tiprise_2024_1_30.dfw

#1: CaseMode := Sensitive

#2: InputMode := Word

#3: $nt :\in Real\ (0, \infty)$

#4: $nht1 :\in Real\ (0, \infty)$

#5: $nlt :\in Real\ (0, \infty)$

#6: $nlt :\in Real\ (0, \infty)$

#7: $nht1 :\in Real\ (0, \infty)$

#8: $nlt1 :\in Real\ (0, \infty)$

eq (1)

#9: $rht = (1 + \mu h)\cdot rt1$

#10: $rlt = (1 - \mu l)\cdot rt1$

eq (2)

#11: $nt = (1 + \eta - \lambda)\cdot nt1$

eq (3) in paper

#12: $nht = nht1 + \eta\cdot\phi\cdot nt1 - \lambda\cdot nht1$

#13: $nht = nht1 + \eta\cdot\phi\cdot(nht1 + nlt1) - \lambda\cdot nht1$

#14: $$nht = nht1\cdot(\eta\cdot\phi - \lambda + 1) + nlt1\cdot\eta\cdot\phi$$

#15: $nlt = nlt1 + \eta\cdot(1 - \phi)\cdot nt1 - \lambda\cdot nlt1$

#16: $nlt = nlt1 + \eta\cdot(1 - \phi)\cdot(nht1 + nlt1) - \lambda\cdot nlt1$

#17: $nlt = nht1\cdot\eta\cdot(1 - \phi) - nlt1\cdot(\eta\cdot(\phi - 1) + \lambda - 1)$

verify sum up to nt in eq (2)

#18: $nht + nlt = nht1 + \eta\cdot\phi\cdot nt1 - \lambda\cdot nht1 + nlt1 + \eta\cdot(1 - \phi)\cdot nt1 - \lambda\cdot nlt1$

#19: $nht + nlt = nht1\cdot(1 - \lambda) + nlt1\cdot(1 - \lambda) + nt1\cdot\eta$

eq (4) avg tipping rate at t

#20: $$rt = \frac{nht\cdot rht + nlt\cdot rlt}{nht + nlt}$$

#21: $$rt = \frac{nht\cdot((1 + \mu h)\cdot rt1) + nlt\cdot((1 - \mu l)\cdot rt1)}{nht + nlt}$$

#22: $$rt = \frac{rt1\cdot(nht\cdot(\mu h + 1) + nlt\cdot(1 - \mu l))}{nht + nlt}$$

Result 1 and eq (5)

rt > rt1 if

#23: $$\frac{nht\cdot(\mu h + 1) + nlt\cdot(1 - \mu l)}{nht + nlt} > 1$$

#24: $$\mathrm{SOLVE}\left(\frac{nht\cdot(\mu h + 1) + nlt\cdot(1 - \mu l)}{nht + nlt} > 1,\ \mu h\right)$$

#25: $$\mathrm{IF}\left(\frac{nht}{nht + nlt} < 0,\ \mu h < \frac{nlt\cdot\mu l}{nht}\right) \vee \mathrm{IF}\left(\frac{nht}{nht + nlt} > 0,\ \mu h > \frac{nlt\cdot\mu l}{nht}\right)$$

eq (6)

#26: $\mu h > \dfrac{nlt \cdot \mu l}{nht}$

*** Section 3: Model calibrations and simulations

eq (7) symmetric μ

#27: $rt = \dfrac{rt1 \cdot (nht \cdot (\mu + 1) + nlt \cdot (1 - \mu))}{nht + nlt}$

#28: $rt = \dfrac{rt1 \cdot (\mu \cdot (nht - nlt) + nht + nlt)}{nht + nlt}$

*** subsection 4.1: Utility formulation

#29: $\alpha :\in \text{Real } (0, 1)$

#30: $\beta :\in \text{Real } (0, 1)$

#31: $\gamma :\in \text{Real } (0, \infty)$

#32: $py :\in \text{Real } (0, \infty)$

#33: $y :\in \text{Real } (0, \infty)$

#34: $\tau :\in \text{Real } (0, \infty)$

#35: $\Delta\tau :\in \text{Real } (0, \infty)$

consumer's objective function, eq (9) in paper [class of...]

#36: $u = I - y \cdot py \cdot (1 + \tau + \Delta\tau) + y^{\alpha} + \gamma \cdot (\tau + \Delta\tau)^{\beta}$

eq (10) and (11) FOCs

#37: $\frac{d}{dy}\left(u = I - y\cdot py\cdot(1 + \tau + \Delta\tau) + y^{\alpha} + \gamma\cdot(\tau + \Delta\tau)^{\beta}\right)$

#38: $$0 = \alpha\cdot y^{\alpha - 1} - py\cdot(\Delta\tau + \tau + 1)$$

#39: $\frac{d}{d\ \Delta\tau}\left(u = I - y\cdot py\cdot(1 + \tau + \Delta\tau) + y^{\alpha} + \gamma\cdot(\tau + \Delta\tau)^{\beta}\right)$

#40: $$0 = \beta\cdot\gamma\cdot(\Delta\tau + \tau)^{\beta - 1} - py\cdot y$$

eqs (12) SOCs

#41: $\frac{d}{dy}\frac{d}{dy}\left(u = I - y\cdot py\cdot(1 + \tau + \Delta\tau) + y^{\alpha} + \gamma\cdot(\tau + \Delta\tau)^{\beta}\right)$

#42: $$0 = \alpha\cdot y^{\alpha - 2}\cdot(\alpha - 1)$$

#43: $\frac{d}{d\ \Delta\tau}\frac{d}{d\ \Delta\tau}\left(u = I - y\cdot py\cdot(1 + \tau + \Delta\tau) + y^{\alpha} + \gamma\cdot(\tau + \Delta\tau)^{\beta}\right)$

#44: $$0 = \beta\cdot\gamma\cdot(\Delta\tau + \tau)^{\beta - 2}\cdot(\beta - 1)$$

#45: $\frac{d}{d\ \Delta\tau}\frac{d}{dy}\left(u = I - y\cdot py\cdot(1 + \tau + \Delta\tau) + y^{\alpha} + \gamma\cdot(\tau + \Delta\tau)^{\beta}\right)$

#46: $$-py$$

#47: $\frac{d}{dy}\frac{d}{d\ \Delta\tau}\left(u = I - y\cdot py\cdot(1 + \tau + \Delta\tau) + y^{\alpha} + \gamma\cdot(\tau + \Delta\tau)^{\beta}\right)$

#48: $-py$

#49: $H = (\alpha \cdot y^{\alpha - 2} \cdot (\alpha - 1)) \cdot (\beta \cdot \gamma \cdot (\Delta\tau + \tau)^{\beta - 2} \cdot (\beta - 1)) - (-py)^2$

#50: $$H = \alpha \cdot \beta \cdot \gamma \cdot y^{\alpha - 2} \cdot (\Delta\tau + \tau)^{\beta - 2} \cdot (\alpha - 1) \cdot (\beta - 1) - py^2$$

eq (13)

#51: $\mathrm{SOLVE}(0 = \beta \cdot \gamma \cdot (\Delta\tau + \tau)^{\beta - 1} - py \cdot y,\ y)$

#52: $$y = \frac{\beta \cdot \gamma \cdot (\Delta\tau + \tau)^{\beta - 1}}{py}$$

#53: $0 = \alpha \cdot \left( \frac{\beta \cdot \gamma \cdot (\Delta\tau + \tau)^{\beta - 1}}{py} \right)^{\alpha - 1} - py \cdot (\Delta\tau + \tau + 1)$

#54: $\mathrm{SOLVE}\left( 0 = \alpha \cdot \left( \frac{\beta \cdot \gamma \cdot (\Delta\tau + \tau)^{\beta - 1}}{py} \right)^{\alpha - 1} - py \cdot (\Delta\tau + \tau + 1),\ \gamma \right)$

#55: $$\gamma = \frac{py^{\alpha/(\alpha - 1)} \cdot (\Delta\tau + \tau)^{1 - \beta} \cdot \left( \frac{\Delta\tau + \tau + 1}{\alpha} \right)^{1/(\alpha - 1)}}{\beta}$$