r\ t}$$

$$tauKH\_1EXP = \omega^P \tau^{K,H}_{r\ t+1} + (1 - \omega^P) \tau^{K,H}_{r\ t}$$

$$P\_1EXP = \omega^P P_{r\ t+1} + (1 - \omega^P) P_{r\ t}$$

$$NX\_1EXP = \omega^P NX_{r\ t+1} + (1 - \omega^P) NX_{r\ t}$$

$$B\_1EXP = \omega^P B_{r\ t} + (1 - \omega^P) B_{r\ t-1}$$

$$B\_1EXPEXP = \omega^P B_{r\ t+1} + (1 - \omega^P) B_{r\ t}$$

$$Y\_1EXP = \omega^P Y_{r\ t+1} + (1 - \omega^P) Y_{r\ t}$$

$$C\_1EXP = \omega^P C_{r\ t+1} + (1 - \omega^P) C_{r\ t}$$

$$H\_1EXP = \omega^P H_{r\ t+1} + (1 - \omega^P) H_{r\ t}$$

$$PoP\_1EXP = \omega^P PoP_{r\ t+1} + (1 - \omega^P) PoP_{r\ t}$$

$$lambda\_1EXP = \omega^P \lambda_{r\ t+1} + (1 - \omega^P) \lambda_{r\ t}$$

$$omegaH\_1EXP = \omega^P \omega^H_{r\ t+1} + (1 - \omega^P) \omega^H_{r\ t}$$

$$NX\_1\_1EXP = \omega^P NX_{r, m\ t+1} + (1 - \omega^P) NX_{r, m\ t}$$

$$B\_1\_1EXP = \omega^P B_{r, m\ t+1} + (1 - \omega^P) B_{r, m\ t}$$

$$B\_1\_1EXPEXP = \omega^P B_{r, m\ t+2} + (1 - \omega^P) B_{r, m\ t+1}$$

$$P\_1\_1EXP = \omega^P P_{s, r\ t+1} + (1 - \omega^P) P_{s, r\ t}$$

$$r\_1\_1EXP = \omega^P r_{s,r_{t+1}} + (1 - \omega^P) r_{s,r_t}$$

$$omegaI\_1\_1EXP = \omega^P \omega_{s,r_{t+1}}^I + (1 - \omega^P) \omega_{s,r_t}^I$$

$$I\_1\_1EXP = \omega^P I_{s,r_{t+1}} + (1 - \omega^P) I_{s,r_t}$$

$$P\_2\_1EXP = \omega^P P_{s,r_{t+1}} + (1 - \omega^P) P_{s,r_t}$$

$$r\_2\_1EXP = \omega^P r_{s,r_{t+1}} + (1 - \omega^P) r_{s,r_t}$$

$$omegaI\_2\_1EXP = \omega^P \omega_{s,r_{t+1}}^I + (1 - \omega^P) \omega_{s,r_t}^I$$

$$I\_2\_1EXP = \omega^P I_{s,r_{t+1}} + (1 - \omega^P) I_{s,r_t}$$

$$P\_3\_1EXP = \omega^P P_{s,r_{t+1}} + (1 - \omega^P) P_{s,r_t}$$

$$r\_3\_1EXP = \omega^P r_{s,r_{t+1}} + (1 - \omega^P) r_{s,r_t}$$

$$omegaI\_3\_1EXP = \omega^P \omega_{s,r_{t+1}}^I + (1 - \omega^P) \omega_{s,r_t}^I$$

$$I\_3\_1EXP = \omega^P I_{s,r_{t+1}} + (1 - \omega^P) I_{s,r_t}$$

$$P\_4\_1EXP = \omega^P P_{s,r_{t+1}} + (1 - \omega^P) P_{s,r_t}$$

$$r\_4\_1EXP = \omega^P r_{s,r_{t+1}} + (1 - \omega^P) r_{s,r_t}$$

$$omegaI\_4\_1EXP = \omega^P \omega_{s,r_{t+1}}^I + (1 - \omega^P) \omega_{s,r_t}^I$$

$$I\_4\_1EXP = \omega^P I_{s,r_{t+1}} + (1 - \omega^P) I_{s,r_t}$$

$$P\_5\_1EXP = \omega^P P_{s,r_{t+1}} + (1 - \omega^P) P_{s,r_t}$$

$$r\_5\_1EXP = \omega^P r_{s,r_{t+1}} + (1 - \omega^P) r_{s,r_t}$$

$$\omega I_{\_5\_1} EXP = \omega^P \omega_{s,r_{t+1}}^I + (1 - \omega^P) \omega_{s,r_t}^I$$

$$I_{\_5\_1} EXP = \omega^P I_{s,r_{t+1}} + (1 - \omega^P) I_{s,r_t}$$

$$lhsBlock2\_1 = PoP_t$$

$$rhsBlock2\_1 = PoP_{r_t}$$

$$lhsBlock2\_2 = LF_t$$

$$rhsBlock2\_2 = LF_{r_t}$$

$$lhsBlock2\_3 = W_t$$

$$rhsBlock2\_3 = \frac{LF_{r_t} N_{s,r_t}}{LF_t N_t} W_{s,r_t} + \frac{LF_{r_t} N_{s,r_t}}{LF_t N_t} W_{s,r_t} + \frac{LF_{r_t} N_{s,r_t}}{LF_t N_t} W_{s,r_t} + \frac{LF_{r_t} N_{s,r_t}}{LF_t N_t} W_{s,r_t} + \frac{LF_{r_t} N_{s,r_t}}{LF_t N_t} W_{s,r_t}$$

$$lhsBlock2\_4 = B_t$$

$$rhsBlock2\_4 = B\_1 EXP$$

$$lhsBlock2\_5 = NX_t$$

$$rhsBlock2\_5 = X_t - M_t$$

$$lhsBlock2\_6 = G_t$$

$$rhsBlock2\_6 = P_{r_t} G_{r_t}$$

$$lhsBlock2\_7 = I_t$$

$$rhsBlock2\_7 = \max(0, P_{s,r_t} I_{s,r_t}) + \max(0, P_{s,r_t} I_{s,r_t}) + \max(0, P_{s,r_t} I_{s,r_t}) + \max(0, P_{s,r_t} I_{s,r_t}) + \max(0, P_{s,r_t} I_{s,r_t})$$

$$lhsBlock2\_8 = C_t$$

$$rhsBlock2\_8 = P_{r_t} C_{r_t}$$

$$lhsBlock2\_9 = Y_t$$

$$rhsBlock2\_9 = Y_{r_t}$$

$$lhsBlock2\_10 = Q_t$$

$$rhsBlock2\_10 = Q_{r_t}^S$$

$$lhsBlock2\_11 = Q_t^I$$

$$rhsBlock2\_11 = Q_{r_t}^I$$

$$lhsBlock2\_12 = Q_t^U$$

$$rhsBlock2\_12 = Q_{r_t}^U P_{r_t}^D$$

$$lhsBlock2\_13 = X_t$$

$$rhsBlock2\_13 = X_{r_t} P_{r_t}^Q$$

$$lhsBlock2\_14 = M_t$$

$$rhsBlock2\_14 = M_{r_t}$$

$$lhsBlock2\_15 = L F_t N_t$$

$$rhsBlock2\_15 = L F_{r_t} N_{r_t}$$

$$WDiff\_1 = \exp \left( \log \left( \frac{W_{r_t-1}}{W_{t-1}} \right) \right)$$

$$lhsBlock3\_1\_1 = W_{r_t}$$

$$rhsBlock3\_1\_1 = W_{s,r_t} \frac{N_{s,r_t}}{N_{r_t}} + W_{s,r_t} \frac{N_{s,r_t}}{N_{r_t}} + W_{s,r_t} \frac{N_{s,r_t}}{N_{r_t}} + W_{s,r_t} \frac{N_{s,r_t}}{N_{r_t}} + W_{s,r_t} \frac{N_{s,r_t}}{N_{r_t}}$$

$$lhsBlock3\_1\_2 = M_{r_t}$$

$$rhsBlock3\_1\_2 = P_{s_t}^M \left( M_{s,r_t}^I + M_{s,r_t}^F \right) + P_{s_t}^M \left( M_{s,r_t}^I + M_{s,r_t}^F \right) + P_{s_t}^M \left( M_{s,r_t}^I + M_{s,r_t}^F \right) + P_{s_t}^M \left( M_{s,r_t}^I + M_{s,r_t}^F \right) + P_{s_t}^M \left( M_{s,r_t}^I + M_{s,r_t}^F \right)$$

$$lhsBlock3\_1\_3 = P_{r_t}^D$$

$$rhsBlock3\_1\_3 = P_0 \exp \left( \eta_r^{P^D} \right)$$

$$lhsAggReg\_1\_11 = P_{r_t}^F$$

$$rhsAggReg\_1\_11 = \left( \omega_{k,r}^{M,A} P_{k,r_t}^{A,M^{1-\eta^Q}} + \omega_{k,r}^{M,A} P_{k,r_t}^{A,M^{1-\eta^Q}} + \omega_{k,r}^{M,A} P_{k,r_t}^{A,M^{1-\eta^Q}} + \omega_{k,r}^{M,A} P_{k,r_t}^{A,M^{1-\eta^Q}} \right)^{\frac{1}{1-\eta^Q}}$$

$$lhsAggReg\_1\_18 = s_{r_t}$$

$$rhsAggReg\_1\_18 = \rho^s s_{r,t-1} + (1 - \rho^s) s_{r,0} \exp(\eta_{r,t}^s)$$

$$lhsAggReg\_1\_EXP = P_{r,t}^Q$$

$$rhsAggReg\_1\_EXP = \left( D_{s,r}^X P_{s,r,t}^{Q^{1-\eta^X}} + D_{s,r}^X P_{s,r,t}^{Q^{1-\eta^X}} + D_{s,r}^X P_{s,r,t}^{Q^{1-\eta^X}} + D_{s,r}^X P_{s,r,t}^{Q^{1-\eta^X}} + D_{s,r}^X P_{s,r,t}^{Q^{1-\eta^X}} \right)^{\frac{1}{1-\eta^X}}$$

$$lhsAggReg\_1\_19 = Q_{r,t}^S$$

$$rhsAggReg\_1\_19 = P_{s,r,t}^Q Q_{s,r,t} + P_{s,r,t}^Q Q_{s,r,t} + P_{s,r,t}^Q Q_{s,r,t} + P_{s,r,t}^Q Q_{s,r,t} + P_{s,r,t}^Q Q_{s,r,t}$$

$$lhsAggReg\_1\_20 = Q_{r,t}^I$$

$$rhsAggReg\_1\_20 = P_{s,r,t}^I Q_{s,r,t}^I + P_{s,r,t}^I Q_{s,r,t}^I + P_{s,r,t}^I Q_{s,r,t}^I + P_{s,r,t}^I Q_{s,r,t}^I + P_{s,r,t}^I Q_{s,r,t}^I$$

$$lhsAggReg\_1\_6 = P_{r,t}$$

$$rhsAggReg\_1\_6 = \left( \omega_r^F P_{r,t}^{F^{1-\eta^F}} + (1 - \omega_r^F) P_{r,t}^{D^{1-\eta^F}} \right)^{\frac{1}{1-\eta^F}}$$

$$lhsAggReg\_1\_22 = NX_{r,t}$$

$$rhsAggReg\_1\_22 = X_{r,t} P_{r,t}^Q - M_{r,t}$$

$$lhsAggReg\_1\_23 = N_{r,t}$$

$$rhsAggReg\_1\_23 = N_{s,r,t} + N_{s,r,t} + N_{s,r,t} + N_{s,r,t} + N_{s,r,t}$$

$$lhsAggReg\_1\_24 = Y_{r,t}$$

$$rhsAggReg\_1\_24 = P_{s,r,t} Y_{s,r,t} + P_{s,r,t} Y_{s,r,t} + P_{s,r,t} Y_{s,r,t} + P_{s,r,t} Y_{s,r,t} + P_{s,r,t} Y_{s,r,t}$$

$$lhsAggReg\_1\_10 = I_{r,t}$$

$$rhsAggReg\_1\_10 = \frac{P_{s,r,t} \max(0, I_{s,r,t})}{P_{r,t}} + \frac{P_{s,r,t} \max(0, I_{s,r,t})}{P_{r,t}} + \frac{P_{s,r,t} \max(0, I_{s,r,t})}{P_{r,t}} + \frac{P_{s,r,t} \max(0, I_{s,r,t})}{P_{r,t}} + \frac{P_{s,r,t} \max(0, I_{s,r,t})}{P_{r,t}}$$

$$lhsAggReg\_1\_29 = LF_{r,t}$$

$$\begin{aligned}
rhsAggReg\_1\_29 &= \left( l^{EndogenousMigration} \right. \\
&= \\
&= 0 \left. \right) LF_{r,0} \exp \left( \eta_r^{LF} \right)_t + \left( l^{EndogenousMigration} \right. \\
&= \\
&= 1 \left. \right) LF_{r,0} \exp \left( \eta_r^{LF} \right)_t
\end{aligned}$$

$$lhsAggReg\_1\_17 = PoP_{r_t}$$

$$rhsAggReg\_1\_17 = LF_{r_t} + (PoP_{r,0} - LF_{r,0}) \exp \left( \eta_r^{NLF} \right)_t$$

$$lhsSubsec\_19\_1 = P_s^M_t$$

$$rhsSubsec\_19\_1 = P_{s,r_t}^Q + \eta^{M,k}_t$$

$$lhsSubsec\_19\_2 = P_s^M_t$$

$$rhsSubsec\_19\_2 = P_{s,r_t}^Q + \eta^{M,k}_t$$

$$lhsSubsec\_19\_3 = P_s^M_t$$

$$rhsSubsec\_19\_3 = P_{s,r_t}^Q + \eta^{M,k}_t$$

$$lhsSubsec\_19\_4 = P_s^M_t$$

$$rhsSubsec\_19\_4 = P_{s,r_t}^Q + \eta^{M,k}_t$$

$$lhsSubsec\_19\_5 = P_s^M_t$$

$$rhsSubsec\_19\_5 = P_{s,r_t}^Q + \eta^{M,k}_t$$

$$lhsAggNat\_2 = r^f_t$$

$$rhsAggNat\_2 = \frac{1}{\beta \exp \left( \eta^\beta_t \right)} - 1 + \eta^{r^f}_t$$

$$\begin{aligned}
lhsNX\_1 &= \frac{NX_{rt}}{Y_{rt}} \left( \eta_r^{NX}{}_t \right. \\
&= \\
&= 1 \Big) + a_{r\_t}^B \left( \eta_r^{NX}{}_t \right. \\
&= \\
&= 0 \Big)
\end{aligned}$$

$$\begin{aligned}
rhsNX\_1 &= \left( \eta_r^{NX}{}_t \right. \\
&= \\
&= 0 \Big) \eta_r^{adj^B}{}_t + \left( \eta_r^{NX}{}_t \right. \\
&= \\
&= 1 \Big) \left( \eta_r^{NX}{}_t + NX_0 \right)
\end{aligned}$$

$$\begin{aligned}
lhsdeltaB\_1 &= \delta_r^B{}_t \left( \eta_r^B{}_t \right. \\
&= \\
&= 0 \Big) + \frac{B\_1EXP \left( \eta_r^B{}_t == 1 \right)}{Y_{rt}}
\end{aligned}$$

$$\begin{aligned}
rhsdeltaB\_1 &= \left( \eta_r^B{}_t \right. \\
&= \\
&= 0 \Big) \eta_r^{\delta^B}{}_t + \left( \eta_r^B{}_t \right. \\
&= \\
&= 1 \Big) \eta_r^B{}_t
\end{aligned}$$

$$lhsAggReg\_1\_7 = \lambda_{rt} \left( 1 + 2 \phi^{adj^B} \left( a_{r\_t}^B + B\_1EXP - B_{rt-1} \right) \right)$$

$$rhsAggReg\_1\_7 = \exp \left( \eta_r^{\beta}{}_t \right) \beta lambda\_1EXP \left( s_{rt+1} \left( 1 + rfEXP \right) \exp \left( \frac{(-\phi^B) \left( B\_1EXP - B_{rt-1} \left( 1 - \delta^B \right) \right)}{Y\_1EXP} \right) + 2 \phi^{adj^B} \left( a_{r\_t+1}^B + B_{rt+1} - B\_1EXP \right) \right)$$

$$lhsAggReg\_1\_107 = B\_1EXP$$

$$rhsAggReg\_1\_107 = \delta_r^B{}_t + NX_{rt} + B_{rt-1} s_{rt} \left( 1 + r^f{}_t \right) \exp \left( \frac{(-\phi^B) \left( B_{rt-1} - \left( 1 - \delta^B \right) B_{rt-2} \right)}{Y_{rt}} \right) - \phi^{adj^B} \left( B\_1EXP - B_{rt-1} + a_{r\_t}^B 0.5 \right)^2$$

$$lhsAggReg\_1\_8 = P_{rt} \lambda_{rt} \left( 1 + \tau_r^C{}_t \right)$$

$$\begin{aligned}
rhsAggReg\_1\_8 &= (1 - \gamma_r) \left( \frac{C_{rt} - h C_{rt-1}}{PoP_{rt}} \right)^{(-\gamma_r)} \left( \frac{H_{rt}}{PoP_{rt}} \right)^{\gamma_r} \left( \left( \frac{H_{rt}}{PoP_{rt}} \right)^{\gamma_r} \left( \frac{C_{rt} - h C_{rt-1}}{PoP_{rt}} \right)^{1-\gamma_r} \right)^{(-\sigma^C)} \\
&\quad - (1 - \gamma_r) \beta \exp\left(\eta_t^\beta\right) h \left( \frac{C\_1EXP - C_{rt} h}{PoP\_1EXP} \right)^{(-\gamma_r)} \left( \frac{H\_1EXP}{PoP\_1EXP} \right)^{\gamma_r} \left( \left( \frac{H\_1EXP}{PoP\_1EXP} \right)^{\gamma_r} \left( \frac{C\_1EXP - C_{rt} h}{PoP\_1EXP} \right)^{1-\gamma_r} \right)^{(-\sigma^C)}
\end{aligned}$$

$$lhsAggReg\_1\_12 = \frac{H_{rt}}{PoP_{rt}}$$

$$rhsAggReg\_1\_12 = \left(1 - \delta^H\right) \frac{H_{rt-1}}{PoP_{rt-1}} + \frac{I_{r,t}^H}{PoP_{rt}} - \frac{D_{r,t}^H}{PoP_{rt}}$$

$$lhsAggReg\_1\_13 = P_{r,t}^H$$

$$rhsAggReg\_1\_13 = P_{r,0}^H \exp\left(\eta_{r,t}^H\right)$$

$$lhsAggReg\_1\_15 = \lambda_{rt} \omega_{r,t}^H$$

$$\begin{aligned}
rhsAggReg\_1\_15 &= \beta \exp\left(\eta_t^\beta\right) \left( \left(1 - \delta^H\right) \text{lambda\_1EXP omegaH\_1EXP} \right. \\
&\quad \left. + \gamma_r \left( \frac{C\_1EXP - C_{rt} h}{PoP\_1EXP} \right)^{1-\gamma_r} \left( \frac{H_{rt}}{PoP\_1EXP} \right)^{\gamma_r-1} \left( \left( \frac{C\_1EXP - C_{rt} h}{PoP\_1EXP} \right)^{1-\gamma_r} \left( \frac{H_{rt}}{PoP\_1EXP} \right)^{\gamma_r} \right)^{(-\sigma^C)} \right)
\end{aligned}$$

$$lhsAggReg\_1\_16 = \lambda_{rt} \omega_{r,t}^H$$

$$rhsAggReg\_1\_16 = \lambda_{rt} P_{r,t}^H \left(1 + \tau_{r,t}^H\right)$$

$$lhsCapSub\_1\_1\_1 = \exp\left(\eta_t^\beta\right) \beta \text{lambda\_1EXP } r_{1\_1EXP} P_{1\_1EXP} l_{s,r}^Q (1 - \text{tauKH\_1EXP}) + \exp\left(\eta_t^\beta\right) \beta P_{1\_1EXP} \text{lambda\_1EXP omegaI\_1\_1EXP} \left(1 - \delta_{s,r}^K\right)$$

$$rhsCapSub\_1\_1\_1 = P_{s,rt} \lambda_{rt} \omega_{s,rt}^I$$

$$lhsCapSub\_2\_1\_1 = \lambda_{rt} P_{s,rt} l_{s,r}^Q$$



$$\begin{aligned}
rhsCapSub\_2\_1\_1 &= P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right. \\
&\quad \left. - \sqrt{\frac{\phi_{s,r}^K}{2}} \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}}}{PoP_{r_t}} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) - \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) \right) \right) \\
&\quad + \sqrt{\frac{\phi_{s,r}^K}{2}} \frac{omegaI\_1\_1EXP P\_1\_1EXP \beta \exp(\eta_t^\beta) lambda\_1EXP I\_1\_1EXP^2}{I_{s,r_t}^2} \left( \frac{PoP_{r_t}}{PoP\_1EXP} \right)^2 \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t} \frac{I\_1\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right. \\
&\quad \left. - \exp \left( \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \left( \frac{PoP_{r_t} \frac{I\_1\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right)
\end{aligned}$$

$$lhsCapSub\_3\_1\_1 = \frac{K_{s,r_t}}{PoP_{r_t}}$$

$$rhsCapSub\_3\_1\_1 = \frac{(1 - \delta_{s,r}^K) K_{s,r_{t-1}}}{PoP_{r_{t-1}}} + \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right) \frac{max(0, I_{s,r_t})}{PoP_{r_t}} - \frac{D_{s,r_t}^K}{PoP_{r_t}}$$

$$lhsSupplySubsec\_11\_1\_1 = \lambda_{r_t} \frac{LF_{r_t} W_{s,r_t} (1 - \tau_r^{N,H_t})}{PoP_{r_t}} l_{s,r}^N + N_{s,r_t} (1 - l_{s,r}^N)$$

$$rhsSupplySubsec\_11\_1\_1 = l_{s,r}^N \phi_{s,r}^L A_{s,r_t}^N N_{s,r_t}^{\sigma^L} + (1 - l_{s,r}^N) N_{s,r,0} N_{r,0}$$

$$lhsCapSub\_1\_1\_2 = (1 - tauKH\_1EXP) \exp(\eta_t^\beta) \beta lambda\_1EXP r\_2\_1EXP P\_2\_1EXP l_{s,r}^Q + \exp(\eta_t^\beta) \beta P\_2\_1EXP lambda\_1EXP omegaI\_2\_1EXP (1 - \delta_{s,r}^K)$$

$$rhsCapSub\_1\_1\_2 = P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I$$

$$lhsCapSub\_2\_1\_2 = \lambda_{r_t} l_{s,r}^Q$$

$$\begin{aligned}
rhsCapSub\_2\_1\_2 = & P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right. \\
& \left. - \sqrt{\frac{\phi_{s,r}^K}{2}} \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}}}{PoP_{r_t}} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) - \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) \right) \right) \\
& + \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t}}{PoP\_1EXP} \right)^2 \frac{\omega I\_2\_1EXP \beta \exp(\eta_t^\beta) \lambda\_1EXP P\_2\_1EXP I\_2\_1EXP^2}{I_{s,r_t}^2} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t} \frac{I\_2\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right. \\
& \left. - \exp \left( \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \left( \frac{PoP_{r_t} \frac{I\_2\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right)
\end{aligned}$$

$$lhsCapSub\_3\_1\_2 = \frac{K_{s,r_t}}{PoP_{r_t}}$$

$$rhsCapSub\_3\_1\_2 = \frac{(1 - \delta_{s,r}^K) K_{s,r_{t-1}}}{PoP_{r_{t-1}}} + \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right) \frac{\max(0, I_{s,r_t})}{PoP_{r_t}} - \frac{D_{s,r_t}^K}{PoP_{r_t}}$$

$$lhsSupplySubsec\_11\_1\_2 = \lambda_{r_t} \frac{LF_{r_t} W_{s,r_t} (1 - \tau_r^{N,H_t})}{PoP_{r_t}} l_{s,r}^N + N_{s,r_t} (1 - l_{s,r}^N)$$

$$rhsSupplySubsec\_11\_1\_2 = l_{s,r}^N \phi_{s,r}^L A_{s,r_t}^N N_{s,r_t} \sigma_t^L + N_{r,0} (1 - l_{s,r}^N) N_{s,r,0}$$

$$lhsCapSub\_1\_1\_3 = (1 - \tau KH\_1EXP) \exp(\eta_t^\beta) \beta \lambda\_1EXP r\_3\_1EXP P\_3\_1EXP l_{s,r}^Q + \exp(\eta_t^\beta) \beta P\_3\_1EXP \lambda\_1EXP \omega I\_3\_1EXP (1 - \delta_{s,r}^K)$$

$$rhsCapSub\_1\_1\_3 = P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I$$

$$lhsCapSub\_2\_1\_3 = \lambda_{r_t} l_{s,r}^Q$$

$$\begin{aligned}
rhsCapSub\_2\_1\_3 = & P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right. \\
& \left. - \sqrt{\frac{\phi_{s,r}^K}{2}} \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}}}{PoP_{r_t}} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) - \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) \right) \right) \\
& + \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t}}{PoP\_1EXP} \right)^2 \frac{\omega I\_3\_1EXP \beta \exp(\eta_t^\beta) \lambda\_1EXP P\_3\_1EXP I\_3\_1EXP^2}{I_{s,r_t}^2} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t} \frac{I\_3\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right. \\
& \left. - \exp \left( \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \left( \frac{PoP_{r_t} \frac{I\_3\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right)
\end{aligned}$$

$$lhsCapSub\_3\_1\_3 = \frac{K_{s,r_t}}{PoP_{r_t}}$$

$$rhsCapSub\_3\_1\_3 = \frac{(1 - \delta_{s,r}^K) K_{s,r_{t-1}}}{PoP_{r_{t-1}}} + \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right) \frac{\max(0, I_{s,r_t})}{PoP_{r_t}} - \frac{D_{s,r_t}^K}{PoP_{r_t}}$$

$$lhsSupplySubsec\_11\_1\_3 = \lambda_{r_t} \frac{LF_{r_t} W_{s,r_t} (1 - \tau_r^{N,H_t})}{PoP_{r_t}} l_{s,r}^N + N_{s,r_t} (1 - l_{s,r}^N)$$

$$rhsSupplySubsec\_11\_1\_3 = l_{s,r}^N \phi_{s,r}^L A_{s,r_t}^N N_{s,r_t} \sigma_t^L + N_{r,0} (1 - l_{s,r}^N) N_{s,r,0}$$

$$lhsCapSub\_1\_1\_4 = (1 - \tau KH\_1EXP) \exp(\eta_t^\beta) \beta \lambda\_1EXP r\_4\_1EXP P\_4\_1EXP l_{s,r}^Q + \exp(\eta_t^\beta) \beta P\_4\_1EXP \lambda\_1EXP \omega I\_4\_1EXP (1 - \delta_{s,r}^K)$$

$$rhsCapSub\_1\_1\_4 = P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I$$

$$lhsCapSub\_2\_1\_4 = \lambda_{r_t} P_{s,r_t} l_{s,r}^Q$$

$$\begin{aligned}
rhsCapSub\_2\_1\_4 = & P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right. \\
& \left. - \sqrt{\frac{\phi_{s,r}^K}{2}} \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}}}{PoP_{r_t}} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) - \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) \right) \right) \\
& + \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t}}{PoP\_1EXP} \right)^2 \frac{\omega I\_4\_1EXP \beta \exp(\eta_t^\beta) \lambda\_1EXP P\_4\_1EXP I\_4\_1EXP^2}{I_{s,r_t}^2} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t} \frac{I\_4\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right. \\
& \left. - \exp \left( \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \left( \frac{PoP_{r_t} \frac{I\_4\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right)
\end{aligned}$$

$$lhsCapSub\_3\_1\_4 = \frac{K_{s,r_t}}{PoP_{r_t}}$$

$$rhsCapSub\_3\_1\_4 = \frac{(1 - \delta_{s,r}^K) K_{s,r_{t-1}}}{PoP_{r_{t-1}}} + \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right) \frac{\max(0, I_{s,r_t})}{PoP_{r_t}} - \frac{D_{s,r_t}^K}{PoP_{r_t}}$$

$$lhsSupplySubsec\_11\_1\_4 = \lambda_{r_t} \frac{LF_{r_t} W_{s,r_t} (1 - \tau_r^{N,H_t})}{PoP_{r_t}} l_{s,r}^N + N_{s,r_t} (1 - l_{s,r}^N)$$

$$rhsSupplySubsec\_11\_1\_4 = l_{s,r}^N \phi_{s,r}^L A_{s,r_t}^N N_{s,r_t} \sigma_t^L + N_{r,0} (1 - l_{s,r}^N) N_{s,r,0}$$

$$lhsCapSub\_1\_1\_5 = (1 - \tau KH\_1EXP) \exp(\eta_t^\beta) \beta \lambda\_1EXP r\_5\_1EXP P\_5\_1EXP l_{s,r}^Q + \exp(\eta_t^\beta) \beta P\_5\_1EXP \lambda\_1EXP \omega I\_5\_1EXP (1 - \delta_{s,r}^K)$$

$$rhsCapSub\_1\_1\_5 = P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I$$

$$lhsCapSub\_2\_1\_5 = \lambda_{r_t} l_{s,r}^Q$$

$$\begin{aligned}
rhsCapSub\_2\_1\_5 = & P_{s,r_t} \lambda_{r_t} \omega_{s,r_t}^I \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right. \\
& \left. - \sqrt{\frac{\phi_{s,r}^K}{2}} \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}}}{PoP_{r_t}} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) - \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) \right) \right) \\
& + \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t}}{PoP\_1EXP} \right)^2 \frac{\omega I\_5\_1EXP \beta \exp(\eta^\beta_t) \lambda\_1EXP P\_5\_1EXP I\_5\_1EXP^2}{I_{s,r_t}^2} \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r_t} \frac{I\_5\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right. \\
& \left. - \exp \left( \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \left( \frac{PoP_{r_t} \frac{I\_5\_1EXP}{I_{s,r_t}} - 1 \right) \right) \right)
\end{aligned}$$

$$lhsCapSub\_3\_1\_5 = \frac{K_{s,r_t}}{PoP_{r_t}}$$

$$rhsCapSub\_3\_1\_5 = \frac{(1 - \delta_{s,r}^K) K_{s,r_{t-1}}}{PoP_{r_{t-1}}} + \left( 1 - \left( \exp \left( \sqrt{\frac{\phi_{s,r}^K}{2}} \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \right) + \exp \left( \left( \frac{PoP_{r,t-1} \frac{I_{s,r_t}}{I_{s,r_{t-1}}} - 1 \right) \left( -\sqrt{\frac{\phi_{s,r}^K}{2}} \right) \right) - 2 \right) \right) \frac{\max(0, I_{s,r_t})}{PoP_{r_t}} - \frac{D_{s,r_t}^K}{PoP_{r_t}}$$

$$lhsSupplySubsec\_11\_1\_5 = \lambda_{r_t} \frac{LF_{r_t} W_{s,r_t} (1 - \tau_r^{N,H}{}_t)}{PoP_{r_t}} l_{s,r}^N + N_{s,r_t} (1 - l_{s,r}^N)$$

$$rhsSupplySubsec\_11\_1\_5 = l_{s,r}^N \phi_{s,r}^L A_{s,r_t}^N N_{s,r_t}^{\sigma^L} + N_{r,0} (1 - l_{s,r}^N) N_{s,r,0}$$

$$lhsAggReg\_1\_1\_2 = B_{r,m_t}$$

$$rhsAggReg\_1\_1\_2 = 0$$

$$lhsAggReg\_1\_1\_1 = NX_{r,m_t}$$

$$rhsAggReg\_1\_1\_1 = 0$$

$$lhsAggReg\_1\_27 = P_{r_t} G_{r_t} + Tr_{r_t} + B_{r_t}^G$$

$$\begin{aligned}
rhsAggReg\_1\_27 = & C_{r_t} \tau_{r_t}^C P_{r_t} + \tau_{r_t}^H I_{r_t}^H P_{r_t}^H + P_{r_t}^E E_{r_t} + r_{s,r_t} P_{s,r_t} K_{s,r_{t-1}} \left( \tau_r^{K,H}{}_t + \tau_{s,r}^{K,F}{}_t \right) + LF_{r_t} N_{s,r_t} W_{s,r_t} \left( \tau_r^{N,H}{}_t + \tau_{s,r}^{N,F}{}_t \right) + r_{s,r_t} P_{s,r_t} K_{s,r_{t-1}} \left( \tau_r^{K,H}{}_t + \tau_{s,r}^{K,F}{}_t \right) \\
& + LF_{r_t} N_{s,r_t} W_{s,r_t} \left( \tau_r^{N,H}{}_t + \tau_{s,r}^{N,F}{}_t \right) + r_{s,r_t} P_{s,r_t} K_{s,r_{t-1}} \left( \tau_r^{K,H}{}_t + \tau_{s,r}^{K,F}{}_t \right) + LF_{r_t} N_{s,r_t} W_{s,r_t} \left( \tau_r^{N,H}{}_t + \tau_{s,r}^{N,F}{}_t \right) + r_{s,r_t} P_{s,r_t} K_{s,r_{t-1}} \left( \tau_r^{K,H}{}_t + \tau_{s,r}^{K,F}{}_t \right) \\
& + LF_{r_t} N_{s,r_t} W_{s,r_t} \left( \tau_r^{N,H}{}_t + \tau_{s,r}^{N,F}{}_t \right) + r_{s,r_t} P_{s,r_t} K_{s,r_{t-1}} \left( \tau_r^{K,H}{}_t + \tau_{s,r}^{K,F}{}_t \right) + LF_{r_t} N_{s,r_t} W_{s,r_t} \left( \tau_r^{N,H}{}_t + \tau_{s,r}^{N,F}{}_t \right) + s_{r_{t-1}} (1 + r^f{}_t) B_{r_{t-1}}^G
\end{aligned}$$

$$lhsAggReg\_1\_28 = Tr_{r\,t}$$

$$rhsAggReg\_1\_28 = Tr_0 + \eta_r^{Tr}{}_t + E_{r\,t} P_r^E{}_t \eta_r^{\tau^{S,Tr}}{}_t$$

$$lhsAggNat\_7\_1 = G_r^{A,D^H}{}_t$$

$$rhsAggNat\_7\_1 = \eta_r^{G^{A,H}}{}_t Y_0$$

$$lhsGov\_1\_1 = B_r^G{}_t$$

$$rhsGov\_1\_1 = \eta_r^{BG}{}_t$$

$$lhsGov\_11\_1 = K_r^G{}_t$$

$$rhsGov\_11\_1 = G_{r\,t} + \left(1 - \delta^{K^G}\right) K_r^G{}_{t-1}$$

$$lhsGov\_3\_1 = \tau_r^{N,H}{}_t$$

$$rhsGov\_3\_1 = \tau_{r,0}^{N,H} + \eta_r^{\tau^{N,H}}{}_t$$

$$lhsGov\_4\_1 = \tau_r^{K,H}{}_t$$

$$rhsGov\_4\_1 = \tau_{r,0}^{K,H} + \eta_r^{\tau^{K,H}}{}_t$$

$$lhsGov\_5\_1 = \tau_r^C{}_t$$

$$rhsGov\_5\_1 = \tau_{r,0}^C + \eta_r^{\tau^C}{}_t$$

$$lhsGov\_6\_1 = \tau_r^H{}_t$$

$$rhsGov\_6\_1 = \tau_{r,0}^H + \eta_r^{\tau^H}{}_t$$

$$lhsExoSubsec\_1\_1\_1 = \tau_{s,r}^{K,F}{}_t$$

$$rhsExoSubsec\_1\_1\_1 = \tau_{s,r}^{K,F} - \tau_r^S{}_t + \eta_r^{\tau^{K,k,r}}{}_t$$

$$lhsExoSubsec\_2\_1\_1 = \tau_{s,r}^{N,F}{}_t$$

$$rhsExoSubsec\_2\_1\_1 = \tau_{s,r}^{N,F} + \eta^{\tau^N,k,r}_t$$

$$lhsExoSubsec\_9\_1\_1 = K_{s,r_t}^A$$

$$rhsExoSubsec\_9\_1\_1 = Y_0 \eta^{G^A, cyclpers, k, r}_t$$

$$lhsExoSubsec\_10\_1\_1 = K_{s,r_t}^A$$

$$rhsExoSubsec\_10\_1\_1 = \left(1 - \delta^{K^A}_{s,r}\right) K_{s,r_{t-1}}^A + G_{s,r_t}^A$$

$$lhsExoSubsec\_1\_1\_2 = \tau_{s,r_t}^{K,F}$$

$$rhsExoSubsec\_1\_1\_2 = \tau_{s,r}^{K,F} - \tau_r^S + \eta^{\tau^K,k,r}_t$$

$$lhsExoSubsec\_2\_1\_2 = \tau_{s,r_t}^{N,F}$$

$$rhsExoSubsec\_2\_1\_2 = \tau_{s,r}^{N,F} + \eta^{\tau^N,k,r}_t$$

$$lhsExoSubsec\_9\_1\_2 = K_{s,r_t}^A$$

$$rhsExoSubsec\_9\_1\_2 = Y_0 \eta^{G^A, cyclpers, k, r}_t$$

$$lhsExoSubsec\_10\_1\_2 = K_{s,r_t}^A$$

$$rhsExoSubsec\_10\_1\_2 = \left(1 - \delta^{K^A}_{s,r}\right) K_{s,r_{t-1}}^A + G_{s,r_t}^A$$

$$lhsExoSubsec\_1\_1\_3 = \tau_{s,r_t}^{K,F}$$

$$rhsExoSubsec\_1\_1\_3 = \tau_{s,r}^{K,F} - \tau_r^S + \eta^{\tau^K,k,r}_t$$

$$lhsExoSubsec\_2\_1\_3 = \tau_{s,r_t}^{N,F}$$

$$rhsExoSubsec\_2\_1\_3 = \tau_{s,r}^{N,F} + \eta^{\tau^N,k,r}_t$$

$$lhsExoSubsec\_9\_1\_3 = K_{s,r_t}^A$$

$$rhsExoSubsec\_9\_1\_3 = Y_0 \eta^{G^A, cyclpers, k, r}_t$$

$$\begin{aligned}
lhsExoSubsec\_10\_1\_3 &= K_{s,r_t}^A \\
rhsExoSubsec\_10\_1\_3 &= \left(1 - \delta^{K_{s,r}^A}\right) K_{s,r_{t-1}}^A + G_{s,r_t}^A \\
lhsExoSubsec\_1\_1\_4 &= \tau_{s,r_t}^{K,F} \\
rhsExoSubsec\_1\_1\_4 &= \tau_{s,r_t}^{K,F} - \tau_r^S + \eta^{\tau^{K,k,r}_t} \\
lhsExoSubsec\_2\_1\_4 &= \tau_{s,r_t}^{N,F} \\
rhsExoSubsec\_2\_1\_4 &= \tau_{s,r_t}^{N,F} + \eta^{\tau^{N,k,r}_t} \\
lhsExoSubsec\_9\_1\_4 &= K_{s,r_t}^A \\
rhsExoSubsec\_9\_1\_4 &= Y_0 \eta^{G^{A,cyclpers,k,r}_t} \\
lhsExoSubsec\_10\_1\_4 &= K_{s,r_t}^A \\
rhsExoSubsec\_10\_1\_4 &= \left(1 - \delta^{K_{s,r}^A}\right) K_{s,r_{t-1}}^A + G_{s,r_t}^A \\
lhsExoSubsec\_1\_1\_5 &= \tau_{s,r_t}^{K,F} \\
rhsExoSubsec\_1\_1\_5 &= \tau_{s,r_t}^{K,F} - \tau_r^S + \eta^{\tau^{K,k,r}_t} \\
lhsExoSubsec\_2\_1\_5 &= \tau_{s,r_t}^{N,F} \\
rhsExoSubsec\_2\_1\_5 &= \tau_{s,r_t}^{N,F} + \eta^{\tau^{N,k,r}_t} \\
lhsExoSubsec\_9\_1\_5 &= K_{s,r_t}^A \\
rhsExoSubsec\_9\_1\_5 &= Y_0 \eta^{G^{A,cyclpers,k,r}_t} \\
lhsExoSubsec\_10\_1\_5 &= K_{s,r_t}^A \\
rhsExoSubsec\_10\_1\_5 &= \left(1 - \delta^{K_{s,r}^A}\right) K_{s,r_{t-1}}^A + G_{s,r_t}^A \\
lhsExoSubsec\_3\_1\_1 &= \log \left( l_{s,r}^Q A_{s,r_t} + Q_{s,r_t} \left(1 - l_{s,r}^Q\right) \right)
\end{aligned}$$



$$rhsExoSubsec\_3\_1\_1 = \log \left( l_{s,r}^Q A_{s,r} K_r^{G\phi^G} \exp \left( \eta^{A,s,r}_t \right) + \left( 1 - l_{s,r}^Q \right) Q_{s,r,0} \exp \left( \eta^{E,s,r}_t \right) \right)$$

$$lhsExoSubsec\_300\_1\_1 = \log \left( A_{s,r_t}^I \right)$$

$$rhsExoSubsec\_300\_1\_1 = \eta^{A^I,k,r}_t + \left( 1 - l^Y \right) \eta^{Q^I,k,r}_t$$

$$lhsExoSubsec\_4\_1\_1 = A_{s,r_t}^K$$

$$rhsExoSubsec\_4\_1\_1 = \exp \left( \eta^{A^K,k,r}_t \right)$$

$$lhsExoSubsec\_5\_1\_1 = \log \left( A_{s,r_t}^N \right)$$

$$rhsExoSubsec\_5\_1\_1 = \eta^{A^N,k,r}_t$$

$$lhsExoSubsec\_6\_1\_1 = D_{s,r_t}$$

$$rhsExoSubsec\_6\_1\_1 = \eta^{D,k,r}_t$$

$$lhsExoSubsec\_7\_1\_1 = D_{s,r_t}^N$$

$$rhsExoSubsec\_7\_1\_1 = \eta^{D^N,k,r}_t$$

$$lhsExoSubsec\_8\_1\_1 = D_{s,r_t}^K$$

$$rhsExoSubsec\_8\_1\_1 = Y_0 \eta^{D^K,k,r}_t$$

$$lhsExoSubsec\_3\_1\_2 = \log \left( l_{s,r}^Q A_{s,r_t} + Q_{s,r_t} \left( 1 - l_{s,r}^Q \right) \right)$$

$$rhsExoSubsec\_3\_1\_2 = \log \left( l_{s,r}^Q K_r^{G\phi^G} A_{s,r} \exp \left( \eta^{A,s,r}_t \right) + \left( 1 - l_{s,r}^Q \right) Q_{s,r,0} \exp \left( \eta^{E,s,r}_t \right) \right)$$

$$lhsExoSubsec\_300\_1\_2 = \log \left( A_{s,r_t}^I \right)$$

$$rhsExoSubsec\_300\_1\_2 = \eta^{A^I,k,r}_t + \left( 1 - l^Y \right) \eta^{Q^I,k,r}_t$$

$$lhsExoSubsec\_4\_1\_2 = A_{s,r_t}^K$$

$$rhsExoSubsec\_4\_1\_2 = \exp\left(\eta^{A^K,k,r}_t\right)$$

$$lhsExoSubsec\_5\_1\_2 = \log\left(A_{s,r_t}^N\right)$$

$$rhsExoSubsec\_5\_1\_2 = \eta^{A^N,k,r}_t$$

$$lhsExoSubsec\_6\_1\_2 = D_{s,r_t}$$

$$rhsExoSubsec\_6\_1\_2 = \eta^{D,k,r}_t$$

$$lhsExoSubsec\_7\_1\_2 = D_{s,r_t}^N$$

$$rhsExoSubsec\_7\_1\_2 = \eta^{D^N,k,r}_t$$

$$lhsExoSubsec\_8\_1\_2 = D_{s,r_t}^K$$

$$rhsExoSubsec\_8\_1\_2 = Y_0 \eta^{D^K,k,r}_t$$

$$lhsExoSubsec\_3\_1\_3 = \log\left(l_{s,r}^Q A_{s,r_t} + Q_{s,r_t} \left(1 - l_{s,r}^Q\right)\right)$$

$$rhsExoSubsec\_3\_1\_3 = \log\left(l_{s,r}^Q K_r^{G\phi^G} A_{s,r} \exp\left(\eta^{A,s,r}_t\right) + \left(1 - l_{s,r}^Q\right) Q_{s,r,0} \exp\left(\eta^{E,s,r}_t\right)\right)$$

$$lhsExoSubsec\_300\_1\_3 = \log\left(A_{s,r_t}^I\right)$$

$$rhsExoSubsec\_300\_1\_3 = \eta^{A^I,k,r}_t + \left(1 - l^Y\right) \eta^{Q^I,k,r}_t$$

$$lhsExoSubsec\_4\_1\_3 = A_{s,r_t}^K$$

$$rhsExoSubsec\_4\_1\_3 = \exp\left(\eta^{A^K,k,r}_t\right)$$

$$lhsExoSubsec\_5\_1\_3 = \log\left(A_{s,r_t}^N\right)$$

$$rhsExoSubsec\_5\_1\_3 = \eta^{A^N,k,r}_t$$

$$lhsExoSubsec\_6\_1\_3 = D_{s,r_t}$$

$$rhsExoSubsec\_6\_1\_3 = \eta^{D,k,r}_t$$

$$lhsExoSubsec\_7\_1\_3 = D_{s,r_t}^N$$

$$rhsExoSubsec\_7\_1\_3 = \eta^{D^N,k,r}_t$$

$$lhsExoSubsec\_8\_1\_3 = D_{s,r_t}^K$$

$$rhsExoSubsec\_8\_1\_3 = Y_0 \eta^{D^K,k,r}_t$$

$$lhsExoSubsec\_3\_1\_4 = \log \left( l_{s,r}^Q A_{s,r_t} + Q_{s,r_t} \left( 1 - l_{s,r}^Q \right) \right)$$

$$rhsExoSubsec\_3\_1\_4 = \log \left( l_{s,r}^Q K_{r_t}^{G\phi^G} A_{s,r} \exp \left( \eta^{A,s,r}_t \right) + \left( 1 - l_{s,r}^Q \right) Q_{s,r,0} \exp \left( \eta^{E,s,r}_t \right) \right)$$

$$lhsExoSubsec\_300\_1\_4 = \log \left( A_{s,r_t}^I \right)$$

$$rhsExoSubsec\_300\_1\_4 = \eta^{A^I,k,r}_t + \left( 1 - l^Y \right) \eta^{Q^I,k,r}_t$$

$$lhsExoSubsec\_4\_1\_4 = A_{s,r_t}^K$$

$$rhsExoSubsec\_4\_1\_4 = \exp \left( \eta^{A^K,k,r}_t \right)$$

$$lhsExoSubsec\_5\_1\_4 = \log \left( A_{s,r_t}^N \right)$$

$$rhsExoSubsec\_5\_1\_4 = \eta^{A^N,k,r}_t$$

$$lhsExoSubsec\_6\_1\_4 = D_{s,r_t}$$

$$rhsExoSubsec\_6\_1\_4 = \eta^{D,k,r}_t$$

$$lhsExoSubsec\_7\_1\_4 = D_{s,r_t}^N$$

$$rhsExoSubsec\_7\_1\_4 = \eta^{D^N,k,r}_t$$

$$lhsExoSubsec\_8\_1\_4 = D_{s,r_t}^K$$

$$rhsExoSubsec\_8\_1\_4 = Y_0 \eta^{D^K,k,r}_t$$

$$lhsExoSubsec\_3\_1\_5 = \log \left( l_{s,r}^Q A_{s,r_t} + Q_{s,r_t} \left( 1 - l_{s,r}^Q \right) \right)$$

$$rhsExoSubsec\_3\_1\_5 = \log \left( l_{s,r}^Q K_r^{G\phi^G} A_{s,r} \exp \left( \eta^{A,s,r}_t \right) + \left( 1 - l_{s,r}^Q \right) Q_{s,r,0} \exp \left( \eta^{E,s,r}_t \right) \right)$$

$$lhsExoSubsec\_300\_1\_5 = \log \left( A_{s,r_t}^I \right)$$

$$rhsExoSubsec\_300\_1\_5 = \eta^{A^I,k,r}_t + \left( 1 - l^Y \right) \eta^{Q^I,k,r}_t$$

$$lhsExoSubsec\_4\_1\_5 = A_{s,r_t}^K$$

$$rhsExoSubsec\_4\_1\_5 = \exp \left( \eta^{A^K,k,r}_t \right)$$

$$lhsExoSubsec\_5\_1\_5 = \log \left( A_{s,r_t}^N \right)$$

$$rhsExoSubsec\_5\_1\_5 = \eta^{A^N,k,r}_t$$

$$lhsExoSubsec\_6\_1\_5 = D_{s,r_t}$$

$$rhsExoSubsec\_6\_1\_5 = \eta^{D,k,r}_t$$

$$lhsExoSubsec\_7\_1\_5 = D_{s,r_t}^N$$

$$rhsExoSubsec\_7\_1\_5 = \eta^{D^N,k,r}_t$$

$$lhsExoSubsec\_8\_1\_5 = D_{s,r_t}^K$$

$$rhsExoSubsec\_8\_1\_5 = Y_0 \eta^{D^K,k,r}_t$$

$$lhsAggReg\_1\_14 = D_r^H_t$$

$$rhsAggReg\_1\_14 = \frac{Y_t \eta_r^{D^H}_t}{P_r^H_t}$$

$$lhsAggReg\_1\_26 = \frac{P_r^D_t}{P_{rt}}$$

$$rhsAggReg\_1\_26 = \left(1 - \omega_r^F\right)^{\frac{1}{\eta^F}} \left( \frac{Q_{r\ t}^U}{G_{rt} + C_{rt} + I_{rt} + I_{r\ t}^H \frac{P_{r\ t}^H (k^{Housing}=0)}{P_{rt}}} \right)^{\frac{(-1)}{\eta^F}}$$

$$lhsAggReg\_1\_9 = \frac{P_{r\ t}^F}{P_{rt}}$$

$$rhsAggReg\_1\_9 = \omega_r^F \frac{1}{\eta^F} \left( \frac{M_{r\ t}^F}{G_{rt} + C_{rt} + I_{rt} + I_{r\ t}^H \frac{P_{r\ t}^H (k^{Housing}=0)}{P_{rt}}} \right)^{\frac{(-1)}{\eta^F}}$$

$$lhsDemandsec\_5\_1\_1 = P_{k,r\ t}^{A,M}$$

$$\begin{aligned} rhsDemandsec\_5\_1\_1 &= \left( \eta_k^{Q^A} \right. \\ &= \\ &= 1 \Big) \exp \left( \omega_{s,r}^{M,F} \log \left( \frac{P_{s\ t}^M}{\omega_{s,r}^{M,F}} \right) \right) + \left( \eta_k^{Q^A} \right. \\ &\neq 1 \Big) \left( \omega_{s,r}^{M,F} P_{s\ t}^{M^{1-\eta_k^{Q^A}}} \right)^{\frac{1}{(\eta_k^{Q^A}=1)+1-\eta_k^{Q^A}}} \end{aligned}$$

$$lhsDemandsec\_6\_1\_1 = \frac{P_{k,r\ t}^A}{P_{r\ t}^D}$$

$$rhsDemandsec\_6\_1\_1 = \omega_k^{Q^A} \frac{1}{\eta^Q} A_{k,r\ t}^F \frac{\eta^{Q-1}}{\eta^Q} \left( \frac{Q_{k,r\ t}^{A,F}}{Q_{r\ t}^U} \right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_7\_1\_1 = \frac{P_{k,r\ t}^{A,M}}{P_{r\ t}^F}$$

$$rhsDemandsec\_7\_1\_1 = \omega_{k,r}^{M,A} \frac{1}{\eta^Q} \left( \frac{Q_{k,r\ t}^{A,M^F}}{M_{r\ t}^F} \right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_AF\_1\_1 = A_{k,r\ t}^F$$

$$rhsDemandsec\_AF\_1\_1 = \exp\left(\eta^{A^F, k, r}_t\right) EE_{r_t}^{1==s^{Energy}}$$

$$lhsDemandsec\_5\_1\_2 = P_{k, r_t}^{A, M}$$

$$\begin{aligned} rhsDemandsec\_5\_1\_2 &= \left(\eta_k^{Q^A}\right. \\ &= \\ &= 1 \Big) \exp\left(\omega_{s, r}^{M, F} \log\left(\frac{P_{s, t}^M}{\omega_{s, r}^{M, F}}\right) + \omega_{s, r}^{M, F} \log\left(\frac{P_{s, t}^M}{\omega_{s, r}^{M, F}}\right)\right) + \left(\eta_k^{Q^A}\right. \\ &\neq 1 \Big) \left(\omega_{s, r}^{M, F} P_{s, t}^{M^{1-\eta_k^{Q^A}}} + \omega_{s, r}^{M, F} P_{s, t}^{M^{1-\eta_k^{Q^A}}}\right) \frac{1}{\left(\eta_k^{Q^A}=1\right)+1-\eta_k^{Q^A}} \end{aligned}$$

$$lhsDemandsec\_6\_1\_2 = \frac{P_{k, r_t}^A}{P_r^D}$$

$$rhsDemandsec\_6\_1\_2 = \omega_k^{Q^A} \frac{1}{\eta^Q} A_{k, r_t}^F \frac{\eta^Q - 1}{\eta^Q} \left(\frac{Q_{k, r_t}^{A, F}}{Q_r^U}\right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_7\_1\_2 = \frac{P_{k, r_t}^{A, M}}{P_r^F}$$

$$rhsDemandsec\_7\_1\_2 = \omega_{k, r}^{M, A} \frac{1}{\eta^Q} \left(\frac{Q_{k, r_t}^{A, M^F}}{M_r^F}\right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_AF\_1\_2 = A_{k, r_t}^F$$

$$rhsDemandsec\_AF\_1\_2 = \exp\left(\eta^{A^F, k, r}_t\right) EE_{r_t}^{2==s^{Energy}}$$

$$lhsDemandsec\_5\_1\_3 = P_{k, r_t}^{A, M}$$

$$\begin{aligned} rhsDemandsec\_5\_1\_3 &= \left(\eta_k^{Q^A}\right. \\ &= \\ &= 1 \Big) \exp\left(\omega_{s, r}^{M, F} \log\left(\frac{P_{s, t}^M}{\omega_{s, r}^{M, F}}\right)\right) + \left(\eta_k^{Q^A}\right. \\ &\neq 1 \Big) \left(\omega_{s, r}^{M, F} P_{s, t}^{M^{1-\eta_k^{Q^A}}}\right) \frac{1}{\left(\eta_k^{Q^A}=1\right)+1-\eta_k^{Q^A}} \end{aligned}$$

$$lhsDemandsec\_6\_1\_3 = \frac{P_{k,r,t}^A}{P_{r,t}^D}$$

$$rhsDemandsec\_6\_1\_3 = \omega_k^{Q^A \frac{1}{\eta^Q}} A_{k,r,t}^F \frac{\eta^Q - 1}{\eta^Q} \left( \frac{Q_{k,r,t}^{A,F}}{Q_{r,t}^U} \right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_7\_1\_3 = \frac{P_{k,r,t}^{A,M}}{P_{r,t}^F}$$

$$rhsDemandsec\_7\_1\_3 = \omega_{k,r}^{M,A \frac{1}{\eta^Q}} \left( \frac{Q_{k,r,t}^{A,M^F}}{M_{r,t}^F} \right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_AF\_1\_3 = A_{k,r,t}^F$$

$$rhsDemandsec\_AF\_1\_3 = \exp \left( \eta^{A^F, k, r}_t \right) EE_{r,t}^3 = s^{Energy}$$

$$lhsDemandsec\_5\_1\_4 = P_{k,r,t}^{A,M}$$

$$\begin{aligned} rhsDemandsec\_5\_1\_4 &= \left( \eta_k^{Q^A} \right. \\ &= \\ &= 1 \left. \right) \exp \left( \omega_{s,r}^{M,F} \log \left( \frac{P_{s,t}^M}{\omega_{s,r}^{M,F}} \right) \right) + \left( \eta_k^{Q^A} \right. \\ &\neq 1 \left. \right) \left( \omega_{s,r}^{M,F} P_{s,t}^{M^{1-\eta_k^{Q^A}}} \right)^{\frac{1}{\left( \eta_k^{Q^A} = 1 \right) + 1 - \eta_k^{Q^A}}} \end{aligned}$$

$$lhsDemandsec\_6\_1\_4 = \frac{P_{k,r,t}^A}{P_{r,t}^D}$$

$$rhsDemandsec\_6\_1\_4 = \omega_k^{Q^A \frac{1}{\eta^Q}} A_{k,r,t}^F \frac{\eta^Q - 1}{\eta^Q} \left( \frac{Q_{k,r,t}^{A,F}}{Q_{r,t}^U} \right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_7\_1\_4 = \frac{P_{k,r,t}^{A,M}}{P_{r,t}^F}$$

$$rhsDemandsec\_7\_1\_4 = \omega_{k,r}^{M,A} \frac{1}{\eta^Q} \left( \frac{Q_{k,r}^{A,M^F}}{M_{r,t}^F} \right)^{\frac{(-1)}{\eta^Q}}$$

$$lhsDemandsec\_AF\_1\_4 = A_{k,r,t}^F$$

$$rhsDemandsec\_AF\_1\_4 = \exp\left(\eta^{A^F,k,r}_t\right) E E_{r,t}^{4==s^{Energy}}$$

$$lhsDemandsec\_4\_1\_1 = Q_{k,r,t}^A$$

$$\begin{aligned} rhsDemandsec\_4\_1\_1 &= \left( \eta_k^{Q^A} \right. \\ &= \\ &= 1 \Big) \exp\left(\log\left(Q_{s,r,t}^D\right) \omega_{s,r}^Q\right) + \left( \eta_k^{Q^A} \right. \\ &\quad \left. \neq 1 \right) \left( \omega_{s,r}^Q \frac{1}{\eta_k^{Q^A}} Q_{s,r,t}^D \right)^{\frac{\eta_k^{Q^A}-1}{\eta_k^{Q^A}}} \frac{\eta_k^{Q^A}}{\left( \eta_k^{Q^A}=1 \right) + \eta_k^{Q^A}-1} \end{aligned}$$

$$lhsDemandsec\_8\_1\_1 = Q_{k,r,t}^A$$

$$rhsDemandsec\_8\_1\_1 = Q_{k,r,t}^{A,F} + Q_{k,r,t}^{A,I} + \frac{P_{r,t}^H I_{r,t}^H (k^{Housing} == 1)}{P_{k,r,t}^A}$$

$$lhsDemandsec\_9\_1\_1 = P_{k,r,t}^A Q_{k,r,t}^{A,I}$$

$$\begin{aligned} rhsDemandsec\_9\_1\_1 &= Q_{s,r,k,t}^I \left( P_{k,r,t}^A + l_{s,r}^Q P_{r,t}^E \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right) \frac{Q_{s,r,t}^D}{Q_{k,r,t}^A} \right) + Q_{s,r,k,t}^I \left( P_{k,r,t}^A + l_{s,r}^Q P_{r,t}^E \frac{Q_{s,r,t}^D}{Q_{k,r,t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right) \right) \\ &+ Q_{s,r,k,t}^I \left( P_{k,r,t}^A + l_{s,r}^Q P_{r,t}^E \frac{Q_{s,r,t}^D}{Q_{k,r,t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right) \right) + Q_{s,r,k,t}^I \left( P_{k,r,t}^A + l_{s,r}^Q P_{r,t}^E \frac{Q_{s,r,t}^D}{Q_{k,r,t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right) \right) \\ &+ Q_{s,r,k,t}^I \left( P_{k,r,t}^A + l_{s,r}^Q P_{r,t}^E \frac{Q_{s,r,t}^D}{Q_{k,r,t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right) \right) \end{aligned}$$

$$lhsDemandSubsec\_1\_1\_1\_1 = P_{s,r,t}^Q$$



$$rhsDemandSubsec\_1\_1\_1\_1 = \omega_{s,r,m}^Q \eta_s^{\frac{1}{Q}} \left( \frac{Q_{s,r,m_t}^D}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}} P_{s,r_t}$$

$$lhsDemandSubsec\_1M\_1\_1 = P_{s_t}^M$$

$$rhsDemandSubsec\_1M\_1\_1 = P_{s,r_t} \omega_{s,r}^M \eta_s^{\frac{1}{Q}} \left( \frac{M_{s,r_t}^I}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}}$$

$$lhsDemandSubsec\_2M\_1\_1 = \frac{P_{s_t}^M}{P_{k,r_t}^{A,M}}$$

$$rhsDemandSubsec\_2M\_1\_1 = \omega_{s,r}^{M,F} \eta_k^{\frac{1}{Q^A}} \left( \frac{M_{s,r_t}^F}{Q_{k,r_t}^{A,M^F}} \right)^{\frac{(-1)}{\eta_k^{Q^A}}}$$

$$lhsDemandSubsec\_2\_1\_1 = Q_{s,r_t}^D$$

$$\begin{aligned} rhsDemandSubsec\_2\_1\_1 &= \left( \eta_s^Q \right. \\ &= \\ &= 1 \Big) \exp \left( \omega_{s,r,m}^Q \log \left( Q_{s,r,m_t}^D \right) + \omega_{s,r}^M \log \left( M_{s,r_t}^I \right) \right) + \left( \eta_s^Q \right. \\ &\neq 1 \Big) \left( \omega_{s,r,m}^Q \eta_s^{\frac{1}{Q}} Q_{s,r,m_t}^D \frac{\eta_s^{Q-1}}{\eta_s^Q} + \omega_{s,r}^M \eta_s^{\frac{1}{Q}} M_{s,r_t}^I \frac{\eta_s^{Q-1}}{\eta_s^Q} \right)^{\frac{\eta_s^Q}{(\eta_s^Q=1)+\eta_s^Q-1}} \end{aligned}$$

$$lhsDemandSubsec\_3\_1\_1 = \frac{P_{s,r_t}}{P_{k,r_t}^A}$$

$$rhsDemandSubsec\_3\_1\_1 = \omega_{s,r}^Q \eta_k^{\frac{1}{Q^A}} \left( \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \right)^{\frac{(-1)}{\eta_k^{Q^A}}}$$

$$lhsDemandsec\_4\_1\_2 = Q_{k,r_t}^A$$

$$\begin{aligned}
rhsDemandsec\_4\_1\_2 &= \left( \eta_k^{Q^A} \right. \\
&= \\
&= 1 \Big) \exp \left( \log \left( Q_{s,r_t}^D \right) \omega_{s,r}^Q + \log \left( Q_{s,r_t}^D \right) \omega_{s,r}^Q \right) + \left( \eta_k^{Q^A} \right. \\
&\neq 1 \Big) \left( \omega_{s,r}^Q \frac{1}{\eta_k^{Q^A}} Q_{s,r_t}^D \frac{\eta_k^{Q^A}-1}{\eta_k^{Q^A}} + \omega_{s,r}^Q \frac{1}{\eta_k^{Q^A}} Q_{s,r_t}^D \frac{\eta_k^{Q^A}-1}{\eta_k^{Q^A}} \right) \frac{\eta_k^{Q^A}}{\left( \eta_k^{Q^A}=1 \right) + \eta_k^{Q^A}-1}
\end{aligned}$$

$$lhsDemandsec\_8\_1\_2 = Q_{k,r_t}^A$$

$$rhsDemandsec\_8\_1\_2 = Q_{k,r_t}^{A,F} + Q_{k,r_t}^{A,I} + \frac{P_{r_t}^H I_{r_t}^H (k^{Housing} == 2)}{P_{k,r_t}^A}$$

$$lhsDemandsec\_9\_1\_2 = P_{k,r_t}^A Q_{k,r_t}^{A,I}$$

$$\begin{aligned}
rhsDemandsec\_9\_1\_2 &= Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) \\
&+ Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) \\
&+ Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right)
\end{aligned}$$

$$lhsDemandSubsec\_1\_1\_2\_1 = P_{s,r_t}^Q$$

$$rhsDemandSubsec\_1\_1\_2\_1 = \omega_{s,r,m}^Q \frac{1}{\eta_s^Q} \left( \frac{Q_{s,r,m_t}^D}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}} P_{s,r_t}$$

$$lhsDemandSubsec\_1M\_1\_2 = P_{s_t}^M$$

$$rhsDemandSubsec\_1M\_1\_2 = P_{s,r_t} \omega_{s,r}^M \frac{1}{\eta_s^Q} \left( \frac{M_{s,r_t}^I}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}}$$

$$lhsDemandSubsec\_2M\_1\_2 = \frac{P_{s_t}^M}{P_{k,r_t}^{A,M}}$$

$$rhsDemandSubsec\_2M\_1\_2 = \omega_{s,r}^{M,F} \eta_k^{\frac{1}{Q^A}} \left( \frac{M_{s,r_t}^F}{Q_{k,r}^{A,M^F}} \right)_t^{\frac{(-1)}{Q^A}}$$

$$lhsDemandSubsec\_2\_1\_2 = Q_{s,r_t}^D$$

$$\begin{aligned} rhsDemandSubsec\_2\_1\_2 &= \left( \eta_s^Q \right. \\ &= \\ &= 1 \Big) \exp \left( \omega_{s,r,m}^Q \log \left( Q_{s,r,m_t}^D \right) + \omega_{s,r}^M \log \left( M_{s,r_t}^I \right) \right) + \left( \eta_s^Q \right. \\ &\neq 1 \Big) \left( \omega_{s,r,m}^Q \eta_s^{\frac{1}{Q}} Q_{s,r,m_t}^D \eta_s^{\frac{Q-1}{Q}} + \omega_{s,r}^M \eta_s^{\frac{1}{Q}} M_{s,r_t}^I \eta_s^{\frac{Q-1}{Q}} \right)^{\frac{\eta_s^Q}{(\eta_s^Q=1)+\eta_s^Q-1}} \end{aligned}$$

$$lhsDemandSubsec\_3\_1\_2 = \frac{P_{s,r_t}}{P_{k,r_t}^A}$$

$$rhsDemandSubsec\_3\_1\_2 = \omega_{s,r}^Q \eta_k^{\frac{1}{Q^A}} \left( \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \right)^{\frac{(-1)}{Q^A}}$$

$$lhsDemandSubsec\_1\_1\_3\_1 = P_{s,r_t}^Q$$

$$rhsDemandSubsec\_1\_1\_3\_1 = \omega_{s,r,m}^Q \eta_s^{\frac{1}{Q}} \left( \frac{Q_{s,r,m_t}^D}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{Q}} P_{s,r_t}$$

$$lhsDemandSubsec\_1M\_1\_3 = P_{s_t}^M$$

$$rhsDemandSubsec\_1M\_1\_3 = P_{s,r_t} \omega_{s,r}^M \eta_s^{\frac{1}{Q}} \left( \frac{M_{s,r_t}^I}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{Q}}$$

$$lhsDemandSubsec\_2M\_1\_3 = \frac{P_{s_t}^M}{P_{k,r_t}^{A,M}}$$

$$rhsDemandSubsec\_2M\_1\_3 = \omega_{s,r}^{M,F} \eta_k^{\frac{1}{Q^A}} \left( \frac{M_{s,r_t}^F}{Q_{k,r}^{A,M^F}} \right)_t^{\frac{(-1)}{Q^A}}$$

$$lhsDemandSubsec\_2\_1\_3 = Q_{s,r_t}^D$$

$$\begin{aligned} rhsDemandSubsec\_2\_1\_3 &= \left( \eta_s^Q \right. \\ &= \\ &= 1 \Big) \exp \left( \omega_{s,r,m}^Q \log \left( Q_{s,r,m_t}^D \right) + \omega_{s,r}^M \log \left( M_{s,r_t}^I \right) \right) + \left( \eta_s^Q \right. \\ &\neq 1 \Big) \left( \omega_{s,r,m}^Q \frac{1}{\eta_s^Q} Q_{s,r,m_t}^D \frac{\eta_s^Q - 1}{\eta_s^Q} + \omega_{s,r}^M \frac{1}{\eta_s^Q} M_{s,r_t}^I \frac{\eta_s^Q - 1}{\eta_s^Q} \right) \frac{\eta_s^Q}{(\eta_s^Q == 1) + \eta_s^Q - 1} \end{aligned}$$

$$lhsDemandSubsec\_3\_1\_3 = \frac{P_{s,r_t}}{P_{k,r_t}^A}$$

$$rhsDemandSubsec\_3\_1\_3 = \omega_{s,r}^Q \frac{1}{\eta_k^{Q^A}} \left( \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \right) \frac{(-1)}{\eta_k^{Q^A}}$$

$$lhsDemandsec\_4\_1\_3 = Q_{k,r_t}^A$$

$$\begin{aligned} rhsDemandsec\_4\_1\_3 &= \left( \eta_k^{Q^A} \right. \\ &= \\ &= 1 \Big) \exp \left( \log \left( Q_{s,r_t}^D \right) \omega_{s,r}^Q \right) + \left( \eta_k^{Q^A} \right. \\ &\neq 1 \Big) \left( \omega_{s,r}^Q \frac{1}{\eta_k^{Q^A}} Q_{s,r_t}^D \frac{\eta_k^{Q^A} - 1}{\eta_k^{Q^A}} \right) \frac{\eta_k^{Q^A}}{(\eta_k^{Q^A} == 1) + \eta_k^{Q^A} - 1} \end{aligned}$$

$$lhsDemandsec\_8\_1\_3 = Q_{k,r_t}^A$$

$$rhsDemandsec\_8\_1\_3 = Q_{k,r_t}^{A,F} + Q_{k,r_t}^{A,I} + \frac{P_{r_t}^H I_{r_t}^H (k^{Housing} == 3)}{P_{k,r_t}^A}$$

$$lhsDemandsec\_9\_1\_3 = P_{k,r_t}^A Q_{k,r_t}^{A,I}$$

$$\begin{aligned}
rhsDemandsec\_9\_1\_3 = & Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I, s, k, r_t} \right) \right) + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I, s, k, r_t} \right) \right) \\
& + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I, s, k, r_t} \right) \right) + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I, s, k, r_t} \right) \right) \\
& + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I, s, k, r_t} \right) \right)
\end{aligned}$$

$$lhsDemandSubsec\_1\_1\_4\_1 = P_{s,r_t}^Q$$

$$rhsDemandSubsec\_1\_1\_4\_1 = \omega_{s,r,m}^Q \eta_s^{\frac{1}{Q}} \left( \frac{Q_{s,r,m_t}^D}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}} P_{s,r_t}$$

$$lhsDemandSubsec\_1M\_1\_4 = P_{s_t}^M$$

$$rhsDemandSubsec\_1M\_1\_4 = P_{s,r_t}^M \omega_{s,r}^M \eta_s^{\frac{1}{Q}} \left( \frac{M_{s,r_t}^I}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}}$$

$$lhsDemandSubsec\_2M\_1\_4 = \frac{P_{s_t}^M}{P_{k,r_t}^{A,M}}$$

$$rhsDemandSubsec\_2M\_1\_4 = \omega_{s,r}^{M,F} \eta_k^{\frac{1}{Q^A}} \left( \frac{M_{s,r_t}^F}{Q_{k,r_t}^{A,M^F}} \right)^{\frac{(-1)}{\eta_k^{Q^A}}}$$

$$lhsDemandSubsec\_2\_1\_4 = Q_{s,r_t}^D$$

$$\begin{aligned}
rhsDemandSubsec\_2\_1\_4 = & \left( \eta_s^Q \right. \\
& = \\
& = 1 \Big) \exp \left( \omega_{s,r,m}^Q \log \left( Q_{s,r,m_t}^D \right) + \omega_{s,r}^M \log \left( M_{s,r_t}^I \right) \right) + \left( \eta_s^Q \right. \\
& \neq 1 \Big) \left( \omega_{s,r,m}^Q \eta_s^{\frac{1}{Q}} Q_{s,r,m_t}^D \frac{\eta_s^Q - 1}{\eta_s^Q} + \omega_{s,r}^M \eta_s^{\frac{1}{Q}} M_{s,r_t}^I \frac{\eta_s^Q - 1}{\eta_s^Q} \right) \frac{\eta_s^Q}{(\eta_s^Q = 1) + \eta_s^Q - 1}
\end{aligned}$$

$$lhsDemandSubsec\_3\_1\_4 = \frac{P_{s,r_t}}{P_{k,r_t}^A}$$

$$rhsDemandSubsec\_3\_1\_4 = \omega_{s,r}^Q \frac{1}{\eta_k^{Q^A}} \left( \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \right)^{\frac{(-1)}{\eta_k^{Q^A}}}$$

$$lhsDemandsec\_4\_1\_4 = Q_{k,r_t}^A$$

$$\begin{aligned} rhsDemandsec\_4\_1\_4 &= \left( \eta_k^{Q^A} \right. \\ &= \\ &= 1 \Big) \exp \left( \log \left( Q_{s,r_t}^D \right) \omega_{s,r}^Q \right) + \left( \eta_k^{Q^A} \right. \\ &\neq 1 \Big) \left( \omega_{s,r}^Q \frac{1}{\eta_k^{Q^A}} Q_{s,r_t}^D \frac{\eta_k^{Q^A} - 1}{\eta_k^{Q^A}} \right)^{\frac{\eta_k^{Q^A}}{(\eta_k^{Q^A} == 1) + \eta_k^{Q^A} - 1}} \end{aligned}$$

$$lhsDemandsec\_8\_1\_4 = Q_{k,r_t}^A$$

$$rhsDemandsec\_8\_1\_4 = Q_{k,r_t}^{A,F} + Q_{k,r_t}^{A,I} + \frac{P_{r_t}^H I_{r_t}^H (k^{Housing} == 4)}{P_{k,r_t}^A}$$

$$lhsDemandsec\_9\_1\_4 = P_{k,r_t}^A Q_{k,r_t}^{A,I}$$

$$\begin{aligned} rhsDemandsec\_9\_1\_4 &= Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_r^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_r^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) \\ &+ Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_r^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) + Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_r^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) \\ &+ Q_{s,r,k_t}^I \left( P_{k,r_t}^A + l_{s,r}^Q P_r^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I,s,k,r_t} \right) \right) \end{aligned}$$

$$lhsDemandSubsec\_1\_1\_5\_1 = P_{s,r_t}^Q$$

$$rhsDemandSubsec\_1\_1\_5\_1 = \omega_{s,r,m}^Q \frac{1}{\eta_s^Q} \left( \frac{Q_{s,r,m_t}^D}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}} P_{s,r_t}$$

$$lhsDemandSubsec\_1M\_1\_5 = P_{s_t}^M$$

$$rhsDemandSubsec\_1M\_1\_5 = P_{s,r_t} \omega_{s,r}^M \frac{1}{\eta_s^Q} \left( \frac{M_{s,r_t}^I}{Q_{s,r_t}^D} \right)^{\frac{(-1)}{\eta_s^Q}}$$

$$lhsDemandSubsec\_2M\_1\_5 = \frac{P_{s,t}^M}{P_{k,r_t}^{A,M}}$$

$$rhsDemandSubsec\_2M\_1\_5 = \omega_{s,r}^{M,F} \frac{1}{\eta_k^A} \left( \frac{M_{s,r_t}^F}{Q_{k,r_t}^{A,M^F}} \right)^{\frac{(-1)}{\eta_k^A}}$$

$$lhsDemandSubsec\_2\_1\_5 = Q_{s,r_t}^D$$

$$\begin{aligned} rhsDemandSubsec\_2\_1\_5 &= \left( \eta_s^Q \right. \\ &= \\ &= 1 \Big) \exp \left( \omega_{s,r,m}^Q \log \left( Q_{s,r,m_t}^D \right) + \omega_{s,r}^M \log \left( M_{s,r_t}^I \right) \right) + \left( \eta_s^Q \right. \\ &\neq 1 \Big) \left( \omega_{s,r,m}^Q \frac{1}{\eta_s^Q} Q_{s,r,m_t}^D \frac{\eta_s^Q - 1}{\eta_s^Q} + \omega_{s,r}^M \frac{1}{\eta_s^Q} M_{s,r_t}^I \frac{\eta_s^Q - 1}{\eta_s^Q} \right) \frac{\eta_s^Q}{(\eta_s^Q = 1) + \eta_s^Q - 1} \end{aligned}$$

$$lhsDemandSubsec\_3\_1\_5 = \frac{P_{s,r_t}}{P_{k,r_t}^A}$$

$$rhsDemandSubsec\_3\_1\_5 = \omega_{s,r}^Q \frac{1}{\eta_k^A} \left( \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \right)^{\frac{(-1)}{\eta_k^A}}$$

$$lhsSupplySubsec\_1\_1\_1 = P_{s,r_t}$$

$$rhsSupplySubsec\_1\_1\_1 = \left( 1 - \omega_{s,r}^{Q^I} \right)^{\frac{1}{\eta_s^I}} \left( \frac{Y_{s,r_t}}{Q_{s,r_t}} \right)^{\frac{(-1)}{\eta_s^I}} \left( P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E \right)$$

$$lhsSupplySubsec\_2\_1\_1 = P_{s,r_t}^I$$

$$rhsSupplySubsec\_2\_1\_1 = \left( P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E \right) A_{s,r_t}^I \frac{\eta_s^I - 1}{\eta_s^I} \omega_{s,r}^{Q^I} \frac{1}{\eta_s^I} \left( \frac{Q_{s,r_t}^I}{Q_{s,r_t}} \right)^{\frac{(-1)}{\eta_s^I}}$$

$$lhsSupplySubsecSec\_1\_1\_1\_1 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right) \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A}$$

$$rhsSupplySubsecSec\_1\_1\_1\_1 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_1\_1 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_1\_1 = Q_{s,r,k_t}^I \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right) \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A}$$

$$lhsSupplySubsecSec\_3\_1\_1\_1 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_1\_1 = E E_{r_t}^{1==s^{Energy}} \exp\left(\eta^{A^I,s,k,r_t}\right)$$

$$lhsSupplySubsecSec\_1\_1\_1\_2 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$rhsSupplySubsecSec\_1\_1\_1\_2 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_1\_2 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_1\_2 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$lhsSupplySubsecSec\_3\_1\_1\_2 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_1\_2 = E E_{r_t}^{2==s^{Energy}} \exp\left(\eta^{A^I,s,k,r_t}\right)$$

$$lhsSupplySubsecSec\_1\_1\_1\_3 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$rhsSupplySubsecSec\_1\_1\_1\_3 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$



$$lhsSupplySubsecSec\_2\_1\_1\_3 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_1\_3 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_1\_3 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_1\_3 = EE_{r_t}^{3==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_1\_4 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_1\_4 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left(\frac{Q_{s,r_t}^I}{Q_{s,r_t}^I}\right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_1\_4 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_1\_4 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_1\_4 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_1\_4 = EE_{r_t}^{4==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsec\_3\_1\_1 = Q_{s,r_t}^I$$

$$\begin{aligned} rhsSupplySubsec\_3\_1\_1 &= \left(\eta_s^{I,A}\right. \\ &= \\ &= 1) \exp\left(\omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)\right) + \left(\eta_s^{I,A}\right. \\ &\neq 1) \left(\omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right. \\ &\quad \left. + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right)^{\frac{\eta_s^{I,A}}{\eta_s^{I,A}-1 + (\eta_s^{I,A}=1)}} \end{aligned}$$

$$lhsSupplySubsec\_4\_1\_1 = Y_{s,r_t}$$

$$\begin{aligned} rhsSupplySubsec\_4\_1\_1 &= A_{s,r_t} \left( \eta_{s,r}^{N,K} \right. \\ &= \\ &= 1 \Big) (1 - D_{s,r_t}) \left( K_{s,r_{t-1}} A_{s,r_t}^K \right)^{\alpha_{s,r}^{K}} \left( N_{s,r_t} A_{s,r_t}^N LFr_t \left( 1 - D_{s,r_t}^N \right) \right)^{\alpha_{s,r}^N} + A_{s,r_t} (1 - D_{s,r_t}) \left( \eta_{s,r}^{N,K} \right. \\ &\neq 1 \Big) \left( \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left( K_{s,r_{t-1}} A_{s,r_t}^K \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} + \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( N_{s,r_t} A_{s,r_t}^N LFr_t \left( 1 - D_{s,r_t}^N \right) \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} \right)^{\frac{N,K}{\eta_{s,r} - 1 + \left( \frac{\eta_{s,r}^{N,K}}{\eta_{s,r}^{N,K}} = 1 \right) 1000}} \end{aligned}$$

$$lhsSupplySubsec\_5\_1\_1 = r_{s,r_t} \left( 1 + \tau_{s,r}^{K,F} \right)$$

$$rhsSupplySubsec\_5\_1\_1 = \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t}^K A_{s,r_t} (1 - D_{s,r_t}) \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} \left( \frac{K_{s,r_{t-1}}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_6\_1\_1 = \frac{W_{s,r_t} \left( 1 + \tau_{s,r}^{N,F} \right)}{P_{s,r_t}}$$

$$rhsSupplySubsec\_6\_1\_1 = \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t} (1 - D_{s,r_t}) A_{s,r_t}^N (1 - D_{s,r_t}^N) \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} \left( \frac{LFr_t N_{s,r_t}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_7\_1\_1 = Q_{s,r_t}$$

$$\begin{aligned} rhsSupplySubsec\_7\_1\_1 &= \left( \eta_s^I \right. \\ &\neq 1 \Big) \left( \omega_{s,r}^{Q^I} \frac{1}{\eta_s^I} \left( Q_{s,r_t}^I A_{s,r_t}^I \right)^{\frac{\eta_s^I - 1}{\eta_s^I}} + \left( 1 - \omega_{s,r}^{Q^I} \right) \frac{1}{\eta_s^I} Y_{s,r_t} \frac{\eta_s^I - 1}{\eta_s^I} \right)^{\frac{\eta_s^I}{\eta_s^I - 1 + \left( \eta_s^I = 1 \right)}} + \left( \eta_s^I \right. \\ &= \\ &= 1 \Big) Q_{s,r_t}^{\omega_{s,r}^{Q^I}} Y_{s,r_t}^{1 - \omega_{s,r}^{Q^I}} \end{aligned}$$

$$lhsSupplySubsec\_9\_1\_1 = D_{s,r_t}^X$$

$$rhsSupplySubsec\_9\_1\_1 = \frac{X_{s,r_t}}{Q_{s,r_t}}$$

$$lhsSupplySubsec\_10\_1\_1 = Q_{s,r_t}$$

$$rhsSupplySubsec\_10\_1\_1 = Q_{s,r,m_t}^D + X_{s,r_t}$$

$$lhsEmissionsSubsecSec\_1\_1\_1 = E_{s,r_t}$$

$$rhsEmissionsSubsecSec\_1\_1\_1 = Q_{s,r_t} \kappa_{s,r_t}^E$$

$$lhsSupplySubsec\_1\_1\_2 = P_{s,r_t}$$

$$rhsSupplySubsec\_1\_1\_2 = \left(1 - \omega_{s,r}^{Q^I}\right)^{\frac{1}{\eta_s^I}} \left(\frac{Y_{s,r_t}}{Q_{s,r_t}}\right)^{\frac{(-1)}{\eta_s^I}} \left(P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E\right)$$

$$lhsSupplySubsec\_2\_1\_2 = P_{s,r_t}^I$$

$$rhsSupplySubsec\_2\_1\_2 = \left(P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E\right) A_{s,r_t}^I \omega_{s,r}^{Q^I \frac{1}{\eta_s^I}} \left(\frac{Q_{s,r_t}^I}{Q_{s,r_t}}\right)^{\frac{(-1)}{\eta_s^I}}$$

$$lhsSupplySubsecSec\_1\_1\_2\_1 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$rhsSupplySubsecSec\_1\_1\_2\_1 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_{s,A}^{I,A}} A_{s,r,k_t}^I \frac{\eta_{s,A}^{I,A}-1}{\eta_{s,A}^{I,A}} \left(\frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I}\right)^{\frac{(-1)}{\eta_{s,A}^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_2\_1 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_2\_1 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$lhsSupplySubsecSec\_3\_1\_2\_1 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_2\_1 = E E_{r_t}^{1==s^{Energy}} \exp\left(\eta^{A^I,s,k,r_t}\right)$$

$$lhsSupplySubsecSec\_1\_1\_2\_2 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$rhsSupplySubsecSec\_1\_1\_2\_2 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_2\_2 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_2\_2 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_2\_2 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_2\_2 = EE_t^{2==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_2\_3 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_2\_3 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_2\_3 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_2\_3 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_2\_3 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_2\_3 = EE_t^{3==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_2\_4 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_2\_4 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_2\_4 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_2\_4 = Q_{s,r,k_t}^I \frac{Q_{s,r,t}^D}{Q_{k,r,t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_2\_4 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_2\_4 = EE_{r_t}^{4==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsec\_3\_1\_2 = Q_{s,r_t}^I$$

$$\begin{aligned} rhsSupplySubsec\_3\_1\_2 &= \left(\eta_s^{I,A}\right. \\ &= \\ &= 1) \exp\left(\omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)\right) + \left(\eta_s^{I,A}\right. \\ &\neq 1) \left(\omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right. \\ &\quad \left. + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right)^{\frac{\eta_s^{I,A}}{\eta_s^{I,A}-1 + \left(\eta_s^{I,A}=1\right)}} \end{aligned}$$

$$lhsSupplySubsec\_4\_1\_2 = Y_{s,r_t}$$

$$\begin{aligned} rhsSupplySubsec\_4\_1\_2 &= A_{s,r_t} \left(\eta_{s,r}^{N,K}\right) \\ &= \\ &= 1) (1 - D_{s,r_t}) \left(K_{s,r_{t-1}} A_{s,r_t}^K\right)^{\alpha_{s,r}^K} \left(N_{s,r_t} A_{s,r_t}^N L F_{r_t} \left(1 - D_{s,r_t}^N\right)\right)^{\alpha_{s,r}^N} + A_{s,r_t} (1 - D_{s,r_t}) \left(\eta_{s,r}^{N,K}\right) \\ &\neq 1) \left(\alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left(K_{s,r_{t-1}} A_{s,r_t}^K\right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} + \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left(N_{s,r_t} A_{s,r_t}^N L F_{r_t} \left(1 - D_{s,r_t}^N\right)\right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} \right)^{\frac{\eta_{s,r}^{N,K}}{\eta_{s,r}^{N,K}-1 + 1000 \left(\eta_{s,r}^{N,K}=1\right)}} \end{aligned}$$

$$lhsSupplySubsec\_5\_1\_2 = r_{s,r_t} \left(1 + \tau_{s,r_t}^{K,F}\right)$$

$$rhsSupplySubsec\_5\_1\_2 = \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left(A_{s,r_t}^K A_{s,r_t} (1 - D_{s,r_t})\right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} \left(\frac{K_{s,r_{t-1}}}{Y_{s,r_t}}\right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_6\_1\_2 = \frac{W_{s,r_t} \left(1 + \tau_{s,r_t}^{N,F}\right)}{P_{s,r_t}}$$

$$rhsSupplySubsec\_6\_1\_2 = \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t} (1 - D_{s,r_t}) A_{s,r_t}^N (1 - D_{s,r_t}^N) \right) \frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}} \left( \frac{L F_{r_t} N_{s,r_t}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_7\_1\_2 = Q_{s,r_t}$$

$$\begin{aligned} rhsSupplySubsec\_7\_1\_2 &= \left( \eta_s^I \right. \\ &\neq 1 \left. \right) \left( \omega_{s,r}^{Q^I} \frac{1}{\eta_s^I} \left( Q_{s,r_t}^I A_{s,r_t}^I \right)^{\frac{\eta_s^I - 1}{\eta_s^I}} + \left( 1 - \omega_{s,r}^{Q^I} \right)^{\frac{1}{\eta_s^I}} Y_{s,r_t} \frac{\eta_s^I - 1}{\eta_s^I} \right)^{\frac{\eta_s^I}{\eta_s^I - 1 + (\eta_s^I = 1)}} + \left( \eta_s^I \right. \\ &= \\ &= 1 \left. \right) Q_{s,r_t}^I \omega_{s,r}^{Q^I} Y_{s,r_t}^{1 - \omega_{s,r}^{Q^I}} \end{aligned}$$

$$lhsSupplySubsec\_9\_1\_2 = D_{s,r_t}^X$$

$$rhsSupplySubsec\_9\_1\_2 = \frac{X_{s,r_t}}{Q_{s,r_t}}$$

$$lhsSupplySubsec\_10\_1\_2 = Q_{s,r_t}$$

$$rhsSupplySubsec\_10\_1\_2 = Q_{s,r,m_t}^D + X_{s,r_t}$$

$$lhsEmissionsSubsecSec\_1\_1\_2 = E_{s,r_t}$$

$$rhsEmissionsSubsecSec\_1\_1\_2 = Q_{s,r_t} \kappa_{s,r_t}^E$$

$$lhsSupplySubsec\_1\_1\_3 = P_{s,r_t}$$

$$rhsSupplySubsec\_1\_1\_3 = \left( 1 - \omega_{s,r}^{Q^I} \right)^{\frac{1}{\eta_s^I}} \left( \frac{Y_{s,r_t}}{Q_{s,r_t}} \right)^{\frac{(-1)}{\eta_s^I}} \left( P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E \right)$$

$$lhsSupplySubsec\_2\_1\_3 = P_{s,r_t}^I$$

$$rhsSupplySubsec\_2\_1\_3 = \left( P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E \right) A_{s,r_t}^I \frac{\eta_s^I - 1}{\eta_s^I} \omega_{s,r}^{Q^I} \frac{1}{\eta_s^I} \left( \frac{Q_{s,r_t}^I}{Q_{s,r_t}} \right)^{\frac{(-1)}{\eta_s^I}}$$

$$lhsSupplySubsecSec\_1\_1\_3\_1 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I, s, k, r_t} \right)$$

$$rhsSupplySubsecSec\_1\_1\_3\_1 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_3\_1 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_3\_1 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_3\_1 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_3\_1 = EE_t^{1==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_3\_2 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_3\_2 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_3\_2 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_3\_2 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_3\_2 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_3\_2 = EE_t^{2==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_3\_3 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_3\_3 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_3\_3 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_3\_3 = Q_{s,r,k_t}^I \frac{Q_{s,r,t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_3\_3 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_3\_3 = EE_t^{3==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_3\_4 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r,t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_3\_4 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left(\frac{Q_{s,r,t}^I}{Q_{s,r,t}^I}\right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_3\_4 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_3\_4 = Q_{s,r,k_t}^I \frac{Q_{s,r,t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_3\_4 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_3\_4 = EE_t^{4==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsec\_3\_1\_3 = Q_{s,r_t}^I$$

$$\begin{aligned} rhsSupplySubsec\_3\_1\_3 &= \left(\eta_s^{I,A}\right. \\ &= \\ &= 1 \Big) \exp\left(\omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)\right) + \left(\eta_s^{I,A}\right. \\ &\neq 1 \Big) \left(\omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right. \\ &\quad \left. + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right)^{\frac{\eta_s^{I,A}}{\eta_s^{I,A}-1+\left(\eta_s^{I,A}=1\right)}} \end{aligned}$$

$$lhsSupplySubsec\_4\_1\_3 = Y_{s,r_t}$$



$$\begin{aligned}
rhsSupplySubsec\_4\_1\_3 &= A_{s,r_t} \left( \eta_{s,r}^{N,K} \right. \\
&= \\
&= 1 \Big) (1 - D_{s,r_t}) \left( K_{s,r_{t-1}} A_{s,r_t}^K \right)^{\alpha_{s,r}^K} \left( N_{s,r_t} A_{s,r_t}^N L F_{r_t} (1 - D_{s,r_t}^N) \right)^{\alpha_{s,r}^N} + A_{s,r_t} (1 - D_{s,r_t}) \left( \eta_{s,r}^{N,K} \right. \\
&\neq 1 \Big) \left( \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left( K_{s,r_{t-1}} A_{s,r_t}^K \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} + \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( N_{s,r_t} A_{s,r_t}^N L F_{r_t} (1 - D_{s,r_t}^N) \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} \right)^{\frac{N,K}{\eta_{s,r}^{N,K} - 1 + 1000 (\eta_{s,r}^{N,K} = 1)}}
\end{aligned}$$

$$lhsSupplySubsec\_5\_1\_3 = r_{s,r_t} \left( 1 + \tau_{s,r_t}^{K,F} \right)$$

$$rhsSupplySubsec\_5\_1\_3 = \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t}^K A_{s,r_t} (1 - D_{s,r_t}) \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} \left( \frac{K_{s,r_{t-1}}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_6\_1\_3 = \frac{W_{s,r_t} \left( 1 + \tau_{s,r_t}^{N,F} \right)}{P_{s,r_t}}$$

$$rhsSupplySubsec\_6\_1\_3 = \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t} (1 - D_{s,r_t}) A_{s,r_t}^N (1 - D_{s,r_t}^N) \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} \left( \frac{L F_{r_t} N_{s,r_t}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_7\_1\_3 = Q_{s,r_t}$$

$$\begin{aligned}
rhsSupplySubsec\_7\_1\_3 &= \left( \eta_s^I \right. \\
&\neq 1 \Big) \left( \omega_{s,r}^{Q^I} \frac{1}{\eta_s^I} \left( Q_{s,r_t}^I A_{s,r_t}^I \right)^{\frac{\eta_s^I - 1}{\eta_s^I}} + \left( 1 - \omega_{s,r}^{Q^I} \right)^{\frac{1}{\eta_s^I}} Y_{s,r_t} \frac{\eta_s^I - 1}{\eta_s^I} \right)^{\frac{\eta_s^I}{\eta_s^I - 1 + (\eta_s^I = 1)}} + \left( \eta_s^I \right. \\
&= \\
&= 1 \Big) Q_{s,r_t}^I \omega_{s,r}^{Q^I} Y_{s,r_t}^{1 - \omega_{s,r}^{Q^I}}
\end{aligned}$$

$$lhsSupplySubsec\_9\_1\_3 = D_{s,r_t}^X$$

$$rhsSupplySubsec\_9\_1\_3 = \frac{X_{s,r_t}}{Q_{s,r_t}}$$

$$lhsSupplySubsec\_10\_1\_3 = Q_{s,r_t}$$

$$rhsSupplySubsec\_10\_1\_3 = Q_{s,r,m_t}^D + X_{s,r_t}$$

$$lhsEmissionsSubsecSec\_1\_1\_3 = E_{s,r_t}$$

$$rhsEmissionsSubsecSec\_1\_1\_3 = Q_{s,r_t} \kappa_{s,r_t}^E$$

$$lhsSupplySubsec\_1\_1\_4 = P_{s,r_t}$$

$$rhsSupplySubsec\_1\_1\_4 = \left(1 - \omega_{s,r}^{Q^I}\right)^{\frac{1}{\eta_s^I}} \left(\frac{Y_{s,r_t}}{Q_{s,r_t}}\right)^{\frac{(-1)}{\eta_s^I}} \left(P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E\right)$$

$$lhsSupplySubsec\_2\_1\_4 = P_{s,r_t}^I$$

$$rhsSupplySubsec\_2\_1\_4 = \left(P_{s,r_t}^Q - l_{s,r}^Q P_{r_t}^E \kappa_{s,r_t}^E\right) A_{s,r_t}^I \omega_{s,r}^{Q^I \frac{\eta_s^I - 1}{\eta_s^I}} \left(\frac{Q_{s,r_t}^I}{Q_{s,r_t}}\right)^{\frac{(-1)}{\eta_s^I}}$$

$$lhsSupplySubsecSec\_1\_1\_4\_1 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$rhsSupplySubsecSec\_1\_1\_4\_1 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_{s,A}^I} A_{s,r,k_t}^I \left(\frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I}\right)^{\frac{(-1)}{\eta_{s,A}^I}}$$

$$lhsSupplySubsecSec\_2\_1\_4\_1 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_4\_1 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$lhsSupplySubsecSec\_3\_1\_4\_1 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_4\_1 = EE_{r_t}^{1==s^{Energy}} \exp\left(\eta^{A^I,s,k,r_t}\right)$$

$$lhsSupplySubsecSec\_1\_1\_4\_2 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r_t}\right)$$

$$rhsSupplySubsecSec\_1\_1\_4\_2 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_{s,A}^I} A_{s,r,k_t}^I \left(\frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I}\right)^{\frac{(-1)}{\eta_{s,A}^I}}$$

$$lhsSupplySubsecSec\_2\_1\_4\_2 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_4\_2 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_4\_2 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_4\_2 = EE_{r_t}^{2==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_4\_3 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_4\_3 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \eta_s^{\frac{I,A-1}{I,A}} \left(\frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I}\right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_4\_3 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_4\_3 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_4\_3 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_4\_3 = EE_{r_t}^{3==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_4\_4 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_4\_4 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \eta_s^{\frac{I,A-1}{I,A}} \left(\frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I}\right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_4\_4 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_4\_4 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_4\_4 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_4\_4 = EE_{r_t}^{4==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsec\_3\_1\_4 = Q_{s,r_t}^I$$

$$\begin{aligned} rhsSupplySubsec\_3\_1\_4 &= \left(\eta_s^{I,A}\right. \\ &= \\ &= 1 \Big) \exp\left(\omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)\right) + \left(\eta_s^{I,A}\right. \\ &\neq 1 \Big) \left(\omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right. \\ &\quad \left. + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right)^{\frac{\eta_s^{I,A}}{\eta_s^{I,A}-1+\left(\eta_s^{I,A}=1\right)}} \end{aligned}$$

$$lhsSupplySubsec\_4\_1\_4 = Y_{s,r_t}$$

$$\begin{aligned} rhsSupplySubsec\_4\_1\_4 &= A_{s,r_t} \left(\eta_{s,r}^{N,K}\right) \\ &= \\ &= 1 \Big) (1 - D_{s,r_t}) \left(K_{s,r_{t-1}} A_{s,r_t}^K\right)^{\alpha_{s,r}^K} \left(N_{s,r_t} A_{s,r_t}^N LFr_t \left(1 - D_{s,r_t}^N\right)\right)^{\alpha_{s,r}^N} + A_{s,r_t} (1 - D_{s,r_t}) \left(\eta_{s,r}^{N,K}\right) \\ &\neq 1 \Big) \left(\alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left(K_{s,r_{t-1}} A_{s,r_t}^K\right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} + \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left(N_{s,r_t} A_{s,r_t}^N LFr_t \left(1 - D_{s,r_t}^N\right)\right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} \right)^{\frac{\eta_{s,r}^{N,K}}{\eta_{s,r}^{N,K}-1+1000\left(\eta_{s,r}^{N,K}=1\right)}} \end{aligned}$$

$$lhsSupplySubsec\_5\_1\_4 = r_{s,r_t} \left(1 + \tau_{s,r_t}^{K,F}\right)$$

$$rhsSupplySubsec\_5\_1\_4 = \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left(A_{s,r_t}^K A_{s,r_t} (1 - D_{s,r_t})\right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} \left(\frac{K_{s,r_{t-1}}}{Y_{s,r_t}}\right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_6\_1\_4 = \frac{W_{s,r_t} \left(1 + \tau_{s,r_t}^{N,F}\right)}{P_{s,r_t}}$$

$$rhsSupplySubsec\_6\_1\_4 = \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t} (1 - D_{s,r_t}) A_{s,r_t}^N (1 - D_{s,r_t}^N) \right)^{\frac{\eta_{s,r}^{N,K} - 1}{\eta_{s,r}^{N,K}}} \left( \frac{L F_{r_t} N_{s,r_t}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_7\_1\_4 = Q_{s,r_t}$$

$$\begin{aligned} rhsSupplySubsec\_7\_1\_4 &= \left( \eta_s^I \right. \\ &\neq 1 \left. \right) \left( \omega_{s,r}^{Q^I \frac{1}{\eta_s^I}} \left( Q_{s,r_t}^I A_{s,r_t}^I \right)^{\frac{\eta_s^I - 1}{\eta_s^I}} + \left( 1 - \omega_{s,r}^{Q^I} \right)^{\frac{1}{\eta_s^I}} Y_{s,r_t}^{\frac{\eta_s^I - 1}{\eta_s^I}} \right)^{\frac{\eta_s^I}{\eta_s^I - 1 + (\eta_s^I = 1)}} + \left( \eta_s^I \right. \\ &= \\ &= 1 \left. \right) Q_{s,r_t}^I \omega_{s,r}^{Q^I} Y_{s,r_t}^{1 - \omega_{s,r}^{Q^I}} \end{aligned}$$

$$lhsSupplySubsec\_9\_1\_4 = D_{s,r_t}^X$$

$$rhsSupplySubsec\_9\_1\_4 = \frac{X_{s,r_t}}{Q_{s,r_t}}$$

$$lhsSupplySubsec\_10\_1\_4 = Q_{s,r_t}$$

$$rhsSupplySubsec\_10\_1\_4 = Q_{s,r,m_t}^D + X_{s,r_t}$$

$$lhsEmissionsSubsecSec\_1\_1\_4 = E_{s,r_t}$$

$$rhsEmissionsSubsecSec\_1\_1\_4 = Q_{s,r_t} \kappa_{s,r_t}^E$$

$$lhsSupplySubsec\_1\_1\_5 = P_{s,r_t}$$

$$rhsSupplySubsec\_1\_1\_5 = \left( 1 - \omega_{s,r}^{Q^I} \right)^{\frac{1}{\eta_s^I}} \left( \frac{Y_{s,r_t}}{Q_{s,r_t}} \right)^{\frac{(-1)}{\eta_s^I}} \left( P_{s,r_t}^Q - l_{s,r}^Q P_r^E \kappa_{s,r_t}^E \right)$$

$$lhsSupplySubsec\_2\_1\_5 = P_{s,r_t}^I$$

$$rhsSupplySubsec\_2\_1\_5 = \left( P_{s,r_t}^Q - l_{s,r}^Q P_r^E \kappa_{s,r_t}^E \right) A_{s,r_t}^I \frac{\eta_s^I - 1}{\eta_s^I} \omega_{s,r}^{Q^I \frac{1}{\eta_s^I}} \left( \frac{Q_{s,r_t}^I}{Q_{s,r_t}} \right)^{\frac{(-1)}{\eta_s^I}}$$

$$lhsSupplySubsecSec\_1\_1\_5\_1 = P_{k,r_t}^A + l_{s,r}^Q P_r^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp \left( \eta^{E^I, s, k, r_t} \right)$$

$$rhsSupplySubsecSec\_1\_1\_5\_1 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_5\_1 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_5\_1 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_5\_1 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_5\_1 = EE_t^{1==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_5\_2 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_5\_2 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_5\_2 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_5\_2 = Q_{s,r,k_t}^I \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_5\_2 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_5\_2 = EE_t^{2==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_5\_3 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r_t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_5\_3 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left( \frac{Q_{s,r,k_t}^I}{Q_{s,r_t}^I} \right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_5\_3 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_5\_3 = Q_{s,r,k_t}^I \frac{Q_{s,r,t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_5\_3 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_5\_3 = EE_t^{3==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_1\_1\_5\_4 = P_{k,r_t}^A + l_{s,r}^Q P_{r_t}^E \frac{Q_{s,r,t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$rhsSupplySubsecSec\_1\_1\_5\_4 = P_{s,r_t}^I \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} A_{s,r,k_t}^I \frac{\eta_s^{I,A}-1}{\eta_s^{I,A}} \left(\frac{Q_{s,r,t}^I}{Q_{s,r,t}^I}\right)^{\frac{(-1)}{\eta_s^{I,A}}}$$

$$lhsSupplySubsecSec\_2\_1\_5\_4 = E_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_2\_1\_5\_4 = Q_{s,r,k_t}^I \frac{Q_{s,r,t}^D}{Q_{k,r_t}^A} \kappa_{s,r,k}^{E,I} \exp\left(\eta^{E^I,s,k,r}_t\right)$$

$$lhsSupplySubsecSec\_3\_1\_5\_4 = A_{s,r,k_t}^I$$

$$rhsSupplySubsecSec\_3\_1\_5\_4 = EE_t^{4==s^{Energy}} \exp\left(\eta^{A^I,s,k,r}_t\right)$$

$$lhsSupplySubsec\_3\_1\_5 = Q_{s,r_t}^I$$

$$\begin{aligned} rhsSupplySubsec\_3\_1\_5 &= \left(\eta_s^{I,A}\right. \\ &= \\ &= 1 \Big) \exp\left(\omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right) + \omega_{s,r,k}^Q \log\left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)\right) + \left(\eta_s^{I,A}\right. \\ &\neq 1 \Big) \left(\omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right. \\ &\quad \left. + \omega_{s,r,k}^Q \frac{1}{\eta_s^{I,A}} \left(Q_{s,r,k_t}^I A_{s,r,k_t}^I\right)^{\frac{\eta_s^{I,A}-1}{\eta_s^{I,A}}} \right)^{\frac{\eta_s^{I,A}}{\eta_s^{I,A}-1+\left(\eta_s^{I,A}=1\right)}} \end{aligned}$$

$$lhsSupplySubsec\_4\_1\_5 = Y_{s,r_t}$$

$$\begin{aligned}
rhsSupplySubsec\_4\_1\_5 &= A_{s,r_t} \left( \eta_{s,r}^{N,K} \right. \\
&= \\
&= 1 \Big) (1 - D_{s,r_t}) \left( K_{s,r_t-1} A_{s,r_t}^K \right)^{\alpha_{s,r}^K} \left( N_{s,r_t} A_{s,r_t}^N L F_{r_t} \left( 1 - D_{s,r_t}^N \right) \right)^{\alpha_{s,r}^N} + A_{s,r_t} (1 - D_{s,r_t}) \left( \eta_{s,r}^{N,K} \right. \\
&\neq 1 \Big) \left( \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left( K_{s,r_t-1} A_{s,r_t}^K \right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} + \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( N_{s,r_t} A_{s,r_t}^N L F_{r_t} \left( 1 - D_{s,r_t}^N \right) \right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} \right)^{\frac{N,K}{\eta_{s,r}^{N,K}-1+1000} \left( \frac{N,K}{\eta_{s,r}^{N,K}} \right)}
\end{aligned}$$

$$lhsSupplySubsec\_5\_1\_5 = r_{s,r_t} \left( 1 + \tau_{s,r_t}^{K,F} \right)$$

$$rhsSupplySubsec\_5\_1\_5 = \alpha_{s,r}^K \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t}^K A_{s,r_t} (1 - D_{s,r_t}) \right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} \left( \frac{K_{s,r_t-1}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_6\_1\_5 = \frac{W_{s,r_t} \left( 1 + \tau_{s,r_t}^{N,F} \right)}{P_{s,r_t}}$$

$$rhsSupplySubsec\_6\_1\_5 = \alpha_{s,r}^N \frac{1}{\eta_{s,r}^{N,K}} \left( A_{s,r_t} (1 - D_{s,r_t}) A_{s,r_t}^N \left( 1 - D_{s,r_t}^N \right) \right)^{\frac{\eta_{s,r}^{N,K}-1}{\eta_{s,r}^{N,K}}} \left( \frac{L F_{r_t} N_{s,r_t}}{Y_{s,r_t}} \right)^{\frac{(-1)}{\eta_{s,r}^{N,K}}}$$

$$lhsSupplySubsec\_7\_1\_5 = Q_{s,r_t}$$

$$\begin{aligned}
rhsSupplySubsec\_7\_1\_5 &= \left( \eta_s^I \right. \\
&\neq 1 \Big) \left( \omega_{s,r}^{Q^I} \frac{1}{\eta_s^I} \left( Q_{s,r_t}^I A_{s,r_t}^I \right)^{\frac{\eta_s^I-1}{\eta_s^I}} + \left( 1 - \omega_{s,r}^{Q^I} \right)^{\frac{1}{\eta_s^I}} Y_{s,r_t} \frac{\eta_s^I-1}{\eta_s^I} \right)^{\frac{\eta_s^I}{\eta_s^I-1+(\eta_s^I=1)}} + \left( \eta_s^I \right. \\
&= \\
&= 1 \Big) Q_{s,r_t}^I \omega_{s,r}^{Q^I} Y_{s,r_t}^{1-\omega_{s,r}^{Q^I}}
\end{aligned}$$

$$lhsSupplySubsec\_9\_1\_5 = D_{s,r_t}^X$$

$$rhsSupplySubsec\_9\_1\_5 = \frac{X_{s,r_t}}{Q_{s,r_t}}$$

$$lhsSupplySubsec\_10\_1\_5 = Q_{s,r_t}$$



$$rhsSupplySubsec\_10\_1\_5 = Q_{s,r,m_t}^D + X_{s,r_t}$$

$$lhsEmissionsSubsecSec\_1\_1\_5 = E_{s,r_t}$$

$$rhsEmissionsSubsecSec\_1\_1\_5 = Q_{s,r_t} \kappa_{s,r_t}^E$$

$$\begin{aligned} lhsSupplySubsec\_8\_1\_1 &= \frac{X_{s,r_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} > 0 \right)}{X_{r_t}} + X_{s,r_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &= \\ &\left. = 0 \right) \end{aligned}$$

$$\begin{aligned} rhsSupplySubsec\_8\_1\_1 &= \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &\left. > 0 \right) D_{s,r}^X \exp \left( \eta^{X,s,r_t} \right) \left( \frac{P_{s,r_t}^Q}{P_{r_t}^Q} \right)^{(-\eta^X)} \end{aligned}$$

$$\begin{aligned} lhsSupplySubsec\_8\_1\_2 &= \frac{X_{s,r_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} > 0 \right)}{X_{r_t}} + X_{s,r_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &= \\ &\left. = 0 \right) \end{aligned}$$

$$\begin{aligned} rhsSupplySubsec\_8\_1\_2 &= \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &\left. > 0 \right) D_{s,r}^X \exp \left( \eta^{X,s,r_t} \right) \left( \frac{P_{s,r_t}^Q}{P_{r_t}^Q} \right)^{(-\eta^X)} \end{aligned}$$

$$\begin{aligned} lhsSupplySubsec\_8\_1\_3 &= \frac{X_{s,r_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} > 0 \right)}{X_{r_t}} + X_{s,r_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &= \\ &\left. = 0 \right) \end{aligned}$$

$$\begin{aligned} rhsSupplySubsec\_8\_1\_3 &= \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &\left. > 0 \right) D_{s,r}^X \exp \left( \eta^{X,s,r_t} \right) \left( \frac{P_{s,r_t}^Q}{P_{r_t}^Q} \right)^{(-\eta^X)} \end{aligned}$$

$$\begin{aligned} lhsSupplySubsec\_8\_1\_4 &= \frac{X_{s,r\_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} > 0 \right)}{X_{r\_t}} + X_{s,r\_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &= \\ &\left. = 0 \right) \end{aligned}$$

$$\begin{aligned} rhsSupplySubsec\_8\_1\_4 &= \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &> 0 \left. \right) D_{s,r}^X \exp \left( \eta^{X,s,r\_t} \right) \left( \frac{P_{s,r\_t}^Q}{P_{r\_t}^Q} \right)^{(-\eta^X)} \end{aligned}$$

$$\begin{aligned} lhsSupplySubsec\_8\_1\_5 &= \frac{X_{s,r\_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} > 0 \right)}{X_{r\_t}} + X_{s,r\_t} \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &= \\ &\left. = 0 \right) \end{aligned}$$

$$\begin{aligned} rhsSupplySubsec\_8\_1\_5 &= \left( \frac{X_{s,r,0} P_{s,r,0}}{P_{s,r,0} Y_{s,r,0}} \right. \\ &> 0 \left. \right) D_{s,r}^X \exp \left( \eta^{X,s,r\_t} \right) \left( \frac{P_{s,r\_t}^Q}{P_{r\_t}^Q} \right)^{(-\eta^X)} \end{aligned}$$

$$lhsClim\_tas\_1 = tas_{r\_t}$$

$$rhsClim\_tas\_1 = T_{0,n} + \eta^{tas,n\_t}$$

$$lhsClim\_cyclpers\_1 = cyclpers_{r\_t}$$

$$rhsClim\_cyclpers\_1 = T_{0,n} + \eta^{cyclpers,n\_t}$$

$$lhsAggReg\_1\_25 = E_{r\_t}$$

$$\begin{aligned} rhsAggReg\_1\_25 &= E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,t} + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,t} + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I \\ &\quad + E_{s,r,k\_t}^I + E_{s,r,t} + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,t} + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,k\_t}^I + E_{s,r,t} \end{aligned}$$

$$lhsSubsidies\_1 = \tau_{r\_t}^S \left( r_{s,r\_t} P_{s,r\_t} K_{s,r\_t-1} + r_{s,r\_t} P_{s,r\_t} K_{s,r\_t-1} + r_{s,r\_t} P_{s,r\_t} K_{s,r\_t-1} + r_{s,r\_t} P_{s,r\_t} K_{s,r\_t-1} + r_{s,r\_t} P_{s,r\_t} K_{s,r\_t-1} \right)$$

$$rhsSubsidies\_1 = E_{r\_t} P_{r\_t}^E \eta_{r\_t}^{\tau^S}$$

$$\begin{aligned}
lhsEmissionPrice\_1 &= P_{r\_t}^E \eta^{CapandTradeInternational}_t + \left(1 - \eta^{CapandTradeInternational}_t\right) \left(E_{r\_t} \eta_r^{CapTrade}_t + P_{r\_t}^E \left(1 - \eta_r^{CapTrade}_t\right)\right) \\
rhsEmissionPrice\_1 &= \eta^{CapandTradeInternational}_t P E_t + \left(1 - \eta^{CapandTradeInternational}_t\right) \left(\eta_r^{CapTrade}_t E_{r,0} \exp\left(\eta_r^{E,Base}_t + \eta_r^E_t\right) + \left(1 - \eta_r^{CapTrade}_t\right) \left(P_{r,0}^E + \eta_r^{P^E}_t + \eta^{P^E}_t\right)\right) \\
lhsEnergyEfficiency\_1 &= E E_{r\_t} \left(l^Y\right. \\
&= \\
&= 1) + Q_{s,r\_t} \left(l^Y\right. \\
&= \\
&= 0) \\
rhsEnergyEfficiency\_1 &= \left(l^Y\right. \\
&= \\
&= 1) \exp\left(\eta_r^{EE}_t\right) + Q_{s,r,0} \exp\left(\eta^{E,s,r}_t\right) \left(l^Y\right. \\
&= \\
&= 0) \\
lhsClim\_SL &= SL_t \\
rhsClim\_SL &= SL_0 + \eta^{SL,n}_t \\
lhsEmissions &= E_t \\
rhsEmissions &= E_{r\_t} \\
lhsEmissionPrice &= \eta^{CapandTradeInternational}_t E_t + \left(1 - \eta^{CapandTradeInternational}_t\right) P E_t \\
rhsEmissionPrice &= \eta^{CapandTradeInternational}_t E_0 \exp\left(\eta^E_t\right) + \left(1 - \eta^{CapandTradeInternational}_t\right) P_0^E \\
lhsAggReg\_1\_21 &= Q_{r\_t}^S \\
rhsAggReg\_1\_21 &= N X_{r,m\_t} + N X_{r\_t} + Q_{r\_t}^I + P_{r\_t} \left(I_{r\_t} + C_{r\_t} + G_{r\_t} + \frac{I_{r\_t}^H P_{r\_t}^H}{P_{r\_t}}\right) \\
\frac{1 + lhsBlock2\_1}{1 + rhsBlock2\_1} &= 1
\end{aligned} \tag{1}$$

$$\frac{1 + lhsBlock2\_2}{1 + rhsBlock2\_2} = 1 \quad (2)$$

$$\frac{1 + lhsBlock2\_3}{1 + rhsBlock2\_3} = 1 \quad (3)$$

$$1 + lhsBlock2\_4 = 1 + rhsBlock2\_4 \quad (4)$$

$$1 + lhsBlock2\_5 = 1 + rhsBlock2\_5 \quad (5)$$

$$\frac{1 + lhsBlock2\_6}{1 + rhsBlock2\_6} = 1 \quad (6)$$

$$\frac{1 + lhsBlock2\_7}{1 + rhsBlock2\_7} = 1 \quad (7)$$

$$\frac{1 + lhsBlock2\_8}{1 + rhsBlock2\_8} = 1 \quad (8)$$

$$\frac{1 + lhsBlock2\_9}{1 + rhsBlock2\_9} = 1 \quad (9)$$

$$\frac{1 + lhsBlock2\_10}{1 + rhsBlock2\_10} = 1 \quad (10)$$

$$\frac{1 + lhsBlock2\_11}{1 + rhsBlock2\_11} = 1 \quad (11)$$

$$\frac{1 + lhsBlock2\_12}{1 + rhsBlock2\_12} = 1 \quad (12)$$

$$\frac{1 + lhsBlock2\_13}{1 + rhsBlock2\_13} = 1 \quad (13)$$

$$\frac{1 + lhsBlock2\_14}{1 + rhsBlock2\_14} = 1 \quad (14)$$

$$\frac{1 + lhsBlock2\_15}{1 + rhsBlock2\_15} = 1 \quad (15)$$

$$\frac{1 + lhsBlock3\_1\_1}{1 + rhsBlock3\_1\_1} = 1 \quad (16)$$

$$\frac{1 + lhsBlock3\_1\_2}{1 + rhsBlock3\_1\_2} = 1 \quad (17)$$

$$\frac{1 + lhsBlock3\_1\_3}{1 + rhsBlock3\_1\_3} = 1 \quad (18)$$

$$\frac{1 + lhsAggReg\_1\_11}{1 + rhsAggReg\_1\_11} = 1 \quad (19)$$

$$\frac{1 + lhsAggReg\_1\_18}{1 + rhsAggReg\_1\_18} = 1 \quad (20)$$

$$\frac{1 + lhsAggReg\_1\_EXP}{1 + rhsAggReg\_1\_EXP} = 1 \quad (21)$$

$$\frac{1 + lhsAggReg\_1\_19}{1 + rhsAggReg\_1\_19} = 1 \quad (22)$$

$$\frac{1 + lhsAggReg\_1\_20}{1 + rhsAggReg\_1\_20} = 1 \quad (23)$$

$$\frac{1 + lhsAggReg\_1\_6}{1 + rhsAggReg\_1\_6} = 1 \quad (24)$$

$$\frac{1 + lhsAggReg\_1\_22}{1 + rhsAggReg\_1\_22} = 1 \quad (25)$$

$$\frac{1 + lhsAggReg\_1\_23}{1 + rhsAggReg\_1\_23} = 1 \quad (26)$$

$$\frac{1 + lhsAggReg\_1\_24}{1 + rhsAggReg\_1\_24} = 1 \quad (27)$$

$$\frac{1 + lhsAggReg\_1\_10}{1 + rhsAggReg\_1\_10} = 1 \quad (28)$$

$$\frac{1 + lhsAggReg\_1\_29}{1 + rhsAggReg\_1\_29} = 1 \quad (29)$$

$$\frac{1 + lhsAggReg\_1\_17}{1 + rhsAggReg\_1\_17} = 1 \quad (30)$$

$$\frac{1 + lhsSubsec\_19\_1}{1 + rhsSubsec\_19\_1} = 1 \quad (31)$$

$$\frac{1 + lhsSubsec\_19\_2}{1 + rhsSubsec\_19\_2} = 1 \quad (32)$$

$$\frac{1 + lhsSubsec\_19\_3}{1 + rhsSubsec\_19\_3} = 1 \quad (33)$$

$$\frac{1 + lhsSubsec\_19\_4}{1 + rhsSubsec\_19\_4} = 1 \quad (34)$$

$$\frac{1 + lhsSubsec\_19\_5}{1 + rhsSubsec\_19\_5} = 1 \quad (35)$$

$$\frac{1 + lhsAggNat\_2}{1 + rhsAggNat\_2} = 1 \quad (36)$$

$$1 + lhsNX\_1 = 1 + rhsNX\_1 \quad (37)$$

$$\frac{1 + lhsdeltaB\_1}{1 + rhsdeltaB\_1} = 1 \quad (38)$$

$$\frac{1 + lhsAggReg\_1\_7}{1 + rhsAggReg\_1\_7} = 1 \quad (39)$$

$$\frac{1 + lhsAggReg\_1\_107}{1 + rhsAggReg\_1\_107} = 1 \quad (40)$$

$$\frac{1 + lhsAggReg\_1\_8}{1 + rhsAggReg\_1\_8} = 1 \quad (41)$$

$$\frac{1 + lhsAggReg\_1\_12}{1 + rhsAggReg\_1\_12} = 1 \quad (42)$$

$$\frac{1 + lhsAggReg\_1\_13}{1 + rhsAggReg\_1\_13} = 1 \quad (43)$$

$$\frac{1 + lhsAggReg\_1\_15}{1 + rhsAggReg\_1\_15} = 1 \quad (44)$$

$$\frac{1 + lhsAggReg\_1\_16}{1 + rhsAggReg\_1\_16} = 1 \quad (45)$$

$$1 + lhsCapSub\_1\_1\_1 = 1 + rhsCapSub\_1\_1\_1 \quad (46)$$

$$1 + lhsCapSub\_2\_1\_1 = 1 + rhsCapSub\_2\_1\_1 \quad (47)$$

$$\frac{lhsCapSub\_3\_1\_1}{rhsCapSub\_3\_1\_1} = 1 \quad (48)$$

$$\frac{1 + lhsSupplySubsec\_11\_1\_1}{1 + rhsSupplySubsec\_11\_1\_1} = 1 \quad (49)$$

$$1 + lhsCapSub\_1\_1\_2 = 1 + rhsCapSub\_1\_1\_2 \quad (50)$$

$$1 + lhsCapSub\_2\_1\_2 = 1 + rhsCapSub\_2\_1\_2 \quad (51)$$

$$\frac{lhsCapSub\_3\_1\_2}{rhsCapSub\_3\_1\_2} = 1 \quad (52)$$

$$\frac{1 + lhsSupplySubsec\_11\_1\_2}{1 + rhsSupplySubsec\_11\_1\_2} = 1 \quad (53)$$

$$1 + lhsCapSub\_1\_1\_3 = 1 + rhsCapSub\_1\_1\_3 \quad (54)$$

$$1 + lhsCapSub\_2\_1\_3 = 1 + rhsCapSub\_2\_1\_3 \quad (55)$$

$$\frac{lhsCapSub\_3\_1\_3}{rhsCapSub\_3\_1\_3} = 1 \quad (56)$$

$$\frac{1 + lhsSupplySubsec\_11\_1\_3}{1 + rhsSupplySubsec\_11\_1\_3} = 1 \quad (57)$$

$$1 + lhsCapSub\_1\_1\_4 = 1 + rhsCapSub\_1\_1\_4 \quad (58)$$

$$1 + lhsCapSub\_2\_1\_4 = 1 + rhsCapSub\_2\_1\_4 \quad (59)$$

$$\frac{lhsCapSub\_3\_1\_4}{rhsCapSub\_3\_1\_4} = 1 \quad (60)$$

$$\frac{1 + lhsSupplySubsec\_11\_1\_4}{1 + rhsSupplySubsec\_11\_1\_4} = 1 \quad (61)$$

$$1 + lhsCapSub\_1\_1\_5 = 1 + rhsCapSub\_1\_1\_5 \quad (62)$$

$$1 + lhsCapSub\_2\_1\_5 = 1 + rhsCapSub\_2\_1\_5 \quad (63)$$

$$\frac{lhsCapSub\_3\_1\_5}{rhsCapSub\_3\_1\_5} = 1 \quad (64)$$

$$\frac{1 + lhsSupplySubsec\_11\_1\_5}{1 + rhsSupplySubsec\_11\_1\_5} = 1 \quad (65)$$

$$1 + lhsAggReg\_1\_1\_2 = 1 \quad (66)$$

$$1 + lhsAggReg\_1\_1\_1 = 1 \quad (67)$$

$$\frac{1 + lhsAggReg\_1\_27}{1 + rhsAggReg\_1\_27} = 1 \quad (68)$$

$$\frac{1 + lhsAggReg\_1\_28}{1 + rhsAggReg\_1\_28} = 1 \quad (69)$$

$$1 + lhsAggNat\_7\_1 = 1 + rhsAggNat\_7\_1 \quad (70)$$

$$1 + lhsGov\_1\_1 = 1 + rhsGov\_1\_1 \quad (71)$$

$$\frac{1 + lhsGov\_11\_1}{1 + rhsGov\_11\_1} = 1 \quad (72)$$

$$1 + lhsGov\_3\_1 = 1 + rhsGov\_3\_1 \quad (73)$$

$$1 + lhsGov\_4\_1 = 1 + rhsGov\_4\_1 \quad (74)$$

$$1 + lhsGov\_5\_1 = 1 + rhsGov\_5\_1 \quad (75)$$

$$1 + lhsGov\_6\_1 = 1 + rhsGov\_6\_1 \quad (76)$$

$$\frac{1 + lhsExoSubsec\_1\_1\_1}{1 + rhsExoSubsec\_1\_1\_1} = 1 \quad (77)$$

$$\frac{1 + lhsExoSubsec\_2\_1\_1}{1 + rhsExoSubsec\_2\_1\_1} = 1 \quad (78)$$

$$\frac{1 + lhsExoSubsec\_9\_1\_1}{1 + rhsExoSubsec\_9\_1\_1} = 1 \quad (79)$$

$$\frac{1 + lhsExoSubsec\_10\_1\_1}{1 + rhsExoSubsec\_10\_1\_1} = 1 \quad (80)$$

$$\frac{1 + lhsExoSubsec\_1\_1\_2}{1 + rhsExoSubsec\_1\_1\_2} = 1 \quad (81)$$



$$\frac{1 + lhsExoSubsec\_2\_1\_2}{1 + rhsExoSubsec\_2\_1\_2} = 1 \quad (82)$$

$$\frac{1 + lhsExoSubsec\_9\_1\_2}{1 + rhsExoSubsec\_9\_1\_2} = 1 \quad (83)$$

$$\frac{1 + lhsExoSubsec\_10\_1\_2}{1 + rhsExoSubsec\_10\_1\_2} = 1 \quad (84)$$

$$\frac{1 + lhsExoSubsec\_1\_1\_3}{1 + rhsExoSubsec\_1\_1\_3} = 1 \quad (85)$$

$$\frac{1 + lhsExoSubsec\_2\_1\_3}{1 + rhsExoSubsec\_2\_1\_3} = 1 \quad (86)$$

$$\frac{1 + lhsExoSubsec\_9\_1\_3}{1 + rhsExoSubsec\_9\_1\_3} = 1 \quad (87)$$

$$\frac{1 + lhsExoSubsec\_10\_1\_3}{1 + rhsExoSubsec\_10\_1\_3} = 1 \quad (88)$$

$$\frac{1 + lhsExoSubsec\_1\_1\_4}{1 + rhsExoSubsec\_1\_1\_4} = 1 \quad (89)$$

$$\frac{1 + lhsExoSubsec\_2\_1\_4}{1 + rhsExoSubsec\_2\_1\_4} = 1 \quad (90)$$

$$\frac{1 + lhsExoSubsec\_9\_1\_4}{1 + rhsExoSubsec\_9\_1\_4} = 1 \quad (91)$$

$$\frac{1 + lhsExoSubsec\_10\_1\_4}{1 + rhsExoSubsec\_10\_1\_4} = 1 \quad (92)$$

$$\frac{1 + lhsExoSubsec\_1\_1\_5}{1 + rhsExoSubsec\_1\_1\_5} = 1 \quad (93)$$

$$\frac{1 + lhsExoSubsec\_2\_1\_5}{1 + rhsExoSubsec\_2\_1\_5} = 1 \quad (94)$$

$$\frac{1 + lhsExoSubsec\_9\_1\_5}{1 + rhsExoSubsec\_9\_1\_5} = 1 \quad (95)$$

$$\frac{1 + lhsExoSubsec\_10\_1\_5}{1 + rhsExoSubsec\_10\_1\_5} = 1 \quad (96)$$

$$\frac{1 + lhsExoSubsec\_3\_1\_1}{1 + rhsExoSubsec\_3\_1\_1} = 1 \quad (97)$$

$$\frac{1 + lhsExoSubsec\_300\_1\_1}{1 + rhsExoSubsec\_300\_1\_1} = 1 \quad (98)$$

$$\frac{1 + lhsExoSubsec\_4\_1\_1}{1 + rhsExoSubsec\_4\_1\_1} = 1 \quad (99)$$

$$\frac{1 + lhsExoSubsec\_5\_1\_1}{1 + rhsExoSubsec\_5\_1\_1} = 1 \quad (100)$$

$$lhsExoSubsec\_6\_1\_1 = rhsExoSubsec\_6\_1\_1 \quad (101)$$

$$\frac{1 + lhsExoSubsec\_7\_1\_1}{1 + rhsExoSubsec\_7\_1\_1} = 1 \quad (102)$$

$$\frac{1 + lhsExoSubsec\_8\_1\_1}{1 + rhsExoSubsec\_8\_1\_1} = 1 \quad (103)$$

$$\frac{1 + lhsExoSubsec\_3\_1\_2}{1 + rhsExoSubsec\_3\_1\_2} = 1 \quad (104)$$

$$\frac{1 + lhsExoSubsec\_300\_1\_2}{1 + rhsExoSubsec\_300\_1\_2} = 1 \quad (105)$$

$$\frac{1 + lhsExoSubsec\_4\_1\_2}{1 + rhsExoSubsec\_4\_1\_2} = 1 \quad (106)$$

$$\frac{1 + lhsExoSubsec\_5\_1\_2}{1 + rhsExoSubsec\_5\_1\_2} = 1 \quad (107)$$

$$lhsExoSubsec\_6\_1\_2 = rhsExoSubsec\_6\_1\_2 \quad (108)$$

$$\frac{1 + lhsExoSubsec\_7\_1\_2}{1 + rhsExoSubsec\_7\_1\_2} = 1 \quad (109)$$

$$\frac{1 + lhsExoSubsec\_8\_1\_2}{1 + rhsExoSubsec\_8\_1\_2} = 1 \quad (110)$$

$$\frac{1 + lhsExoSubsec\_3\_1\_3}{1 + rhsExoSubsec\_3\_1\_3} = 1 \quad (111)$$

$$\frac{1 + lhsExoSubsec\_300\_1\_3}{1 + rhsExoSubsec\_300\_1\_3} = 1 \quad (112)$$

$$\frac{1 + lhsExoSubsec\_4\_1\_3}{1 + rhsExoSubsec\_4\_1\_3} = 1 \quad (113)$$

$$\frac{1 + lhsExoSubsec\_5\_1\_3}{1 + rhsExoSubsec\_5\_1\_3} = 1 \quad (114)$$

$$lhsExoSubsec\_6\_1\_3 = rhsExoSubsec\_6\_1\_3 \quad (115)$$

$$\frac{1 + lhsExoSubsec\_7\_1\_3}{1 + rhsExoSubsec\_7\_1\_3} = 1 \quad (116)$$

$$\frac{1 + lhsExoSubsec\_8\_1\_3}{1 + rhsExoSubsec\_8\_1\_3} = 1 \quad (117)$$

$$\frac{1 + lhsExoSubsec\_3\_1\_4}{1 + rhsExoSubsec\_3\_1\_4} = 1 \quad (118)$$

$$\frac{1 + lhsExoSubsec\_300\_1\_4}{1 + rhsExoSubsec\_300\_1\_4} = 1 \quad (119)$$

$$\frac{1 + lhsExoSubsec\_4\_1\_4}{1 + rhsExoSubsec\_4\_1\_4} = 1 \quad (120)$$

$$\frac{1 + lhsExoSubsec\_5\_1\_4}{1 + rhsExoSubsec\_5\_1\_4} = 1 \quad (121)$$

$$lhsExoSubsec\_6\_1\_4 = rhsExoSubsec\_6\_1\_4 \quad (122)$$

$$\frac{1 + lhsExoSubsec\_7\_1\_4}{1 + rhsExoSubsec\_7\_1\_4} = 1 \quad (123)$$

$$\frac{1 + lhsExoSubsec\_8\_1\_4}{1 + rhsExoSubsec\_8\_1\_4} = 1 \quad (124)$$

$$\frac{1 + lhsExoSubsec\_3\_1\_5}{1 + rhsExoSubsec\_3\_1\_5} = 1 \quad (125)$$

$$\frac{1 + lhsExoSubsec\_300\_1\_5}{1 + rhsExoSubsec\_300\_1\_5} = 1 \quad (126)$$

$$\frac{1 + lhsExoSubsec\_4\_1\_5}{1 + rhsExoSubsec\_4\_1\_5} = 1 \quad (127)$$

$$\frac{1 + lhsExoSubsec\_5\_1\_5}{1 + rhsExoSubsec\_5\_1\_5} = 1 \quad (128)$$

$$lhsExoSubsec\_6\_1\_5 = rhsExoSubsec\_6\_1\_5 \quad (129)$$

$$\frac{1 + lhsExoSubsec\_7\_1\_5}{1 + rhsExoSubsec\_7\_1\_5} = 1 \quad (130)$$

$$\frac{1 + lhsExoSubsec\_8\_1\_5}{1 + rhsExoSubsec\_8\_1\_5} = 1 \quad (131)$$

$$1 + lhsAggReg\_1\_14 = 1 + rhsAggReg\_1\_14 \quad (132)$$

$$\frac{1 + lhsAggReg\_1\_26}{1 + rhsAggReg\_1\_26} = 1 \quad (133)$$

$$\frac{1 + lhsAggReg\_1\_9}{1 + rhsAggReg\_1\_9} = 1 \quad (134)$$

$$\frac{1 + lhsDemandsec\_5\_1\_1}{1 + rhsDemandsec\_5\_1\_1} = 1 \quad (135)$$

$$\frac{1 + lhsDemandsec\_6\_1\_1}{1 + rhsDemandsec\_6\_1\_1} = 1 \quad (136)$$

$$\frac{1 + lhsDemandsec\_7\_1\_1}{1 + rhsDemandsec\_7\_1\_1} = 1 \quad (137)$$

$$\frac{1 + lhsDemandsec\_AF\_1\_1}{1 + rhsDemandsec\_AF\_1\_1} = 1 \quad (138)$$

$$\frac{1 + lhsDemandsec\_5\_1\_2}{1 + rhsDemandsec\_5\_1\_2} = 1 \quad (139)$$

$$\frac{1 + lhsDemandsec\_6\_1\_2}{1 + rhsDemandsec\_6\_1\_2} = 1 \quad (140)$$

$$\frac{1 + lhsDemandsec\_7\_1\_2}{1 + rhsDemandsec\_7\_1\_2} = 1 \quad (141)$$

$$\frac{1 + lhsDemandsec\_AF\_1\_2}{1 + rhsDemandsec\_AF\_1\_2} = 1 \quad (142)$$

$$\frac{1 + lhsDemandsec\_5\_1\_3}{1 + rhsDemandsec\_5\_1\_3} = 1 \quad (143)$$

$$\frac{1 + lhsDemandsec\_6\_1\_3}{1 + rhsDemandsec\_6\_1\_3} = 1 \quad (144)$$

$$\frac{1 + lhsDemandsec\_7\_1\_3}{1 + rhsDemandsec\_7\_1\_3} = 1 \quad (145)$$

$$\frac{1 + lhsDemandsec\_AF\_1\_3}{1 + rhsDemandsec\_AF\_1\_3} = 1 \quad (146)$$

$$\frac{1 + lhsDemandsec\_5\_1\_4}{1 + rhsDemandsec\_5\_1\_4} = 1 \quad (147)$$

$$\frac{1 + lhsDemandsec\_6\_1\_4}{1 + rhsDemandsec\_6\_1\_4} = 1 \quad (148)$$

$$\frac{1 + lhsDemandsec\_7\_1\_4}{1 + rhsDemandsec\_7\_1\_4} = 1 \quad (149)$$

$$\frac{1 + lhsDemandsec\_AF\_1\_4}{1 + rhsDemandsec\_AF\_1\_4} = 1 \quad (150)$$

$$\frac{1 + lhsDemandsec\_4\_1\_1}{1 + rhsDemandsec\_4\_1\_1} = 1 \quad (151)$$

$$\frac{1 + lhsDemandsec\_8\_1\_1}{1 + rhsDemandsec\_8\_1\_1} = 1 \quad (152)$$

$$\frac{1 + lhsDemandsec\_9\_1\_1}{1 + rhsDemandsec\_9\_1\_1} = 1 \quad (153)$$

$$\frac{lhsDemandSubsec\_1\_1\_1\_1}{rhsDemandSubsec\_1\_1\_1\_1} = 1 \quad (154)$$

$$\frac{1 + lhsDemandSubsec\_1M\_1\_1}{1 + rhsDemandSubsec\_1M\_1\_1} = 1 \quad (155)$$

$$\frac{1 + lhsDemandSubsec\_2M\_1\_1}{1 + rhsDemandSubsec\_2M\_1\_1} = 1 \quad (156)$$

$$\frac{1 + lhsDemandSubsec\_2\_1\_1}{1 + rhsDemandSubsec\_2\_1\_1} = 1 \quad (157)$$

$$\frac{1 + lhsDemandSubsec\_3\_1\_1}{1 + rhsDemandSubsec\_3\_1\_1} = 1 \quad (158)$$

$$\frac{1 + lhsDemandsec\_4\_1\_2}{1 + rhsDemandsec\_4\_1\_2} = 1 \quad (159)$$

$$\frac{1 + lhsDemandsec\_8\_1\_2}{1 + rhsDemandsec\_8\_1\_2} = 1 \quad (160)$$

$$\frac{1 + lhsDemandsec\_9\_1\_2}{1 + rhsDemandsec\_9\_1\_2} = 1 \quad (161)$$

$$\frac{lhsDemandSubsec\_1\_1\_2\_1}{rhsDemandSubsec\_1\_1\_2\_1} = 1 \quad (162)$$

$$\frac{1 + lhsDemandSubsec\_1M\_1\_2}{1 + rhsDemandSubsec\_1M\_1\_2} = 1 \quad (163)$$

$$\frac{1 + lhsDemandSubsec\_2M\_1\_2}{1 + rhsDemandSubsec\_2M\_1\_2} = 1 \quad (164)$$

$$\frac{1 + lhsDemandSubsec\_2\_1\_2}{1 + rhsDemandSubsec\_2\_1\_2} = 1 \quad (165)$$

$$\frac{1 + lhsDemandSubsec\_3\_1\_2}{1 + rhsDemandSubsec\_3\_1\_2} = 1 \quad (166)$$

$$\frac{lhsDemandSubsec\_1\_1\_3\_1}{rhsDemandSubsec\_1\_1\_3\_1} = 1 \quad (167)$$

$$\frac{1 + lhsDemandSubsec\_1M\_1\_3}{1 + rhsDemandSubsec\_1M\_1\_3} = 1 \quad (168)$$

$$\frac{1 + lhsDemandSubsec\_2M\_1\_3}{1 + rhsDemandSubsec\_2M\_1\_3} = 1 \quad (169)$$

$$\frac{1 + lhsDemandSubsec\_2\_1\_3}{1 + rhsDemandSubsec\_2\_1\_3} = 1 \quad (170)$$

$$\frac{1 + lhsDemandSubsec\_3\_1\_3}{1 + rhsDemandSubsec\_3\_1\_3} = 1 \quad (171)$$

$$\frac{1 + lhsDemandsec\_4\_1\_3}{1 + rhsDemandsec\_4\_1\_3} = 1 \quad (172)$$

$$\frac{1 + lhsDemandsec\_8\_1\_3}{1 + rhsDemandsec\_8\_1\_3} = 1 \quad (173)$$

$$\frac{1 + lhsDemandsec\_9\_1\_3}{1 + rhsDemandsec\_9\_1\_3} = 1 \quad (174)$$

$$\frac{lhsDemandSubsec\_1\_1\_4\_1}{rhsDemandSubsec\_1\_1\_4\_1} = 1 \quad (175)$$

$$\frac{1 + lhsDemandSubsec\_1M\_1\_4}{1 + rhsDemandSubsec\_1M\_1\_4} = 1 \quad (176)$$

$$\frac{1 + lhsDemandSubsec\_2M\_1\_4}{1 + rhsDemandSubsec\_2M\_1\_4} = 1 \quad (177)$$

$$\frac{1 + lhsDemandSubsec\_2\_1\_4}{1 + rhsDemandSubsec\_2\_1\_4} = 1 \quad (178)$$

$$\frac{1 + lhsDemandSubsec\_3\_1\_4}{1 + rhsDemandSubsec\_3\_1\_4} = 1 \quad (179)$$

$$\frac{1 + lhsDemandsec\_4\_1\_4}{1 + rhsDemandsec\_4\_1\_4} = 1 \quad (180)$$

$$\frac{1 + lhsDemandsec\_8\_1\_4}{1 + rhsDemandsec\_8\_1\_4} = 1 \quad (181)$$

$$\frac{1 + lhsDemandsec\_9\_1\_4}{1 + rhsDemandsec\_9\_1\_4} = 1 \quad (182)$$

$$\frac{lhsDemandSubsec\_1\_1\_5\_1}{rhsDemandSubsec\_1\_1\_5\_1} = 1 \quad (183)$$

$$\frac{1 + lhsDemandSubsec\_1M\_1\_5}{1 + rhsDemandSubsec\_1M\_1\_5} = 1 \quad (184)$$

$$\frac{1 + lhsDemandSubsec\_2M\_1\_5}{1 + rhsDemandSubsec\_2M\_1\_5} = 1 \quad (185)$$

$$\frac{1 + lhsDemandSubsec\_2\_1\_5}{1 + rhsDemandSubsec\_2\_1\_5} = 1 \quad (186)$$

$$\frac{1 + lhsDemandSubsec\_3\_1\_5}{1 + rhsDemandSubsec\_3\_1\_5} = 1 \quad (187)$$

$$\frac{1 + lhsSupplySubsec\_1\_1\_1}{1 + rhsSupplySubsec\_1\_1\_1} = 1 \quad (188)$$

$$\frac{1 + lhsSupplySubsec\_2\_1\_1}{1 + rhsSupplySubsec\_2\_1\_1} = 1 \quad (189)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_1\_1}{1 + rhsSupplySubsecSec\_1\_1\_1\_1} = 1 \quad (190)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_1\_1}{1 + rhsSupplySubsecSec\_2\_1\_1\_1} = 1 \quad (191)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_1\_1}{1 + rhsSupplySubsecSec\_3\_1\_1\_1} = 1 \quad (192)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_1\_2}{1 + rhsSupplySubsecSec\_1\_1\_1\_2} = 1 \quad (193)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_1\_2}{1 + rhsSupplySubsecSec\_2\_1\_1\_2} = 1 \quad (194)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_1\_2}{1 + rhsSupplySubsecSec\_3\_1\_1\_2} = 1 \quad (195)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_1\_3}{1 + rhsSupplySubsecSec\_1\_1\_1\_3} = 1 \quad (196)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_1\_3}{1 + rhsSupplySubsecSec\_2\_1\_1\_3} = 1 \quad (197)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_1\_3}{1 + rhsSupplySubsecSec\_3\_1\_1\_3} = 1 \quad (198)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_1\_4}{1 + rhsSupplySubsecSec\_1\_1\_1\_4} = 1 \quad (199)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_1\_4}{1 + rhsSupplySubsecSec\_2\_1\_1\_4} = 1 \quad (200)$$



$$\frac{1 + lhsSupplySubsecSec\_3\_1\_1\_4}{1 + rhsSupplySubsecSec\_3\_1\_1\_4} = 1 \quad (201)$$

$$\frac{1 + lhsSupplySubsec\_3\_1\_1}{1 + rhsSupplySubsec\_3\_1\_1} = 1 \quad (202)$$

$$\frac{1 + lhsSupplySubsec\_4\_1\_1}{1 + rhsSupplySubsec\_4\_1\_1} = 1 \quad (203)$$

$$\frac{1 + lhsSupplySubsec\_5\_1\_1}{1 + rhsSupplySubsec\_5\_1\_1} = 1 \quad (204)$$

$$\frac{1 + lhsSupplySubsec\_6\_1\_1}{1 + rhsSupplySubsec\_6\_1\_1} = 1 \quad (205)$$

$$\frac{1 + lhsSupplySubsec\_7\_1\_1}{1 + rhsSupplySubsec\_7\_1\_1} = 1 \quad (206)$$

$$\frac{1 + lhsSupplySubsec\_9\_1\_1}{1 + rhsSupplySubsec\_9\_1\_1} = 1 \quad (207)$$

$$\frac{1 + lhsSupplySubsec\_10\_1\_1}{1 + rhsSupplySubsec\_10\_1\_1} = 1 \quad (208)$$

$$\frac{1 + lhsEmissionsSubsecSec\_1\_1\_1}{1 + rhsEmissionsSubsecSec\_1\_1\_1} = 1 \quad (209)$$

$$\begin{aligned} & \kappa_{s,r_t}^E \left( l^Y == 1 \right) + E_{s,r_t} \left( l^Y == 0 \right) \\ &= \left( l^Y \right. \\ &= \\ &= 1 \left. \right) \left( \kappa_{s,r}^E + \eta^{\kappa^E,s,r}_t \right) + E_{r,0} \left( l^Y \right. \\ &= \\ &= 0 \left. \right) \exp \left( \eta^{E,s,r}_t \right) \frac{E_{s,r}}{E_0} \end{aligned} \quad (210)$$

$$\frac{1 + lhsSupplySubsec\_1\_1\_2}{1 + rhsSupplySubsec\_1\_1\_2} = 1 \quad (211)$$

$$\frac{1 + lhsSupplySubsec\_2\_1\_2}{1 + rhsSupplySubsec\_2\_1\_2} = 1 \quad (212)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_2\_1}{1 + rhsSupplySubsecSec\_1\_1\_2\_1} = 1 \quad (213)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_2\_1}{1 + rhsSupplySubsecSec\_2\_1\_2\_1} = 1 \quad (214)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_2\_1}{1 + rhsSupplySubsecSec\_3\_1\_2\_1} = 1 \quad (215)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_2\_2}{1 + rhsSupplySubsecSec\_1\_1\_2\_2} = 1 \quad (216)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_2\_2}{1 + rhsSupplySubsecSec\_2\_1\_2\_2} = 1 \quad (217)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_2\_2}{1 + rhsSupplySubsecSec\_3\_1\_2\_2} = 1 \quad (218)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_2\_3}{1 + rhsSupplySubsecSec\_1\_1\_2\_3} = 1 \quad (219)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_2\_3}{1 + rhsSupplySubsecSec\_2\_1\_2\_3} = 1 \quad (220)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_2\_3}{1 + rhsSupplySubsecSec\_3\_1\_2\_3} = 1 \quad (221)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_2\_4}{1 + rhsSupplySubsecSec\_1\_1\_2\_4} = 1 \quad (222)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_2\_4}{1 + rhsSupplySubsecSec\_2\_1\_2\_4} = 1 \quad (223)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_2\_4}{1 + rhsSupplySubsecSec\_3\_1\_2\_4} = 1 \quad (224)$$

$$\frac{1 + lhsSupplySubsec\_3\_1\_2}{1 + rhsSupplySubsec\_3\_1\_2} = 1 \quad (225)$$

$$\frac{1 + lhsSupplySubsec\_4\_1\_2}{1 + rhsSupplySubsec\_4\_1\_2} = 1 \quad (226)$$

$$\frac{1 + lhsSupplySubsec\_5\_1\_2}{1 + rhsSupplySubsec\_5\_1\_2} = 1 \quad (227)$$

$$\frac{1 + lhsSupplySubsec\_6\_1\_2}{1 + rhsSupplySubsec\_6\_1\_2} = 1 \quad (228)$$

$$\frac{1 + lhsSupplySubsec\_7\_1\_2}{1 + rhsSupplySubsec\_7\_1\_2} = 1 \quad (229)$$

$$\frac{1 + lhsSupplySubsec\_9\_1\_2}{1 + rhsSupplySubsec\_9\_1\_2} = 1 \quad (230)$$

$$\frac{1 + lhsSupplySubsec\_10\_1\_2}{1 + rhsSupplySubsec\_10\_1\_2} = 1 \quad (231)$$

$$\frac{1 + lhsEmissionsSubsecSec\_1\_1\_2}{1 + rhsEmissionsSubsecSec\_1\_1\_2} = 1 \quad (232)$$

$$\begin{aligned} & \kappa_{s,r_t}^E \left( l^Y == 1 \right) + E_{s,r_t} \left( l^Y == 0 \right) \\ &= \left( l^Y \right. \\ &= \\ &= 1 \left. \right) \left( \kappa_{s,r}^E + \eta^{\kappa^E,s,r}_t \right) + E_{r,0} \left( l^Y \right. \\ &= \\ &= 0 \left. \right) \exp \left( \eta^{E,s,r}_t \right) \frac{E_{s,r}}{E_0} \end{aligned} \quad (233)$$

$$\frac{1 + lhsSupplySubsec\_1\_1\_3}{1 + rhsSupplySubsec\_1\_1\_3} = 1 \quad (234)$$

$$\frac{1 + lhsSupplySubsec\_2\_1\_3}{1 + rhsSupplySubsec\_2\_1\_3} = 1 \quad (235)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_3\_1}{1 + rhsSupplySubsecSec\_1\_1\_3\_1} = 1 \quad (236)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_3\_1}{1 + rhsSupplySubsecSec\_2\_1\_3\_1} = 1 \quad (237)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_3\_1}{1 + rhsSupplySubsecSec\_3\_1\_3\_1} = 1 \quad (238)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_3\_2}{1 + rhsSupplySubsecSec\_1\_1\_3\_2} = 1 \quad (239)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_3\_2}{1 + rhsSupplySubsecSec\_2\_1\_3\_2} = 1 \quad (240)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_3\_2}{1 + rhsSupplySubsecSec\_3\_1\_3\_2} = 1 \quad (241)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_3\_3}{1 + rhsSupplySubsecSec\_1\_1\_3\_3} = 1 \quad (242)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_3\_3}{1 + rhsSupplySubsecSec\_2\_1\_3\_3} = 1 \quad (243)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_3\_3}{1 + rhsSupplySubsecSec\_3\_1\_3\_3} = 1 \quad (244)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_3\_4}{1 + rhsSupplySubsecSec\_1\_1\_3\_4} = 1 \quad (245)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_3\_4}{1 + rhsSupplySubsecSec\_2\_1\_3\_4} = 1 \quad (246)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_3\_4}{1 + rhsSupplySubsecSec\_3\_1\_3\_4} = 1 \quad (247)$$

$$\frac{1 + lhsSupplySubsec\_3\_1\_3}{1 + rhsSupplySubsec\_3\_1\_3} = 1 \quad (248)$$

$$\frac{1 + lhsSupplySubsec\_4\_1\_3}{1 + rhsSupplySubsec\_4\_1\_3} = 1 \quad (249)$$

$$\frac{1 + lhsSupplySubsec\_5\_1\_3}{1 + rhsSupplySubsec\_5\_1\_3} = 1 \quad (250)$$

$$\frac{1 + lhsSupplySubsec\_6\_1\_3}{1 + rhsSupplySubsec\_6\_1\_3} = 1 \quad (251)$$

$$\frac{1 + lhsSupplySubsec\_7\_1\_3}{1 + rhsSupplySubsec\_7\_1\_3} = 1 \quad (252)$$

$$\frac{1 + lhsSupplySubsec\_9\_1\_3}{1 + rhsSupplySubsec\_9\_1\_3} = 1 \quad (253)$$

$$\frac{1 + lhsSupplySubsec\_10\_1\_3}{1 + rhsSupplySubsec\_10\_1\_3} = 1 \quad (254)$$

$$\frac{1 + lhsEmissionsSubsecSec\_1\_1\_3}{1 + rhsEmissionsSubsecSec\_1\_1\_3} = 1 \quad (255)$$

$$\begin{aligned} & \kappa_{s,r_t}^E \left( l^Y == 1 \right) + E_{s,r_t} \left( l^Y == 0 \right) \\ &= \left( l^Y \right. \\ &= \\ &= 1 \left. \right) \left( \kappa_{s,r}^E + \eta^{\kappa^E, s, r}_t \right) + E_{r,0} \left( l^Y \right. \\ &= \\ &= 0 \left. \right) \exp \left( \eta^{E, s, r}_t \right) \frac{E_{s,r}}{E_0} \end{aligned} \quad (256)$$

$$\frac{1 + lhsSupplySubsec\_1\_1\_4}{1 + rhsSupplySubsec\_1\_1\_4} = 1 \quad (257)$$

$$\frac{1 + lhsSupplySubsec\_2\_1\_4}{1 + rhsSupplySubsec\_2\_1\_4} = 1 \quad (258)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_4\_1}{1 + rhsSupplySubsecSec\_1\_1\_4\_1} = 1 \quad (259)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_4\_1}{1 + rhsSupplySubsecSec\_2\_1\_4\_1} = 1 \quad (260)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_4\_1}{1 + rhsSupplySubsecSec\_3\_1\_4\_1} = 1 \quad (261)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_4\_2}{1 + rhsSupplySubsecSec\_1\_1\_4\_2} = 1 \quad (262)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_4\_2}{1 + rhsSupplySubsecSec\_2\_1\_4\_2} = 1 \quad (263)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_4\_2}{1 + rhsSupplySubsecSec\_3\_1\_4\_2} = 1 \quad (264)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_4\_3}{1 + rhsSupplySubsecSec\_1\_1\_4\_3} = 1 \quad (265)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_4\_3}{1 + rhsSupplySubsecSec\_2\_1\_4\_3} = 1 \quad (266)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_4\_3}{1 + rhsSupplySubsecSec\_3\_1\_4\_3} = 1 \quad (267)$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_4\_4}{1 + rhsSupplySubsecSec\_1\_1\_4\_4} = 1 \quad (268)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_4\_4}{1 + rhsSupplySubsecSec\_2\_1\_4\_4} = 1 \quad (269)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_4\_4}{1 + rhsSupplySubsecSec\_3\_1\_4\_4} = 1 \quad (270)$$

$$\frac{1 + lhsSupplySubsec\_3\_1\_4}{1 + rhsSupplySubsec\_3\_1\_4} = 1 \quad (271)$$

$$\frac{1 + lhsSupplySubsec\_4\_1\_4}{1 + rhsSupplySubsec\_4\_1\_4} = 1 \quad (272)$$

$$\frac{1 + lhsSupplySubsec\_5\_1\_4}{1 + rhsSupplySubsec\_5\_1\_4} = 1 \quad (273)$$

$$\frac{1 + lhsSupplySubsec\_6\_1\_4}{1 + rhsSupplySubsec\_6\_1\_4} = 1 \quad (274)$$

$$\frac{1 + lhsSupplySubsec\_7\_1\_4}{1 + rhsSupplySubsec\_7\_1\_4} = 1 \quad (275)$$

$$\frac{1 + lhsSupplySubsec\_9\_1\_4}{1 + rhsSupplySubsec\_9\_1\_4} = 1 \quad (276)$$

$$\frac{1 + lhsSupplySubsec\_10\_1\_4}{1 + rhsSupplySubsec\_10\_1\_4} = 1 \quad (277)$$

$$\frac{1 + lhsEmissionsSubsecSec\_1\_1\_4}{1 + rhsEmissionsSubsecSec\_1\_1\_4} = 1 \quad (278)$$

$$\begin{aligned}
& \kappa_{s,r_t}^E \left( l^Y == 1 \right) + E_{s,r_t} \left( l^Y == 0 \right) \\
& = \left( l^Y \right. \\
& = \\
& = 1 \left. \right) \left( \kappa_{s,r}^E + \eta^{\kappa^E, s, r}_t \right) + E_{r,0} \left( l^Y \right. \\
& = \\
& = 0 \left. \right) \exp \left( \eta^{E, s, r}_t \right) \frac{E_{s,r}}{E_0}
\end{aligned} \tag{279}$$

$$\frac{1 + lhsSupplySubsec\_1\_1\_5}{1 + rhsSupplySubsec\_1\_1\_5} = 1 \tag{280}$$

$$\frac{1 + lhsSupplySubsec\_2\_1\_5}{1 + rhsSupplySubsec\_2\_1\_5} = 1 \tag{281}$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_5\_1}{1 + rhsSupplySubsecSec\_1\_1\_5\_1} = 1 \tag{282}$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_5\_1}{1 + rhsSupplySubsecSec\_2\_1\_5\_1} = 1 \tag{283}$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_5\_1}{1 + rhsSupplySubsecSec\_3\_1\_5\_1} = 1 \tag{284}$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_5\_2}{1 + rhsSupplySubsecSec\_1\_1\_5\_2} = 1 \tag{285}$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_5\_2}{1 + rhsSupplySubsecSec\_2\_1\_5\_2} = 1 \tag{286}$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_5\_2}{1 + rhsSupplySubsecSec\_3\_1\_5\_2} = 1 \tag{287}$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_5\_3}{1 + rhsSupplySubsecSec\_1\_1\_5\_3} = 1 \tag{288}$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_5\_3}{1 + rhsSupplySubsecSec\_2\_1\_5\_3} = 1 \tag{289}$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_5\_3}{1 + rhsSupplySubsecSec\_3\_1\_5\_3} = 1 \tag{290}$$

$$\frac{1 + lhsSupplySubsecSec\_1\_1\_5\_4}{1 + rhsSupplySubsecSec\_1\_1\_5\_4} = 1 \quad (291)$$

$$\frac{1 + lhsSupplySubsecSec\_2\_1\_5\_4}{1 + rhsSupplySubsecSec\_2\_1\_5\_4} = 1 \quad (292)$$

$$\frac{1 + lhsSupplySubsecSec\_3\_1\_5\_4}{1 + rhsSupplySubsecSec\_3\_1\_5\_4} = 1 \quad (293)$$

$$\frac{1 + lhsSupplySubsec\_3\_1\_5}{1 + rhsSupplySubsec\_3\_1\_5} = 1 \quad (294)$$

$$\frac{1 + lhsSupplySubsec\_4\_1\_5}{1 + rhsSupplySubsec\_4\_1\_5} = 1 \quad (295)$$

$$\frac{1 + lhsSupplySubsec\_5\_1\_5}{1 + rhsSupplySubsec\_5\_1\_5} = 1 \quad (296)$$

$$\frac{1 + lhsSupplySubsec\_6\_1\_5}{1 + rhsSupplySubsec\_6\_1\_5} = 1 \quad (297)$$

$$\frac{1 + lhsSupplySubsec\_7\_1\_5}{1 + rhsSupplySubsec\_7\_1\_5} = 1 \quad (298)$$

$$\frac{1 + lhsSupplySubsec\_9\_1\_5}{1 + rhsSupplySubsec\_9\_1\_5} = 1 \quad (299)$$

$$\frac{1 + lhsSupplySubsec\_10\_1\_5}{1 + rhsSupplySubsec\_10\_1\_5} = 1 \quad (300)$$

$$\frac{1 + lhsEmissionsSubsecSec\_1\_1\_5}{1 + rhsEmissionsSubsecSec\_1\_1\_5} = 1 \quad (301)$$

$$\begin{aligned} & \kappa_{s,r_t}^E \left( l^Y == 1 \right) + E_{s,r_t} \left( l^Y == 0 \right) \\ &= \left( l^Y \right. \\ &= \\ &= 1 \left. \right) \left( \kappa_{s,r}^E + \eta^{\kappa^E, s, r}_t \right) + E_{r,0} \left( l^Y \right. \\ &= \\ &= 0 \left. \right) \exp \left( \eta^{E, s, r}_t \right) \frac{E_{s,r}}{E_0} \end{aligned} \quad (302)$$



$$\frac{1 + lhsSupplySubsec\_8\_1\_1}{1 + rhsSupplySubsec\_8\_1\_1} = 1 \quad (303)$$

$$\frac{1 + lhsSupplySubsec\_8\_1\_2}{1 + rhsSupplySubsec\_8\_1\_2} = 1 \quad (304)$$

$$\frac{1 + lhsSupplySubsec\_8\_1\_3}{1 + rhsSupplySubsec\_8\_1\_3} = 1 \quad (305)$$

$$\frac{1 + lhsSupplySubsec\_8\_1\_4}{1 + rhsSupplySubsec\_8\_1\_4} = 1 \quad (306)$$

$$\frac{1 + lhsSupplySubsec\_8\_1\_5}{1 + rhsSupplySubsec\_8\_1\_5} = 1 \quad (307)$$

$$lhsClim\_tas\_1 = rhsClim\_tas\_1 \quad (308)$$

$$lhsClim\_cyclpers\_1 = rhsClim\_cyclpers\_1 \quad (309)$$

$$\frac{1 + lhsAggReg\_1\_25}{1 + rhsAggReg\_1\_25} = 1 \quad (310)$$

$$\frac{1 + lhsSubsidies\_1}{1 + rhsSubsidies\_1} = 1 \quad (311)$$

$$\frac{1 + lhsEmissionPrice\_1}{1 + rhsEmissionPrice\_1} = 1 \quad (312)$$

$$\frac{1 + lhsEnergyEfficiency\_1}{1 + rhsEnergyEfficiency\_1} = 1 \quad (313)$$

$$\frac{1 + lhsClim\_SL}{1 + rhsClim\_SL} = 1 \quad (314)$$

$$\frac{1 + lhsEmissions}{1 + rhsEmissions} = 1 \quad (315)$$

$$\frac{1 + lhsEmissionPrice}{1 + rhsEmissionPrice} = 1 \quad (316)$$

$$\frac{1 + lhsAggReg\_1\_21}{1 + rhsAggReg\_1\_21} = 1 \quad (317)$$