1. Equivalence between C7 and (LI-7-1 AND LI-7-1 AND LI-7-1 AND LI-7-1)

1.1. When $\boldsymbol{S}[p[t] = 0$

$C7 = true$, LI-7-1=LI-7-2= $true$

LI-7-3 is satisfied since there is no actual constraint on any $\boldsymbol{f}[t][p][k][j]$ outside it. Therefore, the equivalence is satisfied

1.2. When $\boldsymbol{S}[p[t] = 1$

1.2.1. When $\boldsymbol{\Theta}[p][j] \leq 0$, *(i.e.* $\boldsymbol{\Theta}[p][j] = 0$ *since* $\boldsymbol{\Theta}[p][j]$ *cannot be negative)*

$C7 = true$ LI-7-2 is satisfied.

$$\boldsymbol{S}[p][t] = 1 \Rightarrow \exists k.\boldsymbol{A}[t][p][k] \geq 1 \Rightarrow \exists k.\boldsymbol{A}[t][p][k] - \boldsymbol{S}[p][t] \geq 0 \qquad \text{(app.1)}$$

$$\Rightarrow \exists k.\boldsymbol{A}[t][p][k] + \boldsymbol{f}[t][p][k][j] - \boldsymbol{S}[p][t] \geq 0 \wedge \boldsymbol{f}[t][p][k][j] = 0 \qquad \text{(app.2)}$$

Therefore, LI-7-1 and LI-7-3 are satisfied.

1.2.2. When $\boldsymbol{\Theta}[p][j] > 0$

$C7 \equiv \exists k.\boldsymbol{A}[t][p][k] > 0 \wedge \boldsymbol{M}[k][j] \geq \boldsymbol{\Theta}[p][j]$ LI-7-3 imposes that $\exists \boldsymbol{f}[t][p][k][j] = 0$, therefore LI-7-1 imposes that $\exists \boldsymbol{A}[t][p][k] \geq \boldsymbol{S}[p][t]$. i.e. $\exists \boldsymbol{A}[t][p][k] \geq 1$, i.e. $\exists \boldsymbol{A}[t][p][k] > 0$

LI-7-2 imposes that for the same t, p, k, j where $\boldsymbol{f}[t][p][k][j] = 0$, $\boldsymbol{M}[k][j] - \boldsymbol{\Theta}[p][j] \geq 0$.

Therefore the equivalence is satisfied