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Index sets

$$HH = \{1, 2\}$$

$$SEC = \{\mathrm{A}, \mathrm{B}, \mathrm{C}\}$$

1 HOUSEHOLD $h \in HH$

1.1 Optimisation problem

$$\max_{\left(D^{\langle h,s\rangle}\right)_{s\in SEC}} U^{\langle h\rangle} = \left(\sum_{s\in SEC} \alpha^{\langle h,s\rangle} {D^{\langle h,s\rangle}}^{\omega^{-1}(-1+\omega)}\right)^{\omega(-1+\omega)^{-1}} \tag{1.1}$$

s.t. :

$$\sum_{s\in SEC} p^{\langle s\rangle} D^{\langle h,s\rangle} = L^{\langle h\rangle} + p^{\mathrm{k}} K^{\langle h\rangle} + \left(\delta^{\langle 1,h\rangle}\left(1 - \sum_{h2\in HH\setminus\{1\}} \phi^{\langle h2\rangle}\right) + \phi^{\langle h\rangle}\left(1 - \delta^{\langle 1,h\rangle}\right)\right)\left(\sum_{s\in SEC} \pi^{\langle s\rangle}\right) \quad \left(\lambda^{\mathrm{HOUSEHOLD}^{1\,\langle h\rangle}}\right) \tag{1.2}$$

1.2 Identities

$$hi \in HH: \quad K^{\langle hi\rangle} = par^{\mathrm{k}\,\langle hi\rangle} \tag{1.3}$$

$$hi \in HH: \quad L^{\langle hi\rangle} = par^{\mathrm{l}\,\langle hi\rangle} \tag{1.4}$$

1.3 First order conditions

$$s \in SEC: \quad -\lambda^{\mathrm{HOUSEHOLD}^{1\,\langle h\rangle}} p^{\langle s\rangle} + \alpha^{\langle h,s\rangle} {D^{\langle h,s\rangle}}^{-1+\omega^{-1}(-1+\omega)} \left(\sum_{s\in SEC} \alpha^{\langle h,s\rangle} {D^{\langle h,s\rangle}}^{\omega^{-1}(-1+\omega)}\right)^{-1+\omega(-1+\omega)^{-1}} = 0 \quad \left(D^{\langle h,s\rangle}\right) \tag{1.5}$$

2 FIRM $s \in \mathit{SEC}$

2.1 Optimisation problem

$$\max_{Y^{\langle s\rangle},K^{\langle s\rangle},L^{\langle s\rangle},\left(X^{\langle s,\mathit{si}\rangle}\right)_{\mathit{si}\in \mathit{SEC}}} \pi^{\langle s\rangle} = -L^{\langle s\rangle} - p^{\mathrm{k}}K^{\langle s\rangle} + p^{\langle s\rangle}Y^{\langle s\rangle} - \sum_{\mathit{si}\in \mathit{SEC}} p^{\langle \mathit{si}\rangle}X^{\langle s,\mathit{si}\rangle} \tag{2.1}$$

s.t. :

$$Y^{\langle s\rangle} = \gamma^{\langle s\rangle}{K^{\langle s\rangle}}^{\beta^{\mathrm{k}\langle s\rangle}}{L^{\langle s\rangle}}^{\beta^{\mathrm{l}\langle s\rangle}}\left(\prod_{\mathit{si}\in \mathit{SEC}}{X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}\rangle}}\right) \quad \left(\lambda^{\mathrm{FIRM}^1\langle s\rangle}\right) \tag{2.2}$$

2.2 First order conditions

$$-\lambda^{\mathrm{FIRM}^1\langle s\rangle} + p^{\langle s\rangle} = 0 \quad \left(Y^{\langle s\rangle}\right) \tag{2.3}$$

$$-p^{\mathrm{k}} + \beta^{\mathrm{k}\langle s\rangle}\gamma^{\langle s\rangle}\lambda^{\mathrm{FIRM}^1\langle s\rangle}{K^{\langle s\rangle}}^{-1+\beta^{\mathrm{k}\langle s\rangle}}{L^{\langle s\rangle}}^{\beta^{\mathrm{l}\langle s\rangle}}\left(\prod_{\mathit{si}\in \mathit{SEC}}{X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}\rangle}}\right) = 0 \quad \left(K^{\langle s\rangle}\right) \tag{2.4}$$

$$-1 + \beta^{\mathrm{l}\langle s\rangle}\gamma^{\langle s\rangle}\lambda^{\mathrm{FIRM}^1\langle s\rangle}{K^{\langle s\rangle}}^{\beta^{\mathrm{k}\langle s\rangle}}{L^{\langle s\rangle}}^{-1+\beta^{\mathrm{l}\langle s\rangle}}\left(\prod_{\mathit{si}\in \mathit{SEC}}{X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}\rangle}}\right) = 0 \quad \left(L^{\langle s\rangle}\right) \tag{2.5}$$

$$\mathit{si} \in \mathit{SEC}: \quad -p^{\langle \mathit{si}\rangle} + \beta^{\mathrm{x}\langle s,\mathit{si}\rangle}\gamma^{\langle s\rangle}\lambda^{\mathrm{FIRM}^1\langle s\rangle}{X^{\langle s,\mathit{si}\rangle}}^{-1}{K^{\langle s\rangle}}^{\beta^{\mathrm{k}\langle s\rangle}}{L^{\langle s\rangle}}^{\beta^{\mathrm{l}\langle s\rangle}}\left(\prod_{\mathit{si}'\in \mathit{SEC}}{X^{\langle s,\mathit{si}'\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}'\rangle}}\right) = 0 \quad \left(X^{\langle s,\mathit{si}\rangle}\right) \tag{2.6}$$

2.3 First order conditions after reduction

$$-p^{\mathrm{k}} + \beta^{\mathrm{k}\langle s\rangle}\gamma^{\langle s\rangle}p^{\langle s\rangle}{K^{\langle s\rangle}}^{-1+\beta^{\mathrm{k}\langle s\rangle}}{L^{\langle s\rangle}}^{\beta^{\mathrm{l}\langle s\rangle}}\left(\prod_{\mathit{si}\in \mathit{SEC}}{X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}\rangle}}\right) = 0 \quad \left(K^{\langle s\rangle}\right) \tag{2.7}$$

$$-1 + \beta^{\mathrm{l}\langle s\rangle}\gamma^{\langle s\rangle}p^{\langle s\rangle}{K^{\langle s\rangle}}^{\beta^{\mathrm{k}\langle s\rangle}}{L^{\langle s\rangle}}^{-1+\beta^{\mathrm{l}\langle s\rangle}}\left(\prod_{\mathit{si}\in \mathit{SEC}}{X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}\rangle}}\right) = 0 \quad \left(L^{\langle s\rangle}\right) \tag{2.8}$$

$$\mathit{si} \in \mathit{SEC}: \quad -p^{\langle \mathit{si}\rangle} + \beta^{\mathrm{x}\langle s,\mathit{si}\rangle}\gamma^{\langle s\rangle}p^{\langle s\rangle}{X^{\langle s,\mathit{si}\rangle}}^{-1}{K^{\langle s\rangle}}^{\beta^{\mathrm{k}\langle s\rangle}}{L^{\langle s\rangle}}^{\beta^{\mathrm{l}\langle s\rangle}}\left(\prod_{\mathit{si}'\in \mathit{SEC}}{X^{\langle s,\mathit{si}'\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}'\rangle}}\right) = 0 \quad \left(\left(X^{\langle s,\mathit{si}\rangle}\right)_{\mathit{si}\in \mathit{SEC}}\right) \tag{2.9}$$

3 EQUILIBRIUM

3.1 Identities

$$s \in \mathit{SEC}: \quad Y^{\langle s\rangle} = \sum_{h \in \mathit{HH}} D^{\langle h,s\rangle} + \sum_{\mathit{si} \in \mathit{SEC}} X^{\langle \mathit{si},s\rangle} \tag{3.1}$$

$$\sum_{h \in \mathit{HH}} L^{\langle h\rangle} = \sum_{s \in \mathit{SEC}} L^{\langle s\rangle} \tag{3.2}$$

4 Equilibrium relationships (before expansion and reduction)

$$-\sum_{h \in \mathit{HH}} L^{\langle h\rangle} + \sum_{s \in \mathit{SEC}} L^{\langle s\rangle} = 0 \tag{4.1}$$

$$\mathit{hi} \in \mathit{HH}: \quad \mathit{por}^{\mathrm{k}\,\langle \mathit{hi}\rangle} - K^{\langle \mathit{hi}\rangle} = 0 \tag{4.2}$$

$$\mathit{hi} \in \mathit{HH}: \quad \mathit{por}^{\mathrm{l}\,\langle \mathit{hi}\rangle} - L^{\langle \mathit{hi}\rangle} = 0 \tag{4.3}$$

$$h \in \mathit{HH}: \quad U^{\langle h\rangle} - \left(\sum_{s \in \mathit{SEC}} \alpha^{\langle h,s\rangle} {D^{\langle h,s\rangle}}^{\omega^{-1}(-1+\omega)}\right)^{\omega(-1+\omega)^{-1}} = 0 \tag{4.4}$$

$$h \in \mathit{HH}: \quad L^{\langle h\rangle} + p^{\mathrm{k}} K^{\langle h\rangle} + \left(\delta^{\langle 1,h\rangle}\left(1 - \sum_{\mathit{h2} \in \mathit{HH}\setminus\{1\}} \phi^{\langle \mathit{h2}\rangle}\right) + \phi^{\langle h\rangle}\left(1 - \delta^{\langle 1,h\rangle}\right)\right)\left(\sum_{s \in \mathit{SEC}} \pi^{\langle s\rangle}\right) - \sum_{s \in \mathit{SEC}} p^{\langle s\rangle} D^{\langle h,s\rangle} = 0 \tag{4.5}$$

$$h \in \mathit{HH}: \quad s \in \mathit{SEC}: \quad -\lambda^{\mathrm{HOUSEHOLD}^{1}{}^{\langle h\rangle}} p^{\langle s\rangle} + \alpha^{\langle h,s\rangle} {D^{\langle h,s\rangle}}^{-1+\omega^{-1}(-1+\omega)} \left(\sum_{s \in \mathit{SEC}} \alpha^{\langle h,s\rangle} {D^{\langle h,s\rangle}}^{\omega^{-1}(-1+\omega)}\right)^{-1+\omega(-1+\omega)^{-1}} = 0 \tag{4.6}$$

$$s \in \mathit{SEC}: \quad -1 + \beta^{\mathrm{l}\,\langle s\rangle} \gamma^{\langle s\rangle} p^{\langle s\rangle} {K^{\langle s\rangle}}^{\beta^{\mathrm{k}\,\langle s\rangle}} {L^{\langle s\rangle}}^{-1+\beta^{\mathrm{l}\,\langle s\rangle}} \left(\prod_{\mathit{si} \in \mathit{SEC}} {X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\,\langle s,\mathit{si}\rangle}}\right) = 0 \tag{4.7}$$

$$s \in \mathit{SEC}: \quad -p^{\mathrm{k}} + \beta^{\mathrm{k}\,\langle s\rangle} \gamma^{\langle s\rangle} p^{\langle s\rangle} {K^{\langle s\rangle}}^{-1+\beta^{\mathrm{k}\,\langle s\rangle}} {L^{\langle s\rangle}}^{\beta^{\mathrm{l}\,\langle s\rangle}} \left(\prod_{\mathit{si} \in \mathit{SEC}} {X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\,\langle s,\mathit{si}\rangle}}\right) = 0 \tag{4.8}$$

$$s \in \mathit{SEC}: \quad -Y^{\langle s\rangle} + \gamma^{\langle s\rangle} {K^{\langle s\rangle}}^{\beta^{\mathrm{k}\,\langle s\rangle}} {L^{\langle s\rangle}}^{\beta^{\mathrm{l}\,\langle s\rangle}} \left(\prod_{\mathit{si} \in \mathit{SEC}} {X^{\langle s,\mathit{si}\rangle}}^{\beta^{\mathrm{x}\,\langle s,\mathit{si}\rangle}}\right) = 0 \tag{4.9}$$

$$s \in \mathit{SEC}: \quad -Y^{\langle s\rangle} + \sum_{h \in \mathit{HH}} D^{\langle h,s\rangle} + \sum_{\mathit{si} \in \mathit{SEC}} X^{\langle \mathit{si},s\rangle} = 0 \tag{4.10}$$

$$s \in \mathit{SEC}: \quad \pi^{\langle s\rangle} + L^{\langle s\rangle} + p^{\mathrm{k}} K^{\langle s\rangle} - p^{\langle s\rangle} Y^{\langle s\rangle} + \sum_{\mathit{si} \in \mathit{SEC}} p^{\langle \mathit{si}\rangle} X^{\langle s,\mathit{si}\rangle} = 0 \tag{4.11}$$

$$s \in \mathit{SEC}: \quad \mathit{si} \in \mathit{SEC}: \quad -p^{\langle \mathit{si}\rangle} + \beta^{\mathrm{x}\langle s,\mathit{si}\rangle}\gamma^{\langle s\rangle} p^{\langle s\rangle} {X^{\langle s,\mathit{si}\rangle}}^{-1} {K^{\langle s\rangle}}^{\beta^{\mathrm{k}\langle s\rangle}} {L^{\langle s\rangle}}^{\beta^{\mathrm{l}\langle s\rangle}} \left(\prod_{\mathit{si}' \in \mathit{SEC}} {X^{\langle s,\mathit{si}'\rangle}}^{\beta^{\mathrm{x}\langle s,\mathit{si}'\rangle}} \right) = 0 \tag{4.12}$$

5 Equilibrium relationships (after expansion and reduction)

$$-1 + \beta^{\mathrm{l}\langle \mathrm{A}\rangle}\gamma^{\langle \mathrm{A}\rangle} p^{\langle \mathrm{A}\rangle} {K^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{A}\rangle}} {L^{\langle \mathrm{A}\rangle}}^{-1+\beta^{\mathrm{l}\langle \mathrm{A}\rangle}} {X^{\langle \mathrm{A},\mathrm{A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{A}\rangle}} {X^{\langle \mathrm{A},\mathrm{B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{B}\rangle}} {X^{\langle \mathrm{A},\mathrm{C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{C}\rangle}} = 0 \tag{5.1}$$

$$-1 + \beta^{\mathrm{l}\langle \mathrm{B}\rangle}\gamma^{\langle \mathrm{B}\rangle} p^{\langle \mathrm{B}\rangle} {K^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{B}\rangle}} {L^{\langle \mathrm{B}\rangle}}^{-1+\beta^{\mathrm{l}\langle \mathrm{B}\rangle}} {X^{\langle \mathrm{B},\mathrm{A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B},\mathrm{A}\rangle}} {X^{\langle \mathrm{B},\mathrm{B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B},\mathrm{B}\rangle}} {X^{\langle \mathrm{B},\mathrm{C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B},\mathrm{C}\rangle}} = 0 \tag{5.2}$$

$$-1 + \beta^{\mathrm{l}\langle \mathrm{C}\rangle}\gamma^{\langle \mathrm{C}\rangle} p^{\langle \mathrm{C}\rangle} {K^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{C}\rangle}} {L^{\langle \mathrm{C}\rangle}}^{-1+\beta^{\mathrm{l}\langle \mathrm{C}\rangle}} {X^{\langle \mathrm{C},\mathrm{A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C},\mathrm{A}\rangle}} {X^{\langle \mathrm{C},\mathrm{B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C},\mathrm{B}\rangle}} {X^{\langle \mathrm{C},\mathrm{C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C},\mathrm{C}\rangle}} = 0 \tag{5.3}$$

$$\mathit{par}^{\mathrm{k}\langle 1\rangle} - K^{\langle 1\rangle} = 0 \tag{5.4}$$

$$\mathit{par}^{\mathrm{k}\langle 2\rangle} - K^{\langle 2\rangle} = 0 \tag{5.5}$$

$$\mathit{par}^{\mathrm{l}\langle 1\rangle} - L^{\langle 1\rangle} = 0 \tag{5.6}$$

$$\mathit{par}^{\mathrm{l}\langle 2\rangle} - L^{\langle 2\rangle} = 0 \tag{5.7}$$

$$-p^{\mathrm{k}} + \beta^{\mathrm{k}\langle \mathrm{A}\rangle}\gamma^{\langle \mathrm{A}\rangle} p^{\langle \mathrm{A}\rangle} {K^{\langle \mathrm{A}\rangle}}^{-1+\beta^{\mathrm{k}\langle \mathrm{A}\rangle}} {L^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{A}\rangle}} {X^{\langle \mathrm{A},\mathrm{A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{A}\rangle}} {X^{\langle \mathrm{A},\mathrm{B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{B}\rangle}} {X^{\langle \mathrm{A},\mathrm{C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{C}\rangle}} = 0 \tag{5.8}$$

$$-p^{\mathrm{k}} + \beta^{\mathrm{k}\langle \mathrm{B}\rangle}\gamma^{\langle \mathrm{B}\rangle} p^{\langle \mathrm{B}\rangle} {K^{\langle \mathrm{B}\rangle}}^{-1+\beta^{\mathrm{k}\langle \mathrm{B}\rangle}} {L^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{B}\rangle}} {X^{\langle \mathrm{B},\mathrm{A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B},\mathrm{A}\rangle}} {X^{\langle \mathrm{B},\mathrm{B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B},\mathrm{B}\rangle}} {X^{\langle \mathrm{B},\mathrm{C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B},\mathrm{C}\rangle}} = 0 \tag{5.9}$$

$$-p^{\mathrm{k}} + \beta^{\mathrm{k}\langle \mathrm{C}\rangle}\gamma^{\langle \mathrm{C}\rangle} p^{\langle \mathrm{C}\rangle} {K^{\langle \mathrm{C}\rangle}}^{-1+\beta^{\mathrm{k}\langle \mathrm{C}\rangle}} {L^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{C}\rangle}} {X^{\langle \mathrm{C},\mathrm{A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C},\mathrm{A}\rangle}} {X^{\langle \mathrm{C},\mathrm{B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C},\mathrm{B}\rangle}} {X^{\langle \mathrm{C},\mathrm{C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C},\mathrm{C}\rangle}} = 0 \tag{5.10}$$

$$-p^{\langle \mathrm{A}\rangle} + \beta^{\mathrm{x}\langle \mathrm{A},\mathrm{A}\rangle}\gamma^{\langle \mathrm{A}\rangle} p^{\langle \mathrm{A}\rangle} {X^{\langle \mathrm{A},\mathrm{A}\rangle}}^{-1} {K^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{A}\rangle}} {L^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{A}\rangle}} {X^{\langle \mathrm{A},\mathrm{A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{A}\rangle}} {X^{\langle \mathrm{A},\mathrm{B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{B}\rangle}} {X^{\langle \mathrm{A},\mathrm{C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A},\mathrm{C}\rangle}} = 0 \tag{5.11}$$

$$-p^{\langle \mathrm{A}\rangle}+\beta^{\mathrm{x}\langle \mathrm{B,A}\rangle}\gamma^{\langle \mathrm{B}\rangle}p^{\langle \mathrm{B}\rangle}{X^{\langle \mathrm{B,A}\rangle}}^{-1}{K^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{B}\rangle}}{L^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{B}\rangle}}{X^{\langle \mathrm{B,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,A}\rangle}}{X^{\langle \mathrm{B,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,B}\rangle}}{X^{\langle \mathrm{B,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,C}\rangle}}=0 \tag{5.12}$$

$$-p^{\langle \mathrm{A}\rangle}+\beta^{\mathrm{x}\langle \mathrm{C,A}\rangle}\gamma^{\langle \mathrm{C}\rangle}p^{\langle \mathrm{C}\rangle}{X^{\langle \mathrm{C,A}\rangle}}^{-1}{K^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{C}\rangle}}{L^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{C}\rangle}}{X^{\langle \mathrm{C,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,A}\rangle}}{X^{\langle \mathrm{C,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,B}\rangle}}{X^{\langle \mathrm{C,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,C}\rangle}}=0 \tag{5.13}$$

$$-p^{\langle \mathrm{B}\rangle}+\beta^{\mathrm{x}\langle \mathrm{A,B}\rangle}\gamma^{\langle \mathrm{A}\rangle}p^{\langle \mathrm{A}\rangle}{X^{\langle \mathrm{A,B}\rangle}}^{-1}{K^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{A}\rangle}}{L^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{A}\rangle}}{X^{\langle \mathrm{A,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,A}\rangle}}{X^{\langle \mathrm{A,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,B}\rangle}}{X^{\langle \mathrm{A,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,C}\rangle}}=0 \tag{5.14}$$

$$-p^{\langle \mathrm{B}\rangle}+\beta^{\mathrm{x}\langle \mathrm{B,B}\rangle}\gamma^{\langle \mathrm{B}\rangle}p^{\langle \mathrm{B}\rangle}{X^{\langle \mathrm{B,B}\rangle}}^{-1}{K^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{B}\rangle}}{L^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{B}\rangle}}{X^{\langle \mathrm{B,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,A}\rangle}}{X^{\langle \mathrm{B,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,B}\rangle}}{X^{\langle \mathrm{B,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,C}\rangle}}=0 \tag{5.15}$$

$$-p^{\langle \mathrm{B}\rangle}+\beta^{\mathrm{x}\langle \mathrm{C,B}\rangle}\gamma^{\langle \mathrm{C}\rangle}p^{\langle \mathrm{C}\rangle}{X^{\langle \mathrm{C,B}\rangle}}^{-1}{K^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{C}\rangle}}{L^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{C}\rangle}}{X^{\langle \mathrm{C,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,A}\rangle}}{X^{\langle \mathrm{C,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,B}\rangle}}{X^{\langle \mathrm{C,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,C}\rangle}}=0 \tag{5.16}$$

$$-p^{\langle \mathrm{C}\rangle}+\beta^{\mathrm{x}\langle \mathrm{A,C}\rangle}\gamma^{\langle \mathrm{A}\rangle}p^{\langle \mathrm{A}\rangle}{X^{\langle \mathrm{A,C}\rangle}}^{-1}{K^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{A}\rangle}}{L^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{A}\rangle}}{X^{\langle \mathrm{A,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,A}\rangle}}{X^{\langle \mathrm{A,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,B}\rangle}}{X^{\langle \mathrm{A,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,C}\rangle}}=0 \tag{5.17}$$

$$-p^{\langle \mathrm{C}\rangle}+\beta^{\mathrm{x}\langle \mathrm{B,C}\rangle}\gamma^{\langle \mathrm{B}\rangle}p^{\langle \mathrm{B}\rangle}{X^{\langle \mathrm{B,C}\rangle}}^{-1}{K^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{B}\rangle}}{L^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{B}\rangle}}{X^{\langle \mathrm{B,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,A}\rangle}}{X^{\langle \mathrm{B,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,B}\rangle}}{X^{\langle \mathrm{B,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,C}\rangle}}=0 \tag{5.18}$$

$$-p^{\langle \mathrm{C}\rangle}+\beta^{\mathrm{x}\langle \mathrm{C,C}\rangle}\gamma^{\langle \mathrm{C}\rangle}p^{\langle \mathrm{C}\rangle}{X^{\langle \mathrm{C,C}\rangle}}^{-1}{K^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{C}\rangle}}{L^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{C}\rangle}}{X^{\langle \mathrm{C,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,A}\rangle}}{X^{\langle \mathrm{C,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,B}\rangle}}{X^{\langle \mathrm{C,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,C}\rangle}}=0 \tag{5.19}$$

$$U^{\langle 1\rangle}-\left(\alpha^{\langle 1,\mathrm{A}\rangle}{D^{\langle 1,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)}+\alpha^{\langle 1,\mathrm{B}\rangle}{D^{\langle 1,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)}+\alpha^{\langle 1,\mathrm{C}\rangle}{D^{\langle 1,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)}\right)^{\omega(-1+\omega)^{-1}}=0 \tag{5.20}$$

$$U^{\langle 2\rangle}-\left(\alpha^{\langle 2,\mathrm{A}\rangle}{D^{\langle 2,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)}+\alpha^{\langle 2,\mathrm{B}\rangle}{D^{\langle 2,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)}+\alpha^{\langle 2,\mathrm{C}\rangle}{D^{\langle 2,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)}\right)^{\omega(-1+\omega)^{-1}}=0 \tag{5.21}$$

$$-Y^{\langle \mathrm{A}\rangle}+\gamma^{\langle \mathrm{A}\rangle}{K^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{A}\rangle}}{L^{\langle \mathrm{A}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{A}\rangle}}{X^{\langle \mathrm{A,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,A}\rangle}}{X^{\langle \mathrm{A,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,B}\rangle}}{X^{\langle \mathrm{A,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{A,C}\rangle}}=0 \tag{5.22}$$

$$-Y^{\langle \mathrm{B}\rangle}+\gamma^{\langle \mathrm{B}\rangle}{K^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{B}\rangle}}{L^{\langle \mathrm{B}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{B}\rangle}}{X^{\langle \mathrm{B,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,A}\rangle}}{X^{\langle \mathrm{B,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,B}\rangle}}{X^{\langle \mathrm{B,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{B,C}\rangle}}=0 \tag{5.23}$$

$$-Y^{\langle \mathrm{C}\rangle}+\gamma^{\langle \mathrm{C}\rangle}{K^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{k}\langle \mathrm{C}\rangle}}{L^{\langle \mathrm{C}\rangle}}^{\beta^{\mathrm{l}\langle \mathrm{C}\rangle}}{X^{\langle \mathrm{C,A}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,A}\rangle}}{X^{\langle \mathrm{C,B}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,B}\rangle}}{X^{\langle \mathrm{C,C}\rangle}}^{\beta^{\mathrm{x}\langle \mathrm{C,C}\rangle}}=0 \tag{5.24}$$

$$-{\lambda^{\mathrm{HOUSEHOLD}^{1}}}^{\langle 1\rangle}p^{\langle \mathrm{A}\rangle}+\alpha^{\langle 1,\mathrm{A}\rangle}{D^{\langle 1,\mathrm{A}\rangle}}^{-1+\omega^{-1}(-1+\omega)}\left(\alpha^{\langle 1,\mathrm{A}\rangle}{D^{\langle 1,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)}+\alpha^{\langle 1,\mathrm{B}\rangle}{D^{\langle 1,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)}+\alpha^{\langle 1,\mathrm{C}\rangle}{D^{\langle 1,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)}\right)^{-1+\omega(-1+\omega)^{-1}}=0 \tag{5.25}$$

$$-{\lambda^{\mathrm{HOUSEHOLD}^{1}}}^{\langle 1\rangle} p^{\langle \mathrm{B}\rangle} + \alpha^{\langle 1,\mathrm{B}\rangle} {D^{\langle 1,\mathrm{B}\rangle}}^{-1+\omega^{-1}(-1+\omega)} \left(\alpha^{\langle 1,\mathrm{A}\rangle} {D^{\langle 1,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 1,\mathrm{B}\rangle} {D^{\langle 1,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 1,\mathrm{C}\rangle} {D^{\langle 1,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)} \right)^{-1+\omega(-1+\omega)^{-1}} = 0 \tag{5.26}$$

$$-{\lambda^{\mathrm{HOUSEHOLD}^{1}}}^{\langle 1\rangle} p^{\langle \mathrm{C}\rangle} + \alpha^{\langle 1,\mathrm{C}\rangle} {D^{\langle 1,\mathrm{C}\rangle}}^{-1+\omega^{-1}(-1+\omega)} \left(\alpha^{\langle 1,\mathrm{A}\rangle} {D^{\langle 1,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 1,\mathrm{B}\rangle} {D^{\langle 1,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 1,\mathrm{C}\rangle} {D^{\langle 1,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)} \right)^{-1+\omega(-1+\omega)^{-1}} = 0 \tag{5.27}$$

$$-{\lambda^{\mathrm{HOUSEHOLD}^{1}}}^{\langle 2\rangle} p^{\langle \mathrm{A}\rangle} + \alpha^{\langle 2,\mathrm{A}\rangle} {D^{\langle 2,\mathrm{A}\rangle}}^{-1+\omega^{-1}(-1+\omega)} \left(\alpha^{\langle 2,\mathrm{A}\rangle} {D^{\langle 2,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 2,\mathrm{B}\rangle} {D^{\langle 2,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 2,\mathrm{C}\rangle} {D^{\langle 2,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)} \right)^{-1+\omega(-1+\omega)^{-1}} = 0 \tag{5.28}$$

$$-{\lambda^{\mathrm{HOUSEHOLD}^{1}}}^{\langle 2\rangle} p^{\langle \mathrm{B}\rangle} + \alpha^{\langle 2,\mathrm{B}\rangle} {D^{\langle 2,\mathrm{B}\rangle}}^{-1+\omega^{-1}(-1+\omega)} \left(\alpha^{\langle 2,\mathrm{A}\rangle} {D^{\langle 2,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 2,\mathrm{B}\rangle} {D^{\langle 2,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 2,\mathrm{C}\rangle} {D^{\langle 2,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)} \right)^{-1+\omega(-1+\omega)^{-1}} = 0 \tag{5.29}$$

$$-{\lambda^{\mathrm{HOUSEHOLD}^{1}}}^{\langle 2\rangle} p^{\langle \mathrm{C}\rangle} + \alpha^{\langle 2,\mathrm{C}\rangle} {D^{\langle 2,\mathrm{C}\rangle}}^{-1+\omega^{-1}(-1+\omega)} \left(\alpha^{\langle 2,\mathrm{A}\rangle} {D^{\langle 2,\mathrm{A}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 2,\mathrm{B}\rangle} {D^{\langle 2,\mathrm{B}\rangle}}^{\omega^{-1}(-1+\omega)} + \alpha^{\langle 2,\mathrm{C}\rangle} {D^{\langle 2,\mathrm{C}\rangle}}^{\omega^{-1}(-1+\omega)} \right)^{-1+\omega(-1+\omega)^{-1}} = 0 \tag{5.30}$$

$$-L^{\langle 1\rangle} - L^{\langle 2\rangle} + L^{\langle \mathrm{A}\rangle} + L^{\langle \mathrm{B}\rangle} + L^{\langle \mathrm{C}\rangle} = 0 \tag{5.31}$$

$$D^{\langle 1,\mathrm{A}\rangle} + D^{\langle 2,\mathrm{A}\rangle} + X^{\langle \mathrm{A},\mathrm{A}\rangle} + X^{\langle \mathrm{B},\mathrm{A}\rangle} + X^{\langle \mathrm{C},\mathrm{A}\rangle} - Y^{\langle \mathrm{A}\rangle} = 0 \tag{5.32}$$

$$D^{\langle 1,\mathrm{B}\rangle} + D^{\langle 2,\mathrm{B}\rangle} + X^{\langle \mathrm{A},\mathrm{B}\rangle} + X^{\langle \mathrm{B},\mathrm{B}\rangle} + X^{\langle \mathrm{C},\mathrm{B}\rangle} - Y^{\langle \mathrm{B}\rangle} = 0 \tag{5.33}$$

$$D^{\langle 1,\mathrm{C}\rangle} + D^{\langle 2,\mathrm{C}\rangle} + X^{\langle \mathrm{A},\mathrm{C}\rangle} + X^{\langle \mathrm{B},\mathrm{C}\rangle} + X^{\langle \mathrm{C},\mathrm{C}\rangle} - Y^{\langle \mathrm{C}\rangle} = 0 \tag{5.34}$$

$$L^{\langle 1\rangle} + p^{\mathrm{k}} K^{\langle 1\rangle} - p^{\langle \mathrm{A}\rangle} D^{\langle 1,\mathrm{A}\rangle} - p^{\langle \mathrm{B}\rangle} D^{\langle 1,\mathrm{B}\rangle} - p^{\langle \mathrm{C}\rangle} D^{\langle 1,\mathrm{C}\rangle} + \left(1 - \phi^{\langle 2\rangle}\right) \left(\pi^{\langle \mathrm{A}\rangle} + \pi^{\langle \mathrm{B}\rangle} + \pi^{\langle \mathrm{C}\rangle}\right) = 0 \tag{5.35}$$

$$L^{\langle 2\rangle} + \phi^{\langle 2\rangle} \left(\pi^{\langle \mathrm{A}\rangle} + \pi^{\langle \mathrm{B}\rangle} + \pi^{\langle \mathrm{C}\rangle}\right) + p^{\mathrm{k}} K^{\langle 2\rangle} - p^{\langle \mathrm{A}\rangle} D^{\langle 2,\mathrm{A}\rangle} - p^{\langle \mathrm{B}\rangle} D^{\langle 2,\mathrm{B}\rangle} - p^{\langle \mathrm{C}\rangle} D^{\langle 2,\mathrm{C}\rangle} = 0 \tag{5.36}$$

$$\pi^{\langle \mathrm{A}\rangle} + L^{\langle \mathrm{A}\rangle} + p^{\mathrm{k}} K^{\langle \mathrm{A}\rangle} + p^{\langle \mathrm{A}\rangle} X^{\langle \mathrm{A},\mathrm{A}\rangle} - p^{\langle \mathrm{A}\rangle} Y^{\langle \mathrm{A}\rangle} + p^{\langle \mathrm{B}\rangle} X^{\langle \mathrm{A},\mathrm{B}\rangle} + p^{\langle \mathrm{C}\rangle} X^{\langle \mathrm{A},\mathrm{C}\rangle} = 0 \tag{5.37}$$

$$\pi^{\langle \mathrm{B}\rangle} + L^{\langle \mathrm{B}\rangle} + p^{\mathrm{k}} K^{\langle \mathrm{B}\rangle} + p^{\langle \mathrm{A}\rangle} X^{\langle \mathrm{B},\mathrm{A}\rangle} + p^{\langle \mathrm{B}\rangle} X^{\langle \mathrm{B},\mathrm{B}\rangle} - p^{\langle \mathrm{B}\rangle} Y^{\langle \mathrm{B}\rangle} + p^{\langle \mathrm{C}\rangle} X^{\langle \mathrm{B},\mathrm{C}\rangle} = 0 \tag{5.38}$$

$$\pi^{\langle \mathrm{C}\rangle} + L^{\langle \mathrm{C}\rangle} + p^{\mathrm{k}} K^{\langle \mathrm{C}\rangle} + p^{\langle \mathrm{A}\rangle} X^{\langle \mathrm{C},\mathrm{A}\rangle} + p^{\langle \mathrm{B}\rangle} X^{\langle \mathrm{C},\mathrm{B}\rangle} + p^{\langle \mathrm{C}\rangle} X^{\langle \mathrm{C},\mathrm{C}\rangle} - p^{\langle \mathrm{C}\rangle} Y^{\langle \mathrm{C}\rangle} = 0 \tag{5.39}$$

6 Equilibrium values

	Equilibrium values
p^{k}	1.0008
$\lambda^{\mathrm{HOUSEHOLD}^{1^1}}$	0.2524
$\lambda^{\mathrm{HOUSEHOLD}^{1^2}}$	0.2524
p^{A}	0.992
p^{B}	0.9931
p^{C}	0.9908
π^{A}	-0.0699
π^{B}	-0.06
π^{C}	-0.07
$D^{1^{\mathrm{A}}}$	11.2953
$D^{1^{\mathrm{B}}}$	3.7712
$D^{1^{\mathrm{C}}}$	15.155
$D^{2^{\mathrm{A}}}$	18.7964
$D^{2^{\mathrm{B}}}$	6.2757
$D^{2^{\mathrm{C}}}$	25.2192
K^1	20
K^2	20
K^{A}	19.9764
K^{B}	10.0161
K^{C}	10.0075
L^1	10
L^2	30
L^{A}	9.9962
L^{B}	19.9883
L^{C}	10.0155
U^1	7.5639
U^2	12.5869
$X^{\mathrm{A}^{\mathrm{A}}}$	10.0764
$X^{\mathrm{A}^{\mathrm{B}}}$	20.1315
$X^{\mathrm{A}^{\mathrm{C}}}$	10.0891
$X^{\mathrm{B}^{\mathrm{A}}}$	10.1046
$X^{\mathrm{B}^{\mathrm{B}}}$	10.0939
$X^{\mathrm{B}^{\mathrm{C}}}$	10.1173
$X^{\mathrm{C}^{\mathrm{A}}}$	20.1917
$X^{\mathrm{C}^{\mathrm{B}}}$	20.1703
$X^{\mathrm{C}^{\mathrm{C}}}$	10.1086
Y^{A}	70.4644
Y^{B}	60.4427
Y^{C}	70.6892