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Index sets

$$COU = \{\mathrm{COU1}, \mathrm{COU2}, \mathrm{COU3}, \mathrm{COU4}\}$$

$$COUbig = \{\mathrm{COU3}, \mathrm{COU4}\}$$

$$COUf = \{\mathrm{COU2}, \mathrm{COU3}, \mathrm{COU4}\}$$

$$COUh = \{\mathrm{COU1}\}$$

$$COUonly = \{\mathrm{COU1}, \mathrm{COU2}\}$$

$$SEC = \{\mathrm{SEC1}, \mathrm{SEC2}, \mathrm{SEC3}, \mathrm{SEC4}, \mathrm{SEC5}, \mathrm{SEC6}, \mathrm{SEC7}, \mathrm{SEC8}\}$$

$$SECnr = \{\mathrm{SEC2}, \mathrm{SEC3}, \mathrm{SEC4}, \mathrm{SEC5}, \mathrm{SEC6}, \mathrm{SEC7}, \mathrm{SEC8}\}$$

$$SECnt = \{\mathrm{SEC1}, \mathrm{SEC2}, \mathrm{SEC3}, \mathrm{SEC4}, \mathrm{SEC5}, \mathrm{SEC6}, \mathrm{SEC7}\}$$

$$SECr = \{\mathrm{SEC1}\}$$

$$SECt = \{\mathrm{SEC8}\}$$

1 CONSUMER $c \in COU$

1.1 Optimisation problem

$$\max_{\left(DD^{\langle c,s\rangle}\right)_{s\in SEC}, \left(DM^{\langle c,s\rangle}\right)_{s\in SEC}, \left(DT^{\langle c,s\rangle}\right)_{s\in SEC}} U^{\mathrm{CONS}\langle c\rangle} = \left(\sum_{s\in SEC} \alpha^{\mathrm{dt}\,\langle c,s\rangle} {DT^{\langle c,s\rangle}}^{{\sigma^{\mathrm{u}\,\langle c\rangle}}^{-1}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)}\right)^{\sigma^{\mathrm{u}\,\langle c\rangle}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)^{-1}} \tag{1.1}$$

s.t. :

$$INC^{\mathrm{CONS}\langle c\rangle} = SV^{\mathrm{CONS}\langle c\rangle} + \sum_{s\in SEC} p^{\langle c,s\rangle} DD^{\langle c,s\rangle} \left(1 + tssd^{\mathrm{priv}\,\langle c,s\rangle}\right) + \sum_{s\in SEC} p^{\mathrm{imp}\,\langle c,s\rangle} DM^{\langle c,s\rangle} \left(1 + tssm^{\mathrm{priv}\,\langle c,s\rangle}\right) \quad \left(\lambda^{\mathrm{CONSUMER}^{1}\,\langle c\rangle}\right) \tag{1.2}$$

$$s \in SEC: \quad DT^{\langle c,s\rangle} = \left(\alpha^{\mathrm{dd}\,\langle c,s\rangle} {DD^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1 - \alpha^{\mathrm{dd}\,\langle c,s\rangle}\right) {DM^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{arm}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)^{-1}} \quad \left(\lambda^{\mathrm{CONSUMER}^{2}\,\langle c,s\rangle}\right) \tag{1.3}$$

1.2 Identities

$$INC^{\mathrm{CONS}\,\langle c\rangle} = -DEP^{\langle c\rangle} + SUB^{\langle c\rangle} + \phi^{\langle c\rangle} PROFIT + p^{\mathrm{k}\,\langle c\rangle} K^{\langle c\rangle} \left(1 - tinc^{\mathrm{k}\,\langle c\rangle}\right) + p^{\mathrm{l}\,\langle c\rangle} L^{\langle c\rangle} \left(1 - tinc^{\mathrm{l}\,\langle c\rangle}\right) \tag{1.4}$$

$${INC^{\mathrm{CONS}\,\langle c\rangle}}^{-1} SV^{\mathrm{CONS}\,\langle c\rangle} = saving^{\mathrm{rate}^{\mathrm{cons}}\,\langle c\rangle} \tag{1.5}$$

$$DEP^{\langle c\rangle} = \delta^{\langle c\rangle} p^{\mathrm{k}\,\langle c\rangle} K^{\langle c\rangle} \tag{1.6}$$

$$L^{\langle c\rangle} = {scale^{\langle c\rangle}}^{-1} \left(-L^{\mathrm{slack}\,\langle c\rangle} + \sum_{s\in SEC} L^{\mathrm{data}\,\langle c,s\rangle}\right) \tag{1.7}$$

$$K^{\langle c\rangle} = {scale^{\langle c\rangle}}^{-1} \left(\sum_{s\in SEC} K^{\mathrm{data}\,\langle c,s\rangle}\right) \tag{1.8}$$

1.3 First order conditions

$$s \in SEC: \quad \lambda^{\mathrm{CONSUMER}^1\,\langle c\rangle} p^{\langle c,s\rangle} \left(1 + tssd^{\mathrm{priv}\,\langle c,s\rangle}\right) + \alpha^{\mathrm{dd}\,\langle c,s\rangle} \lambda^{\mathrm{CONSUMER}^2\,\langle c,s\rangle} {DD^{\langle c,s\rangle}}^{-1+{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} \left(\alpha^{\mathrm{dd}\,\langle c,s\rangle} {DD^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1 - \alpha^{\mathrm{dd}\,\langle c,s\rangle}\right) {DM^{\langle c,s\rangle}}^{\sigma^{\mathrm{arm}}} \tag{1.9}$$

$$s \in SEC: \quad \lambda^{\mathrm{CONSUMER}^1\,\langle c\rangle} p^{\mathrm{imp}\,\langle c,s\rangle} \left(1 + tssm^{\mathrm{priv}\,\langle c,s\rangle}\right) + \lambda^{\mathrm{CONSUMER}^2\,\langle c,s\rangle} \left(1 - \alpha^{\mathrm{dd}\,\langle c,s\rangle}\right) {DM^{\langle c,s\rangle}}^{-1+{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} \left(\alpha^{\mathrm{dd}\,\langle c,s\rangle} {DD^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1 - \alpha^{\mathrm{dd}\,\langle c,s\rangle}\right) \tag{1.10}$$

$$s \in SEC: \quad -\lambda^{\mathrm{CONSUMER}^2\,\langle c,s\rangle} + \alpha^{\mathrm{dt}\,\langle c,s\rangle} {DT^{\langle c,s\rangle}}^{-1+{\sigma^{\mathrm{u}\,\langle c\rangle}}^{-1}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)} \left(\sum_{s\in SEC} \alpha^{\mathrm{dt}\,\langle c,s\rangle} {DT^{\langle c,s\rangle}}^{{\sigma^{\mathrm{u}\,\langle c\rangle}}^{-1}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)}\right)^{-1+\sigma^{\mathrm{u}\,\langle c\rangle}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)^{-1}} = 0 \quad \left(DT^{\langle c,s\rangle}\right) \tag{1.11}$$

$$\cdots^{\langle c,s\rangle} = p^{\langle c,s\rangle} Y^{\langle c,s\rangle} \left(1 - tprod^{\langle c,s\rangle}\right) - p^{\mathrm{k}\,\langle c\rangle} K^{\langle c,s\rangle} \left(1 + tf^{\mathrm{k}\,\langle c,s\rangle}\right) - p^{\mathrm{l}\,\langle c\rangle} L^{\langle c,s\rangle} \left(1 + tf^{\mathrm{l}\,\langle c,s\rangle}\right) - \sum_{si \in SEC} p^{\langle c,si\rangle} ICD^{\langle c,s,si\rangle} \left(1 + tssd^{\mathrm{prod}\,\langle c,s,si\rangle}\right) - \sum_{si \in SEC} p^{\mathrm{imp}\,\langle c,si\rangle} ICM^{\langle c,s,si\rangle} \left(1 + tssm^{\mathrm{prod}\,\langle c,s,si\rangle}\right) \tag{2.1}$$

$$\cdots^{\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)\Big)^{\sigma^{\mathrm{y}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)^{-1}} \qquad \left(\lambda^{\mathrm{FIRM}^{1}\,\langle c,s\rangle}\right) \tag{2.2}$$

$$\cdots 1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)\Big)^{\sigma^{\mathrm{fac}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)^{-1}} \qquad \left(\lambda^{\mathrm{FIRM}^{2}\,\langle c,s\rangle}\right) \tag{2.3}$$

$$\cdots \qquad \left(\lambda^{\mathrm{FIRM}^{3}\,\langle c,s\rangle}\right) \tag{2.4}$$

$$\cdots \mathrm{cd}^{\langle c,s,si\rangle}\right) ICM^{\langle c,s,si\rangle^{\sigma^{\mathrm{arm}\,\langle c,si\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)}}\Big)^{\sigma^{\mathrm{arm}\,\langle c,si\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)^{-1}} \qquad \left(\lambda^{\mathrm{FIRM}^{4}\,\langle c,s,si\rangle}\right) \tag{2.5}$$

$$\cdots^{\rangle} = p^{\langle c,s\rangle} \left(1 + tee^{\langle c,x,s\rangle}\right) \tag{2.6}$$

$$\cdots - tprod^{\langle c,s\rangle}\right) = 0 \qquad \left(Y^{\langle c,s\rangle}\right) \tag{2.7}$$

$$\cdots K^{\langle c,s\rangle^{\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)}} + \left(1 - \alpha^{\mathrm{k}\,\langle c,s\rangle}\right) L^{\langle c,s\rangle^{\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)}}\Big)^{-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)^{-1}} = 0 \qquad \left(K^{\langle c,s\rangle}\right) \tag{2.8}$$

$$\cdots^{\mathrm{k}\,\langle c,s\rangle} K^{\langle c,s\rangle^{\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)}} + \left(1 - \alpha^{\mathrm{k}\,\langle c,s\rangle}\right) L^{\langle c,s\rangle^{\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)}}\Big)^{-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)^{-1}} = 0 \qquad \left(L^{\langle c,s\rangle}\right) \tag{2.9}$$

$$-\lambda^{\mathrm{FIRM}^2\langle c,s\rangle} + \alpha^{\mathrm{fac}\langle c,s\rangle} tfp^{\mathrm{y}\langle c,s\rangle} \lambda^{\mathrm{FIRM}^1\langle c,s\rangle} FAC^{\langle c,s\rangle^{-1+\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} \left(\alpha^{\mathrm{fac}\langle c,s\rangle} FAC^{\langle c,s\rangle^{\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} + \left(1-\alpha^{\mathrm{fac}\langle c,s\rangle}\right) IC^{\langle c,s\rangle^{\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}}\right)^{-1+\sigma^{\mathrm{y}\langle c,s\rangle}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)^{-1}} = \tag{2.10}$$

$$-\lambda^{\mathrm{FIRM}^3\langle c,s\rangle} + tfp^{\mathrm{y}\langle c,s\rangle} \lambda^{\mathrm{FIRM}^1\langle c,s\rangle} \left(1-\alpha^{\mathrm{fac}\langle c,s\rangle}\right) IC^{\langle c,s\rangle^{-1+\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} \left(\alpha^{\mathrm{fac}\langle c,s\rangle} FAC^{\langle c,s\rangle^{\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} + \left(1-\alpha^{\mathrm{fac}\langle c,s\rangle}\right) IC^{\langle c,s\rangle^{\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}}\right)^{-1+\sigma^{\mathrm{y}\langle c,s\rangle}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right.} \tag{2.11}$$

$$si \in SEC: \quad -p^{\langle c,si\rangle}\left(1+tssd^{\mathrm{prod}\langle c,s,si\rangle}\right) + \alpha^{\mathrm{icd}\langle c,s,si\rangle} \lambda^{\mathrm{FIRM}^4\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle^{-1+\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} \left(\alpha^{\mathrm{icd}\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle^{\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} + \left(1-\alpha^{\mathrm{icd}\langle c,s,si\rangle}\right) ICM^{\langle c,s,si\rangle^{\sigma^{\mathrm{arm}}}}\right. \tag{2.12}$$

$$si \in SEC: \quad -p^{\mathrm{imp}\langle c,si\rangle}\left(1+tssm^{\mathrm{prod}\langle c,s,si\rangle}\right) + \lambda^{\mathrm{FIRM}^4\langle c,s,si\rangle}\left(1-\alpha^{\mathrm{icd}\langle c,s,si\rangle}\right) ICM^{\langle c,s,si\rangle^{-1+\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} \left(\alpha^{\mathrm{icd}\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle^{\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} + \left(1-\alpha^{\mathrm{icd}\langle c,s,si\rangle}\right) IC\right. \tag{2.13}$$

$$si \in SEC: \quad -\lambda^{\mathrm{FIRM}^4\langle c,s,si\rangle} + \alpha^{\mathrm{ict}\langle c,s,si\rangle} \lambda^{\mathrm{FIRM}^3\langle c,s\rangle} ICT^{\langle c,s,si\rangle^{-1+\sigma^{\mathrm{ic}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{ic}\langle c,s\rangle}\right)}} \left(\sum_{si\in SEC} \alpha^{\mathrm{ict}\langle c,s,si\rangle} ICT^{\langle c,s,si\rangle^{\sigma^{\mathrm{ic}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{ic}\langle c,s\rangle}\right)}}\right)^{-1+\sigma^{\mathrm{ic}\langle c,s\rangle}\left(-1+\sigma^{\mathrm{ic}\langle c,s\rangle}\right)^{-1}} = 0 \quad \left(ICT^{\langle c,s,si\rangle}\right) \tag{2.14}$$

2.4 First order conditions after reduction

$$-p^{\mathrm{k}\langle c\rangle}\left(1+tf^{\mathrm{k}\langle c,s\rangle}\right) + \alpha^{\mathrm{fac}\langle c,s\rangle} \alpha^{\mathrm{k}\langle c,s\rangle} tfp^{\mathrm{y}\langle c,s\rangle} p^{\langle c,s\rangle}\left(1-tprod^{\langle c,s\rangle}\right) FAC^{\langle c,s\rangle^{-1+\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} K^{\langle c,s\rangle^{-1+\sigma^{\mathrm{fac}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{fac}\langle c,s\rangle}\right)}} \left(\alpha^{\mathrm{fac}\langle c,s\rangle} FAC^{\langle c,s\rangle^{\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} + \left(1-\alpha^{\mathrm{fac}\langle c,s\rangle}\right.\right. \tag{2.15}$$

$$-p^{\mathrm{l}\langle c\rangle}\left(1+tf^{\mathrm{l}\langle c,s\rangle}\right) + \alpha^{\mathrm{fac}\langle c,s\rangle} tfp^{\mathrm{y}\langle c,s\rangle} p^{\langle c,s\rangle}\left(1-\alpha^{\mathrm{k}\langle c,s\rangle}\right)\left(1-tprod^{\langle c,s\rangle}\right) FAC^{\langle c,s\rangle^{-1+\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} L^{\langle c,s\rangle^{-1+\sigma^{\mathrm{fac}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{fac}\langle c,s\rangle}\right)}} \left(\alpha^{\mathrm{fac}\langle c,s\rangle} FAC^{\langle c,s\rangle^{\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} + \left(1-\right.\right. \tag{2.16}$$

$$si \in SEC: \quad -p^{\langle c,si\rangle}\left(1+tssd^{\mathrm{prod}\langle c,s,si\rangle}\right) + \alpha^{\mathrm{icd}\langle c,s,si\rangle} \lambda^{\mathrm{FIRM}^4\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle^{-1+\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} \left(\alpha^{\mathrm{icd}\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle^{\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} + \left(1-\alpha^{\mathrm{icd}\langle c,s,si\rangle}\right) ICM^{\langle c,s,si\rangle^{\sigma^{\mathrm{arm}}}}\right. \tag{2.17}$$

$$si \in SEC: \quad -p^{\mathrm{imp}\langle c,si\rangle}\left(1+tssm^{\mathrm{prod}\langle c,s,si\rangle}\right) + \lambda^{\mathrm{FIRM}^4\langle c,s,si\rangle}\left(1-\alpha^{\mathrm{icd}\langle c,s,si\rangle}\right) ICM^{\langle c,s,si\rangle^{-1+\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} \left(\alpha^{\mathrm{icd}\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle^{\sigma^{\mathrm{arm}\langle c,si\rangle^{-1}}\left(-1+\sigma^{\mathrm{arm}\langle c,si\rangle}\right)}} + \left(1-\alpha^{\mathrm{icd}\langle c,s,si\rangle}\right) IC\right. \tag{2.18}$$

$$si \in SEC: \quad -\lambda^{\mathrm{FIRM}^4\langle c,s,si\rangle} + \alpha^{\mathrm{ict}\langle c,s,si\rangle} tfp^{\mathrm{y}\langle c,s\rangle} p^{\langle c,s\rangle}\left(1-\alpha^{\mathrm{fac}\langle c,s\rangle}\right)\left(1-tprod^{\langle c,s\rangle}\right) IC^{\langle c,s\rangle^{-1+\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right)}} ICT^{\langle c,s,si\rangle^{-1+\sigma^{\mathrm{ic}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{ic}\langle c,s\rangle}\right)}} \left(\alpha^{\mathrm{fac}\langle c,s\rangle} FAC^{\langle c,s\rangle^{\sigma^{\mathrm{y}\langle c,s\rangle^{-1}}\left(-1+\sigma^{\mathrm{y}\langle c,s\rangle}\right.}}\right. \tag{2.19}$$

3 IMPORT BIG $c \in \mathit{COUbig}$ $s \in \mathit{SEC}$

3.1 Optimisation problem

$$\max_{\left(\mathit{IM}^{\langle co,c,s\rangle}\right)_{co\in \mathit{COU}},\mathit{IMPORT}^{\langle c,s\rangle}} \pi^{\mathrm{imp}\,\langle c,s\rangle} = p^{\mathrm{imp}\,\langle c,s\rangle}\mathit{IMPORT}^{\langle c,s\rangle} - \mathit{scale}^{\langle c\rangle\,-1}\left(\sum_{co\in \mathit{COU}} \mathit{scale}^{\langle co\rangle} p^{\mathrm{cif}\,\langle co,c,s\rangle}\mathit{IM}^{\langle co,c,s\rangle}\left(1+\mathit{tmm}^{\langle co,c,s\rangle}\right)\right) \tag{3.1}$$

s.t. :

$$\mathit{IMPORT}^{\langle c,s\rangle} = \theta^{\mathrm{im}\,\langle c,s\rangle}\left(\sum_{co\in \mathit{COU}} \alpha^{\mathrm{im}\,\langle co,c,s\rangle}\left(\mathit{scale}^{\langle c\rangle\,-1}\mathit{scale}^{\langle co\rangle}\mathit{IM}^{\langle co,c,s\rangle}\left(1+\mathit{iceberg}^{\mathrm{cost}\,\langle co,c,s\rangle}\right)\right)^{\sigma^{\mathrm{im}\,\langle s\rangle\,-1}\left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)}\right)^{\sigma^{\mathrm{im}\,\langle s\rangle}\left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)^{-1}} \qquad \left(\lambda^{\mathrm{IMPORT}^{\mathrm{BIG}^{1}}\,\langle c,s\rangle}\right) \tag{3.2}$$

3.2 Identities

$$co \in \mathit{COU}: \quad \mathit{IM}^{\langle co,c,s\rangle} = \mathit{EX}^{\langle co,c,s\rangle} \tag{3.3}$$

$$co \in \mathit{COU}: \quad p^{\mathrm{cif}\,\langle c,co,s\rangle} = p^{\mathrm{fob}\,\langle c,co,s\rangle} + \tau^{\langle c,co,s\rangle}p^{\mathrm{trans}} \tag{3.4}$$

3.3 First order conditions

$$co \in \mathit{COU}: \quad -\mathit{scale}^{\langle c\rangle\,-1}\mathit{scale}^{\langle co\rangle}p^{\mathrm{cif}\,\langle co,c,s\rangle}\left(1+\mathit{tmm}^{\langle co,c,s\rangle}\right)+\alpha^{\mathrm{im}\,\langle co,c,s\rangle}\mathit{scale}^{\langle c\rangle\,-1}\mathit{scale}^{\langle co\rangle}\theta^{\mathrm{im}\,\langle c,s\rangle}\lambda^{\mathrm{IMPORT}^{\mathrm{BIG}^{1}}\,\langle c,s\rangle}\left(1+\mathit{iceberg}^{\mathrm{cost}\,\langle co,c,s\rangle}\right)\left(\mathit{scale}^{\langle c\rangle\,-1}\mathit{scale}^{\langle co\rangle}\mathit{IM}^{\langle co,c,s\rangle}\left(1+\mathit{iceberg}^{\mathrm{cost}\,\langle co,c,s\rangle}\right)\right)^{-1+} \tag{3.5}$$

$$-\lambda^{\mathrm{IMPORT}^{\mathrm{BIG}^{1}}\,\langle c,s\rangle} + p^{\mathrm{imp}\,\langle c,s\rangle} = 0 \qquad \left(\mathit{IMPORT}^{\langle c,s\rangle}\right) \tag{3.6}$$

3.4 First order conditions after reduction

$$co \in \mathit{COU}: \quad -\mathit{scale}^{\langle c\rangle\,-1}\mathit{scale}^{\langle co\rangle}p^{\mathrm{cif}\,\langle co,c,s\rangle}\left(1+\mathit{tmm}^{\langle co,c,s\rangle}\right)+\alpha^{\mathrm{im}\,\langle co,c,s\rangle}\mathit{scale}^{\langle c\rangle\,-1}\mathit{scale}^{\langle co\rangle}\theta^{\mathrm{im}\,\langle c,s\rangle}p^{\mathrm{imp}\,\langle c,s\rangle}\left(1+\mathit{iceberg}^{\mathrm{cost}\,\langle co,c,s\rangle}\right)\left(\mathit{scale}^{\langle c\rangle\,-1}\mathit{scale}^{\langle co\rangle}\mathit{IM}^{\langle co,c,s\rangle}\left(1+\mathit{iceberg}^{\mathrm{cost}\,\langle co,c,s\rangle}\right)\right)^{-1+\sigma^{\mathrm{im}\,\langle s\rangle\,-1}} \tag{3.7}$$

4 IMPORT SMALL $c \in COUonly \;\; s \in SEC$

4.1 Optimisation problem

$$\max_{\left(IM^{\langle cc,c,s\rangle}\right)_{cc\in COU\setminus c},\, IMPORT^{\langle c,s\rangle}} \pi^{\mathrm{imp}\,\langle c,s\rangle} = p^{\mathrm{imp}\,\langle c,s\rangle} IMPORT^{\langle c,s\rangle} - scale^{\langle c\rangle\,-1}\left(\sum_{cc\in COU} scale^{\langle cc\rangle} p^{\mathrm{cif}\,\langle cc,c,s\rangle} IM^{\langle cc,c,s\rangle}\left(1+tmm^{\langle cc,c,s\rangle}\right)\right) \tag{4.1}$$

s.t. :

$$IMPORT^{\langle c,s\rangle} = \theta^{\mathrm{im}\,\langle c,s\rangle}\left(\sum_{cc\in COU\setminus c} \alpha^{\mathrm{im}\,\langle cc,c,s\rangle}\left(scale^{\langle c\rangle\,-1} scale^{\langle cc\rangle} IM^{\langle cc,c,s\rangle}\left(1+iceberg^{\mathrm{cost}\,\langle cc,c,s\rangle}\right)\right)^{\sigma^{\mathrm{im}\,\langle s\rangle\,-1}\left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)}\right)^{\sigma^{\mathrm{im}\,\langle s\rangle}\left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)^{-1}} \qquad \left(\lambda^{\mathrm{IMPORT}^{\mathrm{SMALL}^{1}}\,\langle c,s\rangle}\right) \tag{4.2}$$

4.2 Identities

$$cc \in COU: \quad IM^{\langle cc,c,s\rangle} = EX^{\langle cc,c,s\rangle} \tag{4.3}$$

$$scale^{\langle c\rangle} IM^{\langle c,c,s\rangle} = 0 \tag{4.4}$$

$$cc \in COU: \quad p^{\mathrm{cif}\,\langle c,cc,s\rangle} = p^{\mathrm{fob}\,\langle c,cc,s\rangle} + \tau^{\langle c,cc,s\rangle} p^{\mathrm{trans}} \tag{4.5}$$

4.3 First order conditions

$$cc \in COU\setminus c: \quad -scale^{\langle c\rangle\,-1}\left(\sum_{cc'\in COU} \delta^{\langle cc,cc'\rangle} scale^{\langle cc'\rangle} p^{\mathrm{cif}\,\langle cc',c,s\rangle}\left(1+tmm^{\langle cc',c,s\rangle}\right)\right) + \alpha^{\mathrm{im}\,\langle cc,c,s\rangle} scale^{\langle c\rangle\,-1} scale^{\langle cc\rangle} \theta^{\mathrm{im}\,\langle c,s\rangle} \lambda^{\mathrm{IMPORT}^{\mathrm{SMALL}^{1}}\,\langle c,s\rangle}\left(1+iceberg^{\mathrm{cost}\,\langle cc,c,s\rangle}\right)\Big(scale^{\langle c\rangle\,-1} scale^{\langle cc\rangle} IM^{\langle cc,c,s\rangle}\Big(\tag{4.6}$$

$$-\lambda^{\mathrm{IMPORT}^{\mathrm{SMALL}^{1}}\,\langle c,s\rangle} + p^{\mathrm{imp}\,\langle c,s\rangle} = 0 \qquad \left(IMPORT^{\langle c,s\rangle}\right) \tag{4.7}$$

4.4 First order conditions after reduction

$$cc \in COU\setminus c: \quad -scale^{\langle c\rangle\,-1}\left(\sum_{cc'\in COU} \delta^{\langle cc,cc'\rangle} scale^{\langle cc'\rangle} p^{\mathrm{cif}\,\langle cc',c,s\rangle}\left(1+tmm^{\langle cc',c,s\rangle}\right)\right) + \alpha^{\mathrm{im}\,\langle cc,c,s\rangle} scale^{\langle c\rangle\,-1} scale^{\langle cc\rangle} \theta^{\mathrm{im}\,\langle c,s\rangle} p^{\mathrm{imp}\,\langle c,s\rangle}\left(1+iceberg^{\mathrm{cost}\,\langle cc,c,s\rangle}\right)\Big(scale^{\langle c\rangle\,-1} scale^{\langle cc\rangle} IM^{\langle cc,c,s\rangle}\Big(1+iceberg^{\mathrm{co} \tag{4.8}$$

5 GOVERNMENT $c \in COU$

5.1 Optimisation problem

$$\max_{\left(GT^{\langle c,s\rangle}\right)_{s\in SEC},\left(GD^{\langle c,s\rangle}\right)_{s\in SEC},\left(GM^{\langle c,s\rangle}\right)_{s\in SEC}} U^{\mathrm{GOV}\,\langle c\rangle} = \prod_{s\in SEC} {GT^{\langle c,s\rangle}}^{\beta^{\mathrm{gov}\,\langle c,s\rangle}} \tag{5.1}$$

s.t. :

$$s \in SEC: \quad GT^{\langle c,s\rangle} = \left(\alpha^{\mathrm{gt}\,\langle c,s\rangle} {GD^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{gt}\,\langle c,s\rangle}\right) {GM^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{arm}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)^{-1}} \qquad \left(\lambda^{\mathrm{GOVERNMENT}^{1}\,\langle c,s\rangle}\right) \tag{5.2}$$

$$INC^{\mathrm{GOV}\,\langle c\rangle} - SUB^{\langle c\rangle} = \sum_{s\in SEC} p^{\langle c,s\rangle} GD^{\langle c,s\rangle} \left(1 + tssd^{\mathrm{gov}\,\langle c,s\rangle}\right) + \sum_{s\in SEC} p^{\mathrm{imp}\,\langle c,s\rangle} GM^{\langle c,s\rangle} \left(1 + tssm^{\mathrm{gov}\,\langle c,s\rangle}\right) \qquad \left(\lambda^{\mathrm{GOVERNMENT}^{2}\,\langle c\rangle}\right) \tag{5.3}$$

5.2 Identities

$$INC^{\mathrm{GOV}\,\langle c\rangle} = Tee^{\langle c\rangle} + {Tf^{\mathrm{k}}}^{\langle c\rangle} + {Tf^{\mathrm{l}}}^{\langle c\rangle} + Tinc^{\langle c\rangle} + Tmm^{\langle c\rangle} + Tprod^{\langle c\rangle} + Tssm^{\langle c\rangle} + Tssd^{\langle c\rangle} \tag{5.4}$$

$$SUB^{\langle c\rangle} = gsub^{\langle c\rangle} INC^{\mathrm{GOV}\,\langle c\rangle} \tag{5.5}$$

$$Tmm^{\langle c\rangle} = {scale^{\langle c\rangle}}^{-1} \left(\sum_{s\in SEC} \sum_{cc\in COU} scale^{\langle cc\rangle} tmm^{\langle cc,c,s\rangle} p^{\mathrm{cif}\,\langle cc,c,s\rangle} IM^{\langle cc,c,s\rangle}\right) \tag{5.6}$$

$$Tee^{\langle c\rangle} = \sum_{s\in SEC} p^{\langle c,s\rangle} \left(\sum_{cc\in COU} tee^{\langle c,cc,s\rangle} EX^{\langle c,cc,s\rangle}\right) \tag{5.7}$$

$$Tssm^{\langle c\rangle} = \sum_{s\in SEC} p^{\mathrm{imp}\,\langle c,s\rangle} \left(tssm^{\mathrm{priv}\,\langle c,s\rangle} DM^{\langle c,s\rangle} + tssm^{\mathrm{gov}\,\langle c,s\rangle} GM^{\langle c,s\rangle} + tssm^{\mathrm{cgds}\,\langle c,s\rangle} CM^{\langle c,s\rangle} + \sum_{si\in SEC} tssm^{\mathrm{prod}\,\langle c,si,s\rangle} ICM^{\langle c,si,s\rangle}\right) \tag{5.8}$$

$$Tssd^{\langle c\rangle} = \sum_{s\in SEC} p^{\langle c,s\rangle} \left(tssd^{\mathrm{priv}\,\langle c,s\rangle} DD^{\langle c,s\rangle} + tssd^{\mathrm{gov}\,\langle c,s\rangle} GD^{\langle c,s\rangle} + tssd^{\mathrm{cgds}\,\langle c,s\rangle} CD^{\langle c,s\rangle} + \sum_{si\in SEC} tssd^{\mathrm{prod}\,\langle c,si,s\rangle} ICD^{\langle c,si,s\rangle}\right) \tag{5.9}$$

$${Tf^{\mathrm{k}}}^{\langle c\rangle} = {p^{\mathrm{k}}}^{\langle c\rangle} \left(\sum_{s\in SEC} {tf^{\mathrm{k}}}^{\langle c,s\rangle} K^{\langle c,s\rangle}\right) \tag{5.10}$$

$${Tf^{\mathrm{l}}}^{\langle c\rangle} = {p^{\mathrm{l}}}^{\langle c\rangle} \left(\sum_{s\in SEC} {tf^{\mathrm{l}}}^{\langle c,s\rangle} L^{\langle c,s\rangle}\right) \tag{5.11}$$

$$Tprod^{\langle c\rangle} = \sum_{s\in SEC} tprod^{\langle c,s\rangle} p^{\langle c,s\rangle} Y^{\langle c,s\rangle} \tag{5.12}$$

$$Tinc^{\langle c\rangle} = tinc^{\mathrm{k}\,\langle c\rangle} p^{\mathrm{k}\,\langle c\rangle} K^{\langle c\rangle} + tinc^{\mathrm{l}\,\langle c\rangle} p^{\mathrm{l}\,\langle c\rangle} L^{\langle c\rangle} \tag{5.13}$$

5.3 First order conditions

$$s \in SEC: \quad -\lambda^{\mathrm{GOVERNMENT}^1\,\langle c,s\rangle} + \beta^{\mathrm{gov}\,\langle c,s\rangle} GT^{\langle c,s\rangle\,-1} \left(\prod_{s'\in SEC} GT^{\langle c,s'\rangle\,\beta^{\mathrm{gov}\,\langle c,s'\rangle}} \right) = 0 \quad \left(GT^{\langle c,s\rangle}\right) \tag{5.14}$$

$$s \in SEC: \quad \lambda^{\mathrm{GOVERNMENT}^2\,\langle c\rangle} p^{\langle c,s\rangle} \left(1 + tssd^{\mathrm{gov}\,\langle c,s\rangle}\right) + \alpha^{\mathrm{gt}\,\langle c,s\rangle} \lambda^{\mathrm{GOVERNMENT}^1\,\langle c,s\rangle} GD^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} \left(\alpha^{\mathrm{gt}\,\langle c,s\rangle} GD^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1 - \alpha^{\mathrm{gt}\,\langle c,s\rangle}\right) GM^{\langle c,s} \right. \tag{5.15}$$

$$s \in SEC: \quad \lambda^{\mathrm{GOVERNMENT}^2\,\langle c\rangle} p^{\mathrm{imp}\,\langle c,s\rangle} \left(1 + tssm^{\mathrm{gov}\,\langle c,s\rangle}\right) + \lambda^{\mathrm{GOVERNMENT}^1\,\langle c,s\rangle} \left(1 - \alpha^{\mathrm{gt}\,\langle c,s\rangle}\right) GM^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} \left(\alpha^{\mathrm{gt}\,\langle c,s\rangle} GD^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1 - \alpha^{\mathrm{gt}\,\langle} \right. \right. \tag{5.16}$$

6 TRANSPORT

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6.1 Optimisation problem

$$\max_{TRANS^{\mathrm{global}},\left(TRANS^{\mathrm{total}\,\langle c\rangle}\right)_{c\in COU}} \pi^{\mathrm{trans}} = p^{\mathrm{trans}} TRANS^{\mathrm{global}} - \sum_{c\in COU} p^{\langle c,\mathrm{SEC8}\rangle} TRANS^{\mathrm{total}\,\langle c\rangle} \tag{6.1}$$

s.t. :

$$TRANS^{\mathrm{global}} = \theta^{\mathrm{trans}} \left(\prod_{c\in COU} TRANS^{\mathrm{total}\,\langle c\rangle\,\beta^{\mathrm{trans}\,\langle c\rangle}} \right) \quad \left(\lambda^{\mathrm{TRANSPORT}^1}\right) \tag{6.2}$$

6.2 Identities

$$c \in COU: \quad cc \in COU: \quad TRANS^{\langle c,cc\rangle} = scale^{\langle c\rangle} scale^{\langle cc\rangle\,-1} \left(\sum_{s\in SEC} \tau^{\langle c,cc,s\rangle} IM^{\langle c,cc,s\rangle} \right) \tag{6.3}$$

$$c \in COU\backslash\{\mathrm{COU4}\}: \quad TRANS^{\mathrm{total}\,\langle c\rangle} = -TRANS^{\mathrm{bal}\,\langle c\rangle} + \sum_{cc\in COU} TRANS^{\langle cc,c\rangle} \tag{6.4}$$

$$\sum_{c\in COU} TRANS^{\mathrm{bal}\,\langle c\rangle} = 0 \tag{6.5}$$

6.3 First order conditions

$$-\lambda^{\mathrm{TRANSPORT}^1} + p^{\mathrm{trans}} = 0 \quad \left(\mathit{TRANS}^{\mathrm{global}}\right) \tag{6.6}$$

$$c \in \mathit{COU}: \quad -p^{\langle c,\mathrm{SEC8}\rangle} + \theta^{\mathrm{trans}} \beta^{\mathrm{trans}\,\langle c\rangle} \lambda^{\mathrm{TRANSPORT}^1} {\mathit{TRANS}^{\mathrm{total}\,\langle c\rangle}}^{-1} \left(\prod_{c' \in \mathit{COU}} {\mathit{TRANS}^{\mathrm{total}\,\langle c'\rangle}}^{\beta^{\mathrm{trans}\,\langle c'\rangle}} \right) = 0 \quad \left(\mathit{TRANS}^{\mathrm{total}\,\langle c\rangle}\right) \tag{6.7}$$

6.4 First order conditions after reduction

$$c \in \mathit{COU}: \quad -p^{\langle c,\mathrm{SEC8}\rangle} + \theta^{\mathrm{trans}} \beta^{\mathrm{trans}\,\langle c\rangle} p^{\mathrm{trans}} {\mathit{TRANS}^{\mathrm{total}\,\langle c\rangle}}^{-1} \left(\prod_{c' \in \mathit{COU}} {\mathit{TRANS}^{\mathrm{total}\,\langle c'\rangle}}^{\beta^{\mathrm{trans}\,\langle c'\rangle}} \right) = 0 \quad \left(\left(\mathit{TRANS}^{\mathrm{total}\,\langle c\rangle}\right)_{c \in \mathit{COU}}\right) \tag{6.8}$$

7 BANK

7.1 Optimisation problem

$$\max_{\left(\mathit{INV}^{\langle c\rangle}\right)_{c\in \mathit{COU}}, \left(\left(\mathit{CT}^{\langle c,s\rangle}\right)_{s\in \mathit{SEC}}\right)_{c\in \mathit{COU}}, \left(\left(\mathit{CD}^{\langle c,s\rangle}\right)_{s\in \mathit{SEC}}\right)_{c\in \mathit{COU}}, \left(\left(\mathit{CM}^{\langle c,s\rangle}\right)_{s\in \mathit{SEC}}\right)_{c\in \mathit{COU}}} \mathit{INVEST} = \theta^{\mathrm{invest}} \left(\prod_{c \in \mathit{COU}} {\mathit{INV}^{\langle c\rangle}}^{\beta^{\mathrm{invest}\,\langle c\rangle}} \right) \tag{7.1}$$

s.t. :

$$\mathit{SAVINGS} = \sum_{c\in \mathit{COU}} \sum_{s \in \mathit{SEC}} p^{\langle c,s\rangle} \mathit{CD}^{\langle c,s\rangle} \left(1 + \mathit{tssd}^{\mathrm{cgds}\,\langle c,s\rangle}\right) + \sum_{c\in \mathit{COU}} \sum_{s \in \mathit{SEC}} p^{\mathrm{imp}\,\langle c,s\rangle} \mathit{CM}^{\langle c,s\rangle} \left(1 + \mathit{tssm}^{\mathrm{cgds}\,\langle c,s\rangle}\right) \quad \left(\lambda^{\mathrm{BANK}^1}\right) \tag{7.2}$$

$$c \in \mathit{COU}: \quad \mathit{INV}^{\langle c\rangle} = \theta^{\mathrm{inv}\,\langle c\rangle} \left(\prod_{s \in \mathit{SEC}} {\mathit{CT}^{\langle c,s\rangle}}^{\beta^{\mathrm{inv}\,\langle c,s\rangle}} \right) \quad \left(\lambda^{\mathrm{BANK}^2\,\langle c\rangle}\right) \tag{7.3}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad \mathit{CT}^{\langle c,s\rangle} = \theta^{\mathrm{ct}\,\langle c,s\rangle} \left(\alpha^{\mathrm{ct}\,\langle c,s\rangle} {\mathit{CD}^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1 - \alpha^{\mathrm{ct}\,\langle c,s\rangle}\right) {\mathit{CM}^{\langle c,s\rangle}}^{{\sigma^{\mathrm{arm}\,\langle c,s\rangle}}^{-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} \right)^{\sigma^{\mathrm{arm}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)^{-1}} \quad \left(\lambda^{\mathrm{BANK}^3\,\langle s,c\rangle}\right) \tag{7.4}$$

7.2 Identities

$$\mathit{SAVINGS} = \sum_{c \in \mathit{COU}} \mathit{SV}^{\mathrm{REG}\,\langle c\rangle} \tag{7.5}$$

$$c \in \mathit{COU}: \quad \mathit{SV}^{\mathrm{REG}\,\langle c\rangle} = -\mathit{CA}^{\langle c\rangle} + \mathit{DEP}^{\langle c\rangle} + \mathit{SV}^{\mathrm{CONS}\,\langle c\rangle} + p^{\langle c,\mathrm{SEC8}\rangle} \mathit{TRANS}^{\mathrm{bal}\,\langle c\rangle} \tag{7.6}$$

$$cc \in \mathit{COU}: \quad \mathit{CA}^{\langle cc\rangle} = -\sum_{ccc \in \mathit{COU}} \mathit{EX}^{\mathrm{bal}\,\langle cc,ccc\rangle} \tag{7.7}$$

$$c \in COU: \quad cc \in COU: \quad scale^{\langle c \rangle} EX^{\mathrm{bal}\,\langle c,cc \rangle} = scale^{\langle cc \rangle} \left(\sum_{s \in SEC} p^{\mathrm{fob}\,\langle cc,c,s \rangle} IM^{\langle cc,c,s \rangle} \right) - scale^{\langle c \rangle} \left(\sum_{s \in SEC} p^{\mathrm{fob}\,\langle c,cc,s \rangle} EX^{\langle c,cc,s \rangle} \right) \tag{7.8}$$

7.3 First order conditions

$$c \in COU: \quad -\lambda^{\mathrm{BANK}^2\,\langle c \rangle} + \theta^{\mathrm{invest}} \beta^{\mathrm{invest}\,\langle c \rangle} INV^{\langle c \rangle\,-1} \left(\prod_{c' \in COU} INV^{\langle c' \rangle\,\beta^{\mathrm{invest}\,\langle c' \rangle}} \right) = 0 \quad \left(INV^{\langle c \rangle} \right) \tag{7.9}$$

$$c \in COU: \quad s \in SEC: \quad -\lambda^{\mathrm{BANK}^3\,\langle s,c \rangle} + \beta^{\mathrm{inv}\,\langle c,s \rangle} \theta^{\mathrm{inv}\,\langle c \rangle} \lambda^{\mathrm{BANK}^2\,\langle c \rangle} CT^{\langle c,s \rangle\,-1} \left(\prod_{s' \in SEC} CT^{\langle c,s' \rangle\,\beta^{\mathrm{inv}\,\langle c,s' \rangle}} \right) = 0 \quad \left(CT^{\langle c,s \rangle} \right) \tag{7.10}$$

$$c \in COU: \quad s \in SEC: \quad \lambda^{\mathrm{BANK}^1} p^{\langle c,s \rangle} \left(1 + tssd^{\mathrm{cgds}\,\langle c,s \rangle} \right) + \alpha^{\mathrm{ct}\,\langle c,s \rangle} \theta^{\mathrm{ct}\,\langle c,s \rangle} \lambda^{\mathrm{BANK}^3\,\langle s,c \rangle} CD^{\langle c,s \rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s \rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s \rangle}\right)} \left(\alpha^{\mathrm{ct}\,\langle c,s \rangle} CD^{\langle c,s \rangle\,\sigma^{\mathrm{arm}\,\langle c,s \rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s \rangle}\right)} + \left(1 - \alpha^{\mathrm{ct}\,\langle c,s \rangle} \right) CM^{\langle c,s} \right. \tag{7.11}$$

$$c \in COU: \quad s \in SEC: \quad \lambda^{\mathrm{BANK}^1} p^{\mathrm{imp}\,\langle c,s \rangle} \left(1 + tssm^{\mathrm{cgds}\,\langle c,s \rangle} \right) + \theta^{\mathrm{ct}\,\langle c,s \rangle} \lambda^{\mathrm{BANK}^3\,\langle s,c \rangle} \left(1 - \alpha^{\mathrm{ct}\,\langle c,s \rangle} \right) CM^{\langle c,s \rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s \rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s \rangle}\right)} \left(\alpha^{\mathrm{ct}\,\langle c,s \rangle} CD^{\langle c,s \rangle\,\sigma^{\mathrm{arm}\,\langle c,s \rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s \rangle}\right)} + \left(1 - \alpha^{\mathrm{ct}\,\langle} \right. \right. \tag{7.12}$$

8 EQUILIBRIUM

8.1 Identities

$$c \in COU: \quad s \in SEC: \quad Y^{\mathrm{home}\,\langle c,s \rangle} = CD^{\langle c,s \rangle} + DD^{\langle c,s \rangle} + GD^{\langle c,s \rangle} + \sum_{si \in SEC} ICD^{\langle c,si,s \rangle} \tag{8.1}$$

$$c \in COU: \quad s \in SECnt: \quad Y^{\langle c,s \rangle} = Y^{\mathrm{home}\,\langle c,s \rangle} + \sum_{cc \in COU} EX^{\langle c,cc,s \rangle} \tag{8.2}$$

$$c \in COU: \quad s \in SECt: \quad Y^{\langle c,s \rangle} = TRANS^{\mathrm{total}\,\langle c \rangle} + Y^{\mathrm{home}\,\langle c,s \rangle} + \sum_{cc \in COU} EX^{\langle c,cc,s \rangle} \tag{8.3}$$

$$c \in COU: \quad s \in SEC: \quad IMPORT^{\langle c,s \rangle} = CM^{\langle c,s \rangle} + DM^{\langle c,s \rangle} + GM^{\langle c,s \rangle} + \sum_{si \in SEC} ICM^{\langle c,si,s \rangle} \tag{8.4}$$

$$c \in COU: \quad K^{\langle c \rangle} = \sum_{s \in SEC} K^{\langle c,s \rangle} \tag{8.5}$$

$$c \in COU: \quad L^{\langle c \rangle} = \sum_{s \in SEC} L^{\langle c,s \rangle} \tag{8.6}$$

$$\left(\sum_{c\in COU} K^{\langle c\rangle} + \sum_{c\in COU} L^{\langle c\rangle}\right)^{-1} \left(\sum_{c\in COU} p^{\mathrm{k}\langle c\rangle} K^{\langle c\rangle} + \sum_{c\in COU} p^{\mathrm{l}\langle c\rangle} L^{\langle c\rangle}\right) = 1 \tag{8.7}$$

$$\mathit{PROFIT} = \pi^{\mathrm{trans}} + \sum_{c\in COU}\sum_{s\in SEC} \pi^{\langle c,s\rangle} + \sum_{c\in COU}\sum_{s\in SEC} \pi^{\mathrm{imp}\langle c,s\rangle} \tag{8.8}$$

9 Equilibrium relationships (before expansion and reduction)

$$-\sum_{c\in COU} \mathit{TRANS}^{\mathrm{bal}\langle c\rangle} = 0 \tag{9.1}$$

$$1 - \left(\sum_{c\in COU} K^{\langle c\rangle} + \sum_{c\in COU} L^{\langle c\rangle}\right)^{-1} \left(\sum_{c\in COU} p^{\mathrm{k}\langle c\rangle} K^{\langle c\rangle} + \sum_{c\in COU} p^{\mathrm{l}\langle c\rangle} L^{\langle c\rangle}\right) = 0 \tag{9.2}$$

$$\mathit{INVEST} - \theta^{\mathrm{invest}} \left(\prod_{c\in COU} \mathit{INV}^{\langle c\rangle^{\beta^{\mathrm{invest}\langle c\rangle}}}\right) = 0 \tag{9.3}$$

$$-\mathit{SAVINGS} + \sum_{c\in COU} \mathit{SV}^{\mathrm{REG}\langle c\rangle} = 0 \tag{9.4}$$

$$-\mathit{TRANS}^{\mathrm{global}} + \theta^{\mathrm{trans}} \left(\prod_{c\in COU} \mathit{TRANS}^{\mathrm{total}\langle c\rangle^{\beta^{\mathrm{trans}\langle c\rangle}}}\right) = 0 \tag{9.5}$$

$$\pi^{\mathrm{trans}} - p^{\mathrm{trans}}\mathit{TRANS}^{\mathrm{global}} + \sum_{c\in COU} p^{\langle c,\mathrm{SEC8}\rangle}\mathit{TRANS}^{\mathrm{total}\langle c\rangle} = 0 \tag{9.6}$$

$$-\mathit{SAVINGS} + \sum_{c\in COU}\sum_{s\in SEC} p^{\langle c,s\rangle}\mathit{CD}^{\langle c,s\rangle}\left(1 + \mathit{tssd}^{\mathrm{cgds}\langle c,s\rangle}\right) + \sum_{c\in COU}\sum_{s\in SEC} p^{\mathrm{imp}\langle c,s\rangle}\mathit{CM}^{\langle c,s\rangle}\left(1 + \mathit{tssm}^{\mathrm{cgds}\langle c,s\rangle}\right) = 0 \tag{9.7}$$

$$\pi^{\mathrm{trans}} - \mathit{PROFIT} + \sum_{c\in COU}\sum_{s\in SEC} \pi^{\langle c,s\rangle} + \sum_{c\in COU}\sum_{s\in SEC} \pi^{\mathrm{imp}\langle c,s\rangle} = 0 \tag{9.8}$$

$$c \in \mathit{COU}\backslash\{\mathrm{COU4}\}: \quad -\mathit{TRANS}^{\mathrm{total}\langle c\rangle} - \mathit{TRANS}^{\mathrm{bal}\langle c\rangle} + \sum_{cc\in COU} \mathit{TRANS}^{\langle cc,c\rangle} = 0 \tag{9.9}$$

$$c \in \mathit{COU}: \quad \mathit{saving}^{\mathrm{rate}^{\mathrm{cons}\langle c\rangle}} - \mathit{INC}^{\mathrm{CONS}\langle c\rangle^{-1}}\mathit{SV}^{\mathrm{CONS}\langle c\rangle} = 0 \tag{9.10}$$

$$c \in \mathit{COU}: \quad -\lambda^{\mathrm{BANK}^2\langle c\rangle} + \theta^{\mathrm{invest}}\beta^{\mathrm{invest}\langle c\rangle}\mathit{INV}^{\langle c\rangle^{-1}}\left(\prod_{c'\in COU} \mathit{INV}^{\langle c'\rangle^{\beta^{\mathrm{invest}\langle c'\rangle}}}\right) = 0 \tag{9.11}$$

$$c \in COU: \quad -p^{\langle c,\mathrm{SEC8}\rangle} + \theta^{\mathrm{trans}} \beta^{\mathrm{trans}\langle c\rangle} p^{\mathrm{trans}} TRANS^{\mathrm{total}\langle c\rangle^{-1}} \left(\prod_{c' \in COU} TRANS^{\mathrm{total}\langle c'\rangle^{\beta^{\mathrm{trans}\langle c'\rangle}}} \right) = 0 \tag{9.12}$$

$$cc \in COU: \quad -CA^{\langle cc\rangle} - \sum_{ccc \in COU} EX^{\mathrm{bal}\langle cc,ccc\rangle} = 0 \tag{9.13}$$

$$c \in COU: \quad -DEP^{\langle c\rangle} + \delta^{\langle c\rangle} p^{\mathrm{k}\langle c\rangle} K^{\langle c\rangle} = 0 \tag{9.14}$$

$$c \in COU: \quad -INV^{\langle c\rangle} + \theta^{\mathrm{inv}\langle c\rangle} \left(\prod_{s \in SEC} CT^{\langle c,s\rangle^{\beta^{\mathrm{inv}\langle c,s\rangle}}} \right) = 0 \tag{9.15}$$

$$c \in COU: \quad -K^{\langle c\rangle} + scale^{\langle c\rangle^{-1}} \left(\sum_{s \in SEC} K^{\mathrm{data}\langle c,s\rangle} \right) = 0 \tag{9.16}$$

$$c \in COU: \quad -K^{\langle c\rangle} + \sum_{s \in SEC} K^{\langle c,s\rangle} = 0 \tag{9.17}$$

$$c \in COU: \quad -L^{\langle c\rangle} + scale^{\langle c\rangle^{-1}} \left(-L^{\mathrm{slack}\langle c\rangle} + \sum_{s \in SEC} L^{\mathrm{data}\langle c,s\rangle} \right) = 0 \tag{9.18}$$

$$c \in COU: \quad -L^{\langle c\rangle} + \sum_{s \in SEC} L^{\langle c,s\rangle} = 0 \tag{9.19}$$

$$c \in COU: \quad -SUB^{\langle c\rangle} + gsub^{\langle c\rangle} INC^{\mathrm{GOV}\langle c\rangle} = 0 \tag{9.20}$$

$$c \in COU: \quad -Tee^{\langle c\rangle} + \sum_{s \in SEC} p^{\langle c,s\rangle} \left(\sum_{cc \in COU} tee^{\langle c,cc,s\rangle} EX^{\langle c,cc,s\rangle} \right) = 0 \tag{9.21}$$

$$c \in COU: \quad -Tf^{\mathrm{k}\langle c\rangle} + p^{\mathrm{k}\langle c\rangle} \left(\sum_{s \in SEC} tf^{\mathrm{k}\langle c,s\rangle} K^{\langle c,s\rangle} \right) = 0 \tag{9.22}$$

$$c \in COU: \quad -Tf^{\mathrm{l}\langle c\rangle} + p^{\mathrm{l}\langle c\rangle} \left(\sum_{s \in SEC} tf^{\mathrm{l}\langle c,s\rangle} L^{\langle c,s\rangle} \right) = 0 \tag{9.23}$$

$$c \in COU: \quad -Tmm^{\langle c\rangle} + scale^{\langle c\rangle^{-1}} \left(\sum_{s \in SEC} \sum_{cc \in COU} scale^{\langle cc\rangle} tmm^{\langle cc,c,s\rangle} p^{\mathrm{cif}\langle cc,c,s\rangle} IM^{\langle cc,c,s\rangle} \right) = 0 \tag{9.24}$$

$$c \in COU: \quad -Tprod^{\langle c\rangle} + \sum_{s \in SEC} tprod^{\langle c,s\rangle} p^{\langle c,s\rangle} Y^{\langle c,s\rangle} = 0 \tag{9.25}$$

$$c \in \mathit{COU}: \quad -\mathit{Tssm}^{\langle c\rangle} + \sum_{s \in \mathit{SEC}} p^{\mathrm{imp}\,\langle c,s\rangle} \left(\mathit{tssm}^{\mathrm{priv}\,\langle c,s\rangle} \mathit{DM}^{\langle c,s\rangle} + \mathit{tssm}^{\mathrm{gov}\,\langle c,s\rangle} \mathit{GM}^{\langle c,s\rangle} + \mathit{tssm}^{\mathrm{cgds}\,\langle c,s\rangle} \mathit{CM}^{\langle c,s\rangle} + \sum_{\mathit{si} \in \mathit{SEC}} \mathit{tssm}^{\mathrm{prod}\,\langle c,\mathit{si},s\rangle} \mathit{ICM}^{\langle c,\mathit{si},s\rangle} \right) = 0 \tag{9.26}$$

$$c \in \mathit{COU}: \quad -\mathit{Tssd}^{\langle c\rangle} + \sum_{s \in \mathit{SEC}} p^{\langle c,s\rangle} \left(\mathit{tssd}^{\mathrm{priv}\,\langle c,s\rangle} \mathit{DD}^{\langle c,s\rangle} + \mathit{tssd}^{\mathrm{gov}\,\langle c,s\rangle} \mathit{GD}^{\langle c,s\rangle} + \mathit{tssd}^{\mathrm{cgds}\,\langle c,s\rangle} \mathit{CD}^{\langle c,s\rangle} + \sum_{\mathit{si} \in \mathit{SEC}} \mathit{tssd}^{\mathrm{prod}\,\langle c,\mathit{si},s\rangle} \mathit{ICD}^{\langle c,\mathit{si},s\rangle} \right) = 0 \tag{9.27}$$

$$c \in \mathit{COU}: \quad U^{\mathrm{CONS}\,\langle c\rangle} - \left(\sum_{s \in \mathit{SEC}} \alpha^{\mathrm{dt}\,\langle c,s\rangle} {\mathit{DT}^{\langle c,s\rangle}}^{{\sigma^{\mathrm{u}\,\langle c\rangle}}^{-1}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)} \right)^{\sigma^{\mathrm{u}\,\langle c\rangle}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)^{-1}} = 0 \tag{9.28}$$

$$c \in \mathit{COU}: \quad U^{\mathrm{GOV}\,\langle c\rangle} - \prod_{s \in \mathit{SEC}} {\mathit{GT}^{\langle c,s\rangle}}^{\beta^{\mathrm{gov}\,\langle c,s\rangle}} = 0 \tag{9.29}$$

$$c \in \mathit{COU}: \quad -\mathit{Tinc}^{\langle c\rangle} + \mathit{tinc}^{\mathrm{k}\,\langle c\rangle} p^{\mathrm{k}\,\langle c\rangle} K^{\langle c\rangle} + \mathit{tinc}^{\mathrm{l}\,\langle c\rangle} p^{\mathrm{l}\,\langle c\rangle} L^{\langle c\rangle} = 0 \tag{9.30}$$

$$c \in \mathit{COU}: \quad -\mathit{INC}^{\mathrm{GOV}\,\langle c\rangle} + \mathit{SUB}^{\langle c\rangle} + \sum_{s \in \mathit{SEC}} p^{\langle c,s\rangle} \mathit{GD}^{\langle c,s\rangle} \left(1 + \mathit{tssd}^{\mathrm{gov}\,\langle c,s\rangle}\right) + \sum_{s \in \mathit{SEC}} p^{\mathrm{imp}\,\langle c,s\rangle} \mathit{GM}^{\langle c,s\rangle} \left(1 + \mathit{tssm}^{\mathrm{gov}\,\langle c,s\rangle}\right) = 0 \tag{9.31}$$

$$c \in \mathit{COU}: \quad -\mathit{INC}^{\mathrm{CONS}\,\langle c\rangle} + \mathit{SV}^{\mathrm{CONS}\,\langle c\rangle} + \sum_{s \in \mathit{SEC}} p^{\langle c,s\rangle} \mathit{DD}^{\langle c,s\rangle} \left(1 + \mathit{tssd}^{\mathrm{priv}\,\langle c,s\rangle}\right) + \sum_{s \in \mathit{SEC}} p^{\mathrm{imp}\,\langle c,s\rangle} \mathit{DM}^{\langle c,s\rangle} \left(1 + \mathit{tssm}^{\mathrm{priv}\,\langle c,s\rangle}\right) = 0 \tag{9.32}$$

$$c \in \mathit{COU}: \quad -\mathit{CA}^{\langle c\rangle} + \mathit{DEP}^{\langle c\rangle} + \mathit{SV}^{\mathrm{CONS}\,\langle c\rangle} - \mathit{SV}^{\mathrm{REG}\,\langle c\rangle} + p^{\langle c,\mathrm{SEC8}\rangle} \mathit{TRANS}^{\mathrm{bal}\,\langle c\rangle} = 0 \tag{9.33}$$

$$c \in \mathit{COU}: \quad -\mathit{DEP}^{\langle c\rangle} - \mathit{INC}^{\mathrm{CONS}\,\langle c\rangle} + \mathit{SUB}^{\langle c\rangle} + \phi^{\langle c\rangle} \mathit{PROFIT} + p^{\mathrm{k}\,\langle c\rangle} K^{\langle c\rangle} \left(1 - \mathit{tinc}^{\mathrm{k}\,\langle c\rangle}\right) + p^{\mathrm{l}\,\langle c\rangle} L^{\langle c\rangle} \left(1 - \mathit{tinc}^{\mathrm{l}\,\langle c\rangle}\right) = 0 \tag{9.34}$$

$$c \in \mathit{COU}: \quad -\mathit{INC}^{\mathrm{GOV}\,\langle c\rangle} + \mathit{Tee}^{\langle c\rangle} + \mathit{Tf}^{\mathrm{k}\,\langle c\rangle} + \mathit{Tf}^{\mathrm{l}\,\langle c\rangle} + \mathit{Tinc}^{\langle c\rangle} + \mathit{Tmm}^{\langle c\rangle} + \mathit{Tprod}^{\langle c\rangle} + \mathit{Tssm}^{\langle c\rangle} + \mathit{Tssd}^{\langle c\rangle} = 0 \tag{9.35}$$

$$c \in \mathit{COU}: \quad \mathit{cc} \in \mathit{COU}: \quad -\mathit{TRANS}^{\langle c,\mathit{cc}\rangle} + \mathit{scale}^{\langle c\rangle} {\mathit{scale}^{\langle \mathit{cc}\rangle}}^{-1} \left(\sum_{s \in \mathit{SEC}} \tau^{\langle c,\mathit{cc},s\rangle} \mathit{IM}^{\langle c,\mathit{cc},s\rangle} \right) = 0 \tag{9.36}$$

$$c \in \mathit{COU}: \quad \mathit{cc} \in \mathit{COU}: \quad -\mathit{scale}^{\langle c\rangle} \left(\sum_{s \in \mathit{SEC}} p^{\mathrm{fob}\,\langle c,\mathit{cc},s\rangle} \mathit{EX}^{\langle c,\mathit{cc},s\rangle} \right) + \mathit{scale}^{\langle \mathit{cc}\rangle} \left(\sum_{s \in \mathit{SEC}} p^{\mathrm{fob}\,\langle \mathit{cc},c,s\rangle} \mathit{IM}^{\langle \mathit{cc},c,s\rangle} \right) - \mathit{scale}^{\langle c\rangle} \mathit{EX}^{\mathrm{bal}\,\langle c,\mathit{cc}\rangle} = 0 \tag{9.37}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\lambda^{\mathrm{CONSUMER}^{2}\,\langle c,s\rangle} + \alpha^{\mathrm{dt}\,\langle c,s\rangle} {\mathit{DT}^{\langle c,s\rangle}}^{-1+{\sigma^{\mathrm{u}\,\langle c\rangle}}^{-1}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)} \left(\sum_{s \in \mathit{SEC}} \alpha^{\mathrm{dt}\,\langle c,s\rangle} {\mathit{DT}^{\langle c,s\rangle}}^{{\sigma^{\mathrm{u}\,\langle c\rangle}}^{-1}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)} \right)^{-1+\sigma^{\mathrm{u}\,\langle c\rangle}\left(-1+\sigma^{\mathrm{u}\,\langle c\rangle}\right)^{-1}} = 0 \tag{9.38}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\lambda^{\mathrm{GOVERNMENT}^{1}\,\langle c,s\rangle} + \beta^{\mathrm{gov}\,\langle c,s\rangle} {\mathit{GT}^{\langle c,s\rangle}}^{-1} \left(\prod_{s' \in \mathit{SEC}} {\mathit{GT}^{\langle c,s'\rangle}}^{\beta^{\mathrm{gov}\,\langle c,s'\rangle}} \right) = 0 \tag{9.39}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\lambda^{\mathrm{BANK}^{3}\,\langle s,c\rangle} + \beta^{\mathrm{inv}\,\langle c,s\rangle} \theta^{\mathrm{inv}\,\langle c\rangle} \lambda^{\mathrm{BANK}^{2}\,\langle c\rangle} {\mathit{CT}^{\langle c,s\rangle}}^{-1} \left(\prod_{s' \in \mathit{SEC}} {\mathit{CT}^{\langle c,s'\rangle}}^{\beta^{\mathrm{inv}\,\langle c,s'\rangle}} \right) = 0 \tag{9.40}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\mathit{CT}^{\langle c,s\rangle} + \theta^{\mathrm{ct}\,\langle c,s\rangle}\left(\alpha^{\mathrm{ct}\,\langle c,s\rangle}\mathit{CD}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{ct}\,\langle c,s\rangle}\right)\mathit{CM}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{arm}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)^{-1}} = 0 \tag{9.41}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\mathit{DT}^{\langle c,s\rangle} + \left(\alpha^{\mathrm{dd}\,\langle c,s\rangle}\mathit{DD}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{dd}\,\langle c,s\rangle}\right)\mathit{DM}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{arm}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)^{-1}} = 0 \tag{9.42}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\mathit{FAC}^{\langle c,s\rangle} + \left(\alpha^{\mathrm{k}\,\langle c,s\rangle}K^{\langle c,s\rangle\,\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{k}\,\langle c,s\rangle}\right)L^{\langle c,s\rangle\,\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{fac}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)^{-1}} = 0 \tag{9.43}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\mathit{GT}^{\langle c,s\rangle} + \left(\alpha^{\mathrm{gt}\,\langle c,s\rangle}\mathit{GD}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{gt}\,\langle c,s\rangle}\right)\mathit{GM}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{arm}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)^{-1}} = 0 \tag{9.44}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -\mathit{IC}^{\langle c,s\rangle} + \left(\sum_{\mathit{si}\in \mathit{SEC}}\alpha^{\mathrm{ict}\,\langle c,s,\mathit{si}\rangle}\mathit{ICT}^{\langle c,s,\mathit{si}\rangle\,\sigma^{\mathrm{ic}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{ic}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{ic}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{ic}\,\langle c,s\rangle}\right)^{-1}} = 0 \tag{9.45}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -Y^{\langle c,s\rangle} + \mathit{tfp}^{\mathrm{y}\,\langle c,s\rangle}\left(\alpha^{\mathrm{fac}\,\langle c,s\rangle}\mathit{FAC}^{\langle c,s\rangle\,\sigma^{\mathrm{y}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{fac}\,\langle c,s\rangle}\right)\mathit{IC}^{\langle c,s\rangle\,\sigma^{\mathrm{y}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)}\right)^{\sigma^{\mathrm{y}\,\langle c,s\rangle}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)^{-1}} = 0 \tag{9.46}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -p^{\mathrm{k}\,\langle c\rangle}\left(1+\mathit{tf}^{\mathrm{k}\,\langle c,s\rangle}\right)+\alpha^{\mathrm{fac}\,\langle c,s\rangle}\alpha^{\mathrm{k}\,\langle c,s\rangle}\mathit{tfp}^{\mathrm{y}\,\langle c,s\rangle}p^{\langle c,s\rangle}\left(1-\mathit{tprod}^{\langle c,s\rangle}\right)\mathit{FAC}^{\langle c,s\rangle\,-1+\sigma^{\mathrm{y}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)}K^{\langle c,s\rangle\,-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)}\left(\alpha^{\mathrm{fac}\,\langle c,s\rangle}\mathit{FAC}^{\langle c,s\rangle\,\sigma^{\mathrm{y}\,\langle c,s\rangle\,-1}(\cdots} \right. \tag{9.47}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad -p^{\mathrm{l}\,\langle c\rangle}\left(1+\mathit{tf}^{\mathrm{l}\,\langle c,s\rangle}\right)+\alpha^{\mathrm{fac}\,\langle c,s\rangle}\mathit{tfp}^{\mathrm{y}\,\langle c,s\rangle}p^{\langle c,s\rangle}\left(1-\alpha^{\mathrm{k}\,\langle c,s\rangle}\right)\left(1-\mathit{tprod}^{\langle c,s\rangle}\right)\mathit{FAC}^{\langle c,s\rangle\,-1+\sigma^{\mathrm{y}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)}L^{\langle c,s\rangle\,-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{fac}\,\langle c,s\rangle}\right)}\left(\alpha^{\mathrm{fac}\,\langle c,s\rangle}\mathit{FAC}^{\langle c,s\rangle\,\sigma^{\mathrm{y}\,\cdots}} \right. \tag{9.48}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad \lambda^{\mathrm{BANK}^1}p^{\langle c,s\rangle}\left(1+\mathit{tssd}^{\mathrm{cgds}\,\langle c,s\rangle}\right)+\alpha^{\mathrm{ct}\,\langle c,s\rangle}\theta^{\mathrm{ct}\,\langle c,s\rangle}\lambda^{\mathrm{BANK}^3\,\langle s,c\rangle}\mathit{CD}^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\left(\alpha^{\mathrm{ct}\,\langle c,s\rangle}\mathit{CD}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{ct}\,\langle c,s\rangle}\right)\mathit{CM}^{\langle c,s\cdots} \right. \tag{9.49}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad \lambda^{\mathrm{BANK}^1}p^{\mathrm{imp}\,\langle c,s\rangle}\left(1+\mathit{tssm}^{\mathrm{cgds}\,\langle c,s\rangle}\right)+\theta^{\mathrm{ct}\,\langle c,s\rangle}\lambda^{\mathrm{BANK}^3\,\langle s,c\rangle}\left(1-\alpha^{\mathrm{ct}\,\langle c,s\rangle}\right)\mathit{CM}^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\left(\alpha^{\mathrm{ct}\,\langle c,s\rangle}\mathit{CD}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{ct}\cdots} \right.\right. \tag{9.50}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad \lambda^{\mathrm{CONSUMER}^1\,\langle c\rangle}p^{\langle c,s\rangle}\left(1+\mathit{tssd}^{\mathrm{priv}\,\langle c,s\rangle}\right)+\alpha^{\mathrm{dd}\,\langle c,s\rangle}\lambda^{\mathrm{CONSUMER}^2\,\langle c,s\rangle}\mathit{DD}^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\left(\alpha^{\mathrm{dd}\,\langle c,s\rangle}\mathit{DD}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(1-\alpha^{\mathrm{dd}\,\langle c,s\rangle}\cdots \right.\right. \tag{9.51}$$

$$c \in \mathit{COU}: \quad s \in \mathit{SEC}: \quad \lambda^{\mathrm{CONSUMER}^1\,\langle c\rangle}p^{\mathrm{imp}\,\langle c,s\rangle}\left(1+\mathit{tssm}^{\mathrm{priv}\,\langle c,s\rangle}\right)+\lambda^{\mathrm{CONSUMER}^2\,\langle c,s\rangle}\left(1-\alpha^{\mathrm{dd}\,\langle c,s\rangle}\right)\mathit{DM}^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\left(\alpha^{\mathrm{dd}\,\langle c,s\rangle}\mathit{DD}^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \left(\cdots \right.\right. \tag{9.52}$$

$$c \in COU: \quad s \in SEC: \quad \lambda^{\mathrm{GOVERNMENT}^2\,\langle c\rangle} p^{\langle c,s\rangle}\Big(1+tssd^{\mathrm{gov}\,\langle c,s\rangle}\Big)+\alpha^{\mathrm{gt}\,\langle c,s\rangle}\lambda^{\mathrm{GOVERNMENT}^1\,\langle c,s\rangle} GD^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\Big(\alpha^{\mathrm{gt}\,\langle c,s\rangle} GD^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} + \Big(1-\alpha^{\mathrm{gt}\,\langle} \cdots \tag{9.53}$$

$$c \in COU: \quad s \in SEC: \quad \lambda^{\mathrm{GOVERNMENT}^2\,\langle c\rangle} p^{\mathrm{imp}\,\langle c,s\rangle}\Big(1+tssm^{\mathrm{gov}\,\langle c,s\rangle}\Big)+\lambda^{\mathrm{GOVERNMENT}^1\,\langle c,s\rangle}\Big(1-\alpha^{\mathrm{gt}\,\langle c,s\rangle}\Big) GM^{\langle c,s\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)}\Big(\alpha^{\mathrm{gt}\,\langle c,s\rangle} GD^{\langle c,s\rangle\,\sigma^{\mathrm{arm}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,s\rangle}\right)} \cdots \tag{9.54}$$

$$c \in COU: \quad s \in SEC: \quad CD^{\langle c,s\rangle}+DD^{\langle c,s\rangle}+GD^{\langle c,s\rangle}-Y^{\mathrm{home}\,\langle c,s\rangle}+\sum_{si\in SEC} ICD^{\langle c,si,s\rangle}=0 \tag{9.55}$$

$$c \in COU: \quad s \in SEC: \quad CM^{\langle c,s\rangle}+DM^{\langle c,s\rangle}+GM^{\langle c,s\rangle}-IMPORT^{\langle c,s\rangle}+\sum_{si\in SEC} ICM^{\langle c,si,s\rangle}=0 \tag{9.56}$$

$$c \in COU: \quad s \in SEC: \quad \pi^{\langle c,s\rangle}-p^{\langle c,s\rangle}Y^{\langle c,s\rangle}\Big(1-tprod^{\langle c,s\rangle}\Big)+p^{\mathrm{k}\,\langle c\rangle}K^{\langle c,s\rangle}\Big(1+tf^{\mathrm{k}\,\langle c,s\rangle}\Big)+p^{\mathrm{l}\,\langle c\rangle}L^{\langle c,s\rangle}\Big(1+tf^{\mathrm{l}\,\langle c,s\rangle}\Big)+\sum_{si\in SEC} p^{\langle c,si\rangle} ICD^{\langle c,s,si\rangle}\Big(1+tssd^{\mathrm{prod}\,\langle c,s,si\rangle}\Big)+\sum_{si\in SEC} p^{\mathrm{imp}\,\langle c,si\rangle} ICM^{\langle c,s,si\rangle} \cdots \tag{9.57}$$

$$c \in COU: \quad s \in SEC: \quad cc \in COU: \quad -p^{\mathrm{fob}\,\langle c,cc,s\rangle}+p^{\langle c,s\rangle}\Big(1+tee^{\langle c,cc,s\rangle}\Big)=0 \tag{9.58}$$

$$c \in COU: \quad s \in SEC: \quad si \in SEC: \quad -\lambda^{\mathrm{FIRM}^4\,\langle c,s,si\rangle}+\alpha^{\mathrm{ict}\,\langle c,s,si\rangle} tfp^{\mathrm{y}\,\langle c,s\rangle} p^{\langle c,s\rangle}\Big(1-\alpha^{\mathrm{fac}\,\langle c,s\rangle}\Big)\Big(1-tprod^{\langle c,s\rangle}\Big) IC^{\langle c,s\rangle\,-1+\sigma^{\mathrm{y}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{y}\,\langle c,s\rangle}\right)} ICT^{\langle c,s,si\rangle\,-1+\sigma^{\mathrm{ic}\,\langle c,s\rangle\,-1}\left(-1+\sigma^{\mathrm{ic}\,\langle c,s\rangle}\right)}\Big(\alpha^{\mathrm{fac}\,\langle c,s\rangle} \cdots \tag{9.59}$$

$$c \in COU: \quad s \in SEC: \quad si \in SEC: \quad -ICT^{\langle c,s,si\rangle}+\left(\alpha^{\mathrm{icd}\,\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle\,\sigma^{\mathrm{arm}\,\langle c,si\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)}+\Big(1-\alpha^{\mathrm{icd}\,\langle c,s,si\rangle}\Big) ICM^{\langle c,s,si\rangle\,\sigma^{\mathrm{arm}\,\langle c,si\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)}\right)^{\sigma^{\mathrm{arm}\,\langle c,si\rangle}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)^{-1}}=0 \tag{9.60}$$

$$c \in COU: \quad s \in SEC: \quad si \in SEC: \quad -p^{\langle c,si\rangle}\Big(1+tssd^{\mathrm{prod}\,\langle c,s,si\rangle}\Big)+\alpha^{\mathrm{icd}\,\langle c,s,si\rangle}\lambda^{\mathrm{FIRM}^4\,\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)}\Big(\alpha^{\mathrm{icd}\,\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle\,\sigma^{\mathrm{arm}\,\langle c,si\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)}+\Big(1- \cdots \tag{9.61}$$

$$c \in COU: \quad s \in SEC: \quad si \in SEC: \quad -p^{\mathrm{imp}\,\langle c,si\rangle}\Big(1+tssm^{\mathrm{prod}\,\langle c,s,si\rangle}\Big)+\lambda^{\mathrm{FIRM}^4\,\langle c,s,si\rangle}\Big(1-\alpha^{\mathrm{icd}\,\langle c,s,si\rangle}\Big) ICM^{\langle c,s,si\rangle\,-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c,si\rangle}\right)}\Big(\alpha^{\mathrm{icd}\,\langle c,s,si\rangle} ICD^{\langle c,s,si\rangle\,\sigma^{\mathrm{arm}\,\langle c,si\rangle\,-1}\left(-1+\sigma^{\mathrm{arm}\,\langle c \cdots \tag{9.62}$$

$$c \in COU: \quad s \in SECt: \quad TRANS^{\mathrm{total}\,\langle c\rangle}-Y^{\langle c,s\rangle}+Y^{\mathrm{home}\,\langle c,s\rangle}+\sum_{cc\in COU} EX^{\langle c,cc,s\rangle}=0 \tag{9.63}$$

$$c \in COU: \quad s \in SECnt: \quad -Y^{\langle c,s\rangle}+Y^{\mathrm{home}\,\langle c,s\rangle}+\sum_{cc\in COU} EX^{\langle c,cc,s\rangle}=0 \tag{9.64}$$

$$c \in COUbig: \quad s \in SEC: \quad -IMPORT^{\langle c,s\rangle}+\theta^{\mathrm{im}\,\langle c,s\rangle}\left(\sum_{cc\in COU}\alpha^{\mathrm{im}\,\langle cc,c,s\rangle}\left(scale^{\langle c\rangle\,-1} scale^{\langle cc\rangle} IM^{\langle cc,c,s\rangle}\Big(1+iceberg^{\mathrm{cost}\,\langle cc,c,s\rangle}\Big)\right)^{\sigma^{\mathrm{im}\,\langle s\rangle\,-1}\left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)}\right)^{\sigma^{\mathrm{im}\,\langle s\rangle}\left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)^{-1}}=0 \tag{9.65}$$

$$c \in \mathit{COUbig}: \quad s \in \mathit{SEC}: \quad \pi^{\mathrm{imp}\,\langle c,s\rangle} + \mathit{scale}^{\langle c\rangle\,-1} \left(\sum_{\mathit{cc} \in \mathit{COU}} \mathit{scale}^{\langle \mathit{cc}\rangle} p^{\mathrm{cif}\,\langle \mathit{cc},c,s\rangle} \mathit{IM}^{\langle \mathit{cc},c,s\rangle} \left(1 + \mathit{tmm}^{\langle \mathit{cc},c,s\rangle}\right)\right) - p^{\mathrm{imp}\,\langle c,s\rangle} \mathit{IMPORT}^{\langle c,s\rangle} = 0 \tag{9.66}$$

$$c \in \mathit{COUbig}: \quad s \in \mathit{SEC}: \quad \mathit{cc} \in \mathit{COU}: \quad \mathit{EX}^{\langle \mathit{cc},c,s\rangle} - \mathit{IM}^{\langle \mathit{cc},c,s\rangle} = 0 \tag{9.67}$$

$$c \in \mathit{COUbig}: \quad s \in \mathit{SEC}: \quad \mathit{cc} \in \mathit{COU}: \quad -\mathit{scale}^{\langle c\rangle\,-1} \mathit{scale}^{\langle \mathit{cc}\rangle} p^{\mathrm{cif}\,\langle \mathit{cc},c,s\rangle} \left(1 + \mathit{tmm}^{\langle \mathit{cc},c,s\rangle}\right) + \alpha^{\mathrm{im}\,\langle \mathit{cc},c,s\rangle} \mathit{scale}^{\langle c\rangle\,-1} \mathit{scale}^{\langle \mathit{cc}\rangle} \theta^{\mathrm{im}\,\langle c,s\rangle} p^{\mathrm{imp}\,\langle c,s\rangle} \left(1 + \mathit{iceberg}^{\mathrm{cost}\,\langle \mathit{cc},c,s\rangle}\right) \left(\mathit{scale}^{\langle c\rangle\,-1} \mathit{scale}^{\langle \mathit{cc}\rangle} \mathit{IM}^{\langle \mathit{cc},c,s\rangle} \left(1 + \mathit{ice} \right.\right. \tag{9.68}$$

$$c \in \mathit{COUbig}: \quad s \in \mathit{SEC}: \quad \mathit{cc} \in \mathit{COU}: \quad p^{\mathrm{fob}\,\langle c,\mathit{cc},s\rangle} - p^{\mathrm{cif}\,\langle c,\mathit{cc},s\rangle} + \tau^{\langle c,\mathit{cc},s\rangle} p^{\mathrm{trans}} = 0 \tag{9.69}$$

$$c \in \mathit{COUonly}: \quad s \in \mathit{SEC}: \quad -\mathit{IMPORT}^{\langle c,s\rangle} + \theta^{\mathrm{im}\,\langle c,s\rangle} \left(\sum_{\mathit{cc} \in \mathit{COU} \setminus c} \alpha^{\mathrm{im}\,\langle \mathit{cc},c,s\rangle} \left(\mathit{scale}^{\langle c\rangle\,-1} \mathit{scale}^{\langle \mathit{cc}\rangle} \mathit{IM}^{\langle \mathit{cc},c,s\rangle} \left(1 + \mathit{iceberg}^{\mathrm{cost}\,\langle \mathit{cc},c,s\rangle}\right)\right)^{\sigma^{\mathrm{im}\,\langle s\rangle\,-1} \left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)} \right)^{\sigma^{\mathrm{im}\,\langle s\rangle} \left(-1+\sigma^{\mathrm{im}\,\langle s\rangle}\right)^{-1}} = 0 \tag{9.70}$$

$$c \in \mathit{COUonly}: \quad s \in \mathit{SEC}: \quad \pi^{\mathrm{imp}\,\langle c,s\rangle} + \mathit{scale}^{\langle c\rangle\,-1} \left(\sum_{\mathit{cc} \in \mathit{COU}} \mathit{scale}^{\langle \mathit{cc}\rangle} p^{\mathrm{cif}\,\langle \mathit{cc},c,s\rangle} \mathit{IM}^{\langle \mathit{cc},c,s\rangle} \left(1 + \mathit{tmm}^{\langle \mathit{cc},c,s\rangle}\right)\right) - p^{\mathrm{imp}\,\langle c,s\rangle} \mathit{IMPORT}^{\langle c,s\rangle} = 0 \tag{9.71}$$

$$c \in \mathit{COUonly}: \quad s \in \mathit{SEC}: \quad -\mathit{scale}^{\langle c\rangle} \mathit{IM}^{\langle c,c,s\rangle} = 0 \tag{9.72}$$

$$c \in \mathit{COUonly}: \quad s \in \mathit{SEC}: \quad \mathit{cc} \in \mathit{COU}: \quad \mathit{EX}^{\langle \mathit{cc},c,s\rangle} - \mathit{IM}^{\langle \mathit{cc},c,s\rangle} = 0 \tag{9.73}$$

$$c \in \mathit{COUonly}: \quad s \in \mathit{SEC}: \quad \mathit{cc} \in \mathit{COU}: \quad p^{\mathrm{fob}\,\langle c,\mathit{cc},s\rangle} - p^{\mathrm{cif}\,\langle c,\mathit{cc},s\rangle} + \tau^{\langle c,\mathit{cc},s\rangle} p^{\mathrm{trans}} = 0 \tag{9.74}$$

$$c \in \mathit{COUonly}: \quad s \in \mathit{SEC}: \quad \mathit{cc} \in \mathit{COU} \setminus c: \quad -\mathit{scale}^{\langle c\rangle\,-1} \left(\sum_{\mathit{cc}' \in \mathit{COU}} \delta^{\langle \mathit{cc},\mathit{cc}'\rangle} \mathit{scale}^{\langle \mathit{cc}'\rangle} p^{\mathrm{cif}\,\langle \mathit{cc}',c,s\rangle} \left(1 + \mathit{tmm}^{\langle \mathit{cc}',c,s\rangle}\right)\right) + \alpha^{\mathrm{im}\,\langle \mathit{cc},c,s\rangle} \mathit{scale}^{\langle c\rangle\,-1} \mathit{scale}^{\langle \mathit{cc}\rangle} \theta^{\mathrm{im}\,\langle c,s\rangle} p^{\mathrm{imp}\,\langle c,s\rangle} \left(1 + \mathit{iceberg}^{\mathrm{cost}\,\langle \mathit{cc},c,s\rangle}\right) \left(\mathit{scale}^{\langle c\rangle\,-1} \right. \tag{9.75}$$

10 Parameter settings

$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC1}\rangle} = 0 \tag{10.1}$$

$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC2}\rangle} = 0 \tag{10.2}$$

$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC3}\rangle} = 0 \tag{10.3}$$

$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC4}\rangle} = 0 \tag{10.4}$$

$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC5}\rangle} = 0 \tag{10.5}$$

$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC6} \rangle} = 0 \tag{10.6}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC7} \rangle} = 0 \tag{10.7}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU1,COU1,SEC8} \rangle} = 0 \tag{10.8}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC1} \rangle} = 0 \tag{10.9}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC2} \rangle} = 0 \tag{10.10}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC3} \rangle} = 0 \tag{10.11}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC4} \rangle} = 0 \tag{10.12}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC5} \rangle} = 0 \tag{10.13}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC6} \rangle} = 0 \tag{10.14}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC7} \rangle} = 0 \tag{10.15}$$
$$\alpha^{\mathrm{im}\,\langle \mathrm{COU2,COU2,SEC8} \rangle} = 0 \tag{10.16}$$
$$\phi^{\langle \mathrm{COU1} \rangle} = 0.25 \tag{10.17}$$
$$\phi^{\langle \mathrm{COU2} \rangle} = 0.25 \tag{10.18}$$
$$\phi^{\langle \mathrm{COU3} \rangle} = 0.25 \tag{10.19}$$
$$\phi^{\langle \mathrm{COU4} \rangle} = 0.25 \tag{10.20}$$
$$L^{\mathrm{slack}\,\langle \mathrm{COU1} \rangle} = 0 \tag{10.21}$$
$$L^{\mathrm{slack}\,\langle \mathrm{COU2} \rangle} = 0 \tag{10.22}$$
$$L^{\mathrm{slack}\,\langle \mathrm{COU3} \rangle} = 0 \tag{10.23}$$
$$L^{\mathrm{slack}\,\langle \mathrm{COU4} \rangle} = 0 \tag{10.24}$$