wres

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Model : ① focus is on taxes & monetization
if taxes do not ↑ ⇒ ↑ money to pay for deficits ⇒ ↑ debt ⇒ ↑ inflation
② Costs to maintaining pol. stance (status quo)
③ Heterogeneity in policy

Time: Continuous

Economy: $t < 0$ balanced budget

$t = 0$ shocks $\Rightarrow b_0 \geq 0$ debt

g_0: gov't expend at $t=0$

$$\left.\begin{matrix} (1-\gamma) & \text{debt} \\ \gamma & \text{tax} \end{matrix}\right\} \text{expenditure}$$

$$\underset{\substack{\uparrow \\ \Delta \text{ in debt}}}{\dot{b}(t)} = (1-\underset{\substack{\uparrow \\ \text{deficit}}}{\gamma})[r\underbrace{b(t)+g_0}_{\text{total gov't spending}}] \qquad (1)$$

$$\underset{\substack{\uparrow \\ \text{taxes}}}{\tau(t)} = \underset{\substack{\uparrow \\ \text{prop. taxes}}}{\gamma}[r\underbrace{b(t)+g_0}_{\text{total gov't spending}}] \qquad (2)$$

Using $\boxed{T.O.D.}$ =

$$b(t) = b_0 e^{(1-\gamma)rt} + \frac{g_0}{r}\left(e^{(1-\gamma)rt} - 1\right) \quad (3)$$

assume $g^t = g_0 \; \forall t$

↖ actual debt

Not going to show this (subst ~~z~~ (3) ⇒ (2))

$$\tau(t) = \gamma r \bar{b} e^{(1-\gamma)rt} \qquad \bar{b} = b_0 + g_0/r \qquad (4)$$

↖ actual tax

Notice taxes ↑ if rate of finance ↑

for $\boxed{\text{stabilization}}$ ⇒ ↑ in taxes to prevent ↑ in debt

post stab. expenditures

$$\Rightarrow \quad \tau(T) = r b(T) + g_T \qquad \text{by } \cancel{\gamma = 1} \text{ substituting}$$

by (3) + (4) ⇒ if $g^T = g^0$ (assume)

$$\tau(T) = r\bar{b}e^{(1-\gamma)rT}$$

> this is stabilizin tax rate

See Below

Payoffs: utility loss from distortionary taxes

i's ~~degree of loss~~ ~~loss~~ is $\boxed{\theta_i}$ — private info. $\theta \sim F(\theta)$ $\quad F(\theta) \sim [\underline{\theta}, \bar{\theta}]$

$$K_i(t) = \theta_i \tau(t)$$

} so it is ↑ in taxrate

K_i ↑ utility loss

θ_i ↑ rate of loss — borne by diff people diff

$\tau(t)$ ↑ tax rate (actual tax)

$$u_i(t) = C_i(t) - \boxed{y} - K_i(t)$$

$K_i(t)$ ← heterogeneity (cost from tax)

$C_i(t)$ ↗ consumption

y ↑ normalization constant across all indiv'a

Note: ① y

② No g u

not source of het

[cover]

Players: 2 groups $i = 1, 2$

Allocation after stabilization: $\alpha > 1/2$ s.t. $\tau(t)$ → α → loser; → $(1-\alpha)$ → winner

① α is fixed

② post-stabilization taxes are less distortionary

- steps: (1) write down lifetime (intertemporal) b.c.'s
(budget constraint)

Ex: Loser

$$\underbrace{\int_0^T c^D(x)e^{-rx}dx}_{\text{cons. during destab.}} + \underbrace{\int_T^\infty c^L(x)e^{-rx}dx}_{\text{consump after stab.}}$$

$$= \underbrace{\int_0^T \left(y - \tfrac{1}{2}\gamma r\bar{b}e^{(1-\gamma)rx}\right)e^{-rx}dx}_{} + \underbrace{\int_T^\infty \left(y - \alpha r\bar{b}e^{(1-\gamma)rT}\right)}_{}e^{-rx}dX$$

cons.
const before
level of tax
× budget def.
+ exp.

cons const after
level of tax

(2) solve for consump. path. c^D, c^L, c^W

$$c^D(t) = y - \frac{\gamma}{2}r\bar{b}e^{(1-\gamma)rT}$$

(3) solve utility u_i^D (before) – function of θ_i

$$u_{i\infty} = \frac{u_t}{1-\delta}$$

(4) after stabilization

$$V^j = u_\infty^j / r \Leftarrow \text{discounted value}$$

(5) calculate using $u_i(t) = c_i(t) - y - K_i(t)$
and $c^D(t), c^L(t), c^W(t)$

get $\boxed{V^W(T) \underset{\Delta^{WL}}{-} V^L(T) = (2\alpha - 1)\bar{b}e^{(1-\gamma)rT}}$

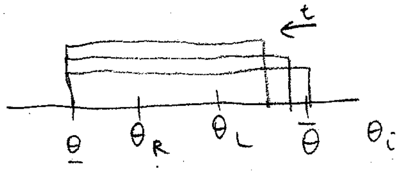
diff. in being a winner and a loser

Basically want to get to this point - I didn't even go through it too carefully.

① difference (Δ^{WL}) ↑ in α
② Δ^{WL} ↑ in $\bar{b}$
③ Δ^{WL} ↑ in $1-\gamma$

rategies: 1) Choose when to concede ← this is the stopping time
2) Consumption

Solutions:



$Pr(\theta_i \leq \theta_i)$

over time, reveal type by lack of concession

Let $u^P(t) \equiv$ be pre-stabilization utility

$V^j(t) \equiv$ post-stab utility $\quad j = W, L$

winner loser

$$\Rightarrow U^j(T) = \int_0^T u^P(x) e^{-rx} dx + e^{-rt} V^j(T) \qquad j = W, L$$

util of winner at time T

pre-stab utility

discount

discount at t

value

$$EU(T_i) = [1 - H^*(T_i)] U^L(T_i) + \int_0^{T_i} U^W(x) h(x) dx \qquad (8)$$

EU of player stopping T_i

losing

Prob. opp's. s.t. $> T_i$
opponent stop before you do

utility of losing w/ $T_i = T_i$

until you stop

value of winning

Prob. win other (concede before you do

dist stopping times before you

So optimal strat. for i is

$$\max_{\{c_{it}\}, T_i} EU(T_i)$$

use:
① linear utility ⇒ any c satisfying the intertemporal budget constraint is optimal
② $\frac{1}{2}, \frac{1}{2}$ split of pre-stabilization losses

5: Now have all we need for und. what makes people ~~[illegible]~~ stop. when accept ~~[illegible]~~ <u>loser</u>? $T_i(\theta_i)$

<u>lemma 1</u>. $\dfrac{\partial T_i^*(\theta)}{\partial \theta} < 0$

write down EU and solve: just diff. EU earlier

$$\frac{\partial EU}{\partial T_i} = e^{-rT_i}\left\{ h(T_i)\left[V^w(T_i) - V^L(T_i)\right] + (1-H(T_i))\right] \left[u_i^D(T_i) - rV^L(T_i) + \frac{\partial V^L(T_i)}{\partial(T_i)}\right]\right\}$$

substitute: $V^w(T)$, $V^L(T)$ and $u_i^D(t)$

diff w.r.t θ_i

$\partial^2 EU / \partial T_i \partial \theta_i < 0$ ⇒ <u>your EU</u> ~~[illegible]~~ ↓ as T_i ↑ w/ ↑ θ_i

→ optimal T_i is ↓ in θ_i

[illegible]

NE Steps: ① write down $EU(\theta_i) = Pr(\theta_i < \theta_j)[EU(\theta_i < \theta_j)] + Pr(\theta_i > \theta_j)[EU(\theta_i > \theta_j)]$

look for symmetric equi.

$\{T_1^*(\theta), T_2^*(\theta)\}$

$T_1^*(\theta) = T_2^*(\theta)$

② differentiate with respect to θ_i

③ set $\theta_i = \theta_j$ to get symmetry

④ Result

hazard rate of concession

change in time for conceding w.r.t. to time

ongoing value of winning vs. losing Δ^{WL}

cost of waiting

$\boxed{MB = MC}$

$$\left[-\frac{f(\theta)}{F(\theta)} \frac{1}{T'(\theta)}\right] \frac{2\alpha - 1}{r} = \cancel{\delta}(\theta + \tfrac{1}{2} - \alpha)$$

and $T(\bar{\theta}) = 0$

highest type stops right away

$T(\bar{\theta}) = 0$

Interpretation

① MB, MC

② Need $\underline{\theta} > \alpha - \frac{1}{2}$

③ dynamics - "walking down the θ scale"

④ ⇒ Delay

w/② ⇒ "inefficient" delay (in pareto sense)

⑤ Optimal to act immediately if θ known

⑥ Sources of delay

- heterogeneity (θ)
- destabilization (α)
- incomplete information

⑦ Comparative statics

$$\frac{\partial T_i^*(\theta)}{\underset{\uparrow}{\partial \gamma}} < 0$$

↑ population taxed ⇒ stabilization faster