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Model name: `pure_exchange_t`

Index sets

$$agents = \{\mathrm{A}, \mathrm{B}\}$$
$$goods = \{1, 2, 3\}$$

1 AGENTS $a \in agents$

1.1 Optimisation problem

$$\max_{\left(C^{\langle a,g\rangle}\right)_{g\in goods}} U^{\langle a\rangle} = \prod_{g\in goods} {C^{\langle a,g\rangle}}^{\alpha^{\langle a,g\rangle}} \tag{1.1}$$

s.t. :

$$\sum_{g\in goods} p^{\langle g\rangle} C^{\langle a,g\rangle} = \sum_{g\in goods} e^{\langle a,g\rangle} p^{\langle g\rangle} \quad \left(\lambda^{\mathrm{AGENTS}^1\langle a\rangle}\right) \tag{1.2}$$

1.2 Identities

$$g \in goods: \quad e_t^{\langle a,g\rangle} = e^{\mathrm{calibr}\langle a,g\rangle} \tag{1.3}$$

1.3 First order conditions

$$g \in goods: \quad -\lambda^{\mathrm{AGENTS}^1\langle a\rangle}_t p_t^{\langle g\rangle} + \alpha^{\langle a,g\rangle} {C_t^{\langle a,g\rangle}}^{-1} \left(\prod_{g'\in goods} {C_t^{\langle a,g'\rangle}}^{\alpha^{\langle a,g'\rangle}}\right) = 0 \quad \left(C_t^{\langle a,g\rangle}\right) \tag{1.4}$$

2 EQUILIBRIUM

2.1 Identities

$$p^{\langle 1\rangle} = 1 \tag{2.1}$$

$$g \in goods\backslash\{1\}: \quad \sum_{a\in agents} C_t^{\langle a,g\rangle} = \sum_{a\in agents} e_t^{\langle a,g\rangle} \tag{2.2}$$

3 Equilibrium relationships (before expansion and reduction)

$$-1 + p^{\langle 1\rangle} = 0 \tag{3.1}$$

$$a \in agents: \quad U^{\langle a\rangle} - \prod_{g\in goods} {C^{\langle a,g\rangle}}^{\alpha^{\langle a,g\rangle}} = 0 \tag{3.2}$$

$$a \in agents: \quad \sum_{g\in goods} e^{\langle a,g\rangle} p^{\langle g\rangle} - \sum_{g\in goods} p^{\langle g\rangle} C^{\langle a,g\rangle} = 0 \tag{3.3}$$

$$a \in agents: \quad g \in goods: \quad -e^{\mathrm{calibr}\langle a,g\rangle} + e^{\langle a,g\rangle} = 0 \tag{3.4}$$

$$a \in agents: \quad g \in goods: \quad -\lambda^{\mathrm{AGENTS}^1\langle a\rangle} p^{\langle g\rangle} + \alpha^{\langle a,g\rangle} {C^{\langle a,g\rangle}}^{-1} \left(\prod_{g'\in goods} {C^{\langle a,g'\rangle}}^{\alpha^{\langle a,g'\rangle}}\right) = 0 \tag{3.5}$$

$$g \in goods\backslash\{1\}: \quad -\sum_{a\in agents} e^{\langle a,g\rangle} + \sum_{a\in agents} C^{\langle a,g\rangle} = 0 \tag{3.6}$$

4 Equilibrium relationships (after expansion and reduction)

$$-1 + p^{\langle 1 \rangle} = 0 \tag{4.1}$$

$$-e^{\mathrm{calibr}\,\langle \mathrm{A},1 \rangle} + e^{\langle \mathrm{A},1 \rangle} = 0 \tag{4.2}$$

$$-e^{\mathrm{calibr}\,\langle \mathrm{A},2 \rangle} + e^{\langle \mathrm{A},2 \rangle} = 0 \tag{4.3}$$

$$-e^{\mathrm{calibr}\,\langle \mathrm{A},3 \rangle} + e^{\langle \mathrm{A},3 \rangle} = 0 \tag{4.4}$$

$$-e^{\mathrm{calibr}\,\langle \mathrm{B},1 \rangle} + e^{\langle \mathrm{B},1 \rangle} = 0 \tag{4.5}$$

$$-e^{\mathrm{calibr}\,\langle \mathrm{B},2 \rangle} + e^{\langle \mathrm{B},2 \rangle} = 0 \tag{4.6}$$

$$-e^{\mathrm{calibr}\,\langle \mathrm{B},3 \rangle} + e^{\langle \mathrm{B},3 \rangle} = 0 \tag{4.7}$$

$$U^{\langle \mathrm{A} \rangle} - C^{\langle \mathrm{A},1 \rangle^{\alpha^{\langle \mathrm{A},1 \rangle}}} C^{\langle \mathrm{A},2 \rangle^{\alpha^{\langle \mathrm{A},2 \rangle}}} C^{\langle \mathrm{A},3 \rangle^{\alpha^{\langle \mathrm{A},3 \rangle}}} = 0 \tag{4.8}$$

$$U^{\langle \mathrm{B} \rangle} - C^{\langle \mathrm{B},1 \rangle^{\alpha^{\langle \mathrm{B},1 \rangle}}} C^{\langle \mathrm{B},2 \rangle^{\alpha^{\langle \mathrm{B},2 \rangle}}} C^{\langle \mathrm{B},3 \rangle^{\alpha^{\langle \mathrm{B},3 \rangle}}} = 0 \tag{4.9}$$

$$-\lambda^{\mathrm{AGENTS}^{1}\,\langle \mathrm{A} \rangle} p^{\langle 1 \rangle} + \alpha^{\langle \mathrm{A},1 \rangle} C^{\langle \mathrm{A},1 \rangle^{-1}} C^{\langle \mathrm{A},1 \rangle^{\alpha^{\langle \mathrm{A},1 \rangle}}} C^{\langle \mathrm{A},2 \rangle^{\alpha^{\langle \mathrm{A},2 \rangle}}} C^{\langle \mathrm{A},3 \rangle^{\alpha^{\langle \mathrm{A},3 \rangle}}} = 0 \tag{4.10}$$

$$-\lambda^{\mathrm{AGENTS}^{1}\,\langle \mathrm{A} \rangle} p^{\langle 2 \rangle} + \alpha^{\langle \mathrm{A},2 \rangle} C^{\langle \mathrm{A},2 \rangle^{-1}} C^{\langle \mathrm{A},1 \rangle^{\alpha^{\langle \mathrm{A},1 \rangle}}} C^{\langle \mathrm{A},2 \rangle^{\alpha^{\langle \mathrm{A},2 \rangle}}} C^{\langle \mathrm{A},3 \rangle^{\alpha^{\langle \mathrm{A},3 \rangle}}} = 0 \tag{4.11}$$

$$-\lambda^{\mathrm{AGENTS}^{1}\,\langle \mathrm{A} \rangle} p^{\langle 3 \rangle} + \alpha^{\langle \mathrm{A},3 \rangle} C^{\langle \mathrm{A},3 \rangle^{-1}} C^{\langle \mathrm{A},1 \rangle^{\alpha^{\langle \mathrm{A},1 \rangle}}} C^{\langle \mathrm{A},2 \rangle^{\alpha^{\langle \mathrm{A},2 \rangle}}} C^{\langle \mathrm{A},3 \rangle^{\alpha^{\langle \mathrm{A},3 \rangle}}} = 0 \tag{4.12}$$

$$-\lambda^{\mathrm{AGENTS}^{1}\,\langle \mathrm{B} \rangle} p^{\langle 1 \rangle} + \alpha^{\langle \mathrm{B},1 \rangle} C^{\langle \mathrm{B},1 \rangle^{-1}} C^{\langle \mathrm{B},1 \rangle^{\alpha^{\langle \mathrm{B},1 \rangle}}} C^{\langle \mathrm{B},2 \rangle^{\alpha^{\langle \mathrm{B},2 \rangle}}} C^{\langle \mathrm{B},3 \rangle^{\alpha^{\langle \mathrm{B},3 \rangle}}} = 0 \tag{4.13}$$

$$-\lambda^{\mathrm{AGENTS}^{1}\,\langle \mathrm{B} \rangle} p^{\langle 2 \rangle} + \alpha^{\langle \mathrm{B},2 \rangle} C^{\langle \mathrm{B},2 \rangle^{-1}} C^{\langle \mathrm{B},1 \rangle^{\alpha^{\langle \mathrm{B},1 \rangle}}} C^{\langle \mathrm{B},2 \rangle^{\alpha^{\langle \mathrm{B},2 \rangle}}} C^{\langle \mathrm{B},3 \rangle^{\alpha^{\langle \mathrm{B},3 \rangle}}} = 0 \tag{4.14}$$

$$-\lambda^{\mathrm{AGENTS}^{1}\,\langle \mathrm{B} \rangle} p^{\langle 3 \rangle} + \alpha^{\langle \mathrm{B},3 \rangle} C^{\langle \mathrm{B},3 \rangle^{-1}} C^{\langle \mathrm{B},1 \rangle^{\alpha^{\langle \mathrm{B},1 \rangle}}} C^{\langle \mathrm{B},2 \rangle^{\alpha^{\langle \mathrm{B},2 \rangle}}} C^{\langle \mathrm{B},3 \rangle^{\alpha^{\langle \mathrm{B},3 \rangle}}} = 0 \tag{4.15}$$

$$-e^{\langle \mathrm{A},2 \rangle} - e^{\langle \mathrm{B},2 \rangle} + C^{\langle \mathrm{A},2 \rangle} + C^{\langle \mathrm{B},2 \rangle} = 0 \tag{4.16}$$

$$-e^{\langle \mathrm{A},3 \rangle} - e^{\langle \mathrm{B},3 \rangle} + C^{\langle \mathrm{A},3 \rangle} + C^{\langle \mathrm{B},3 \rangle} = 0 \tag{4.17}$$

$$e^{\langle \mathrm{A},1 \rangle} p^{\langle 1 \rangle} + e^{\langle \mathrm{A},2 \rangle} p^{\langle 2 \rangle} + e^{\langle \mathrm{A},3 \rangle} p^{\langle 3 \rangle} - p^{\langle 1 \rangle} C^{\langle \mathrm{A},1 \rangle} - p^{\langle 2 \rangle} C^{\langle \mathrm{A},2 \rangle} - p^{\langle 3 \rangle} C^{\langle \mathrm{A},3 \rangle} = 0 \tag{4.18}$$

$$e^{\langle \mathrm{B},1 \rangle} p^{\langle 1 \rangle} + e^{\langle \mathrm{B},2 \rangle} p^{\langle 2 \rangle} + e^{\langle \mathrm{B},3 \rangle} p^{\langle 3 \rangle} - p^{\langle 1 \rangle} C^{\langle \mathrm{B},1 \rangle} - p^{\langle 2 \rangle} C^{\langle \mathrm{B},2 \rangle} - p^{\langle 3 \rangle} C^{\langle \mathrm{B},3 \rangle} = 0 \tag{4.19}$$

5 Equilibrium values

	Equilibrium values
$e^{\mathrm{A}^{1}}$	3
$e^{\mathrm{A}^{2}}$	2
$e^{\mathrm{A}^{3}}$	1
$\lambda^{\mathrm{AGENTS}^{1\mathrm{A}}}$	0.2674
$C^{\mathrm{A}^{1}}$	2.2667
$C^{\mathrm{A}^{2}}$	1.7
$C^{\mathrm{A}^{3}}$	2.2667
U^{A}	2.0203

6 Equilibrium values

	Equilibrium values
$e^{\mathrm{B}^{1}}$	1
$e^{\mathrm{B}^{2}}$	1
$e^{\mathrm{B}^{3}}$	3
$\lambda^{\mathrm{AGENTS}^{1\mathrm{B}}}$	0.2674
$C^{\mathrm{B}^{1}}$	1.7333
$C^{\mathrm{B}^{2}}$	1.3
$C^{\mathrm{B}^{3}}$	1.7333
U^{B}	1.5449