Positive Long Run Capital Taxation: Chamley-Judd Revisited

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Motivation

Chamley-Judd result:

- Suppose some endog. objects converge to an interior s.s.
- Then capital tax $\to 0$

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- Suppose some endog. objects converge to an interior s.s.
- Then capital tax $\to 0$

Show that some endogenous objects don't converge

Model

Two models:

1. Judd (1985): Capitalists/Workers, Workers don't save

   Goal: Tax Capitalists to redistribute to Workers

2. Chamley (1986): Rep. Agent, bounds on capital tax

   Goal: Tax Agent to finance g_t/debt

Results (Judd 1985)

Very nice and clean intuition:

- Exploit income effect to lower C_t and raise k_{t+1}
- IES < 1: Anticipation of higher future taxes $\rightarrow$ lower C_t
  - Increasing taxes cannot converge to 0
- IES > 1: Anticipation of lower future taxes $\rightarrow$ lower C_t
  - But transition is very long

Results (Chamley 1986)

$$\max_{c,n} \sum_{t=0}^{\infty} \beta^t \left[u\left(c_t\right) - v\left(n_t\right) \right]$$

subject to

$$c_t + g + k_{t+1} \leq F\left(k_t, n_t\right) + \left(1 - \delta\right) k_t$$

$$\sum_{t=0}^{\infty} \beta^t \left[u'\left(c_t\right) c_t - v'\left(n_t\right) n_t \right] = u'\left(c_0\right) \left(R_0 k_0 + R_0^b b_0 \right)$$

$$u'\left(c_t\right) \geq \beta u'\left(c_{t+1}\right)$$

Results (Chamley 1986)

If $\beta^t u'(c_t)\,\Lambda_t$ is the Lagrange multiplier on RC

$$\underbrace{F_1'(k_{t+1}, n_{t+1}) + 1 - \delta}_{MRT} = \underbrace{\frac{u'(c_t)}{\beta u'(c_{t+1})}}_{MRS^{private}} \left(1 + \frac{\Lambda_t - \Lambda_{t+1}}{\Lambda_{t+1}}\right)$$

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In general,

$$MRS^{social}_{t,t+1} \neq MRS^{private}_{t,t+1}$$

But if we assume $\Lambda_t \to \Lambda > 0$, then in the long-run

$$MRS^{social}_{t,t+1} = MRS^{private}_{t,t+1}$$

Results (Chamley 1986)

But if IES < 1 and high initial debt

$$\Lambda_t \to 0$$

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But if IES < 1 and high initial debt

$$\Lambda_t \to 0$$

- capital tax = upper bound forever!
- no interior steady state exists

$$u'(c_t) = \beta u'(c_{t+1}) < u'(c_{t+1})$$

$$c_t > c_{t+1}$$

Comments

Steady state

Judd (1985): when $\sigma > 1$ (and $g = 0$)

- Consumption (including Workers') and capital $\to 0$

Chamley (1986): when $\sigma > 1$ and enough initial debt

- Consumption and capital $\to 0$

Comments

To exploit income effect (with IES < 1) need rising future taxes

This eventually lowers capital

and thus consumption

- Are these implications realistic?
- Is this a good model for capital taxation?

Comments

Taxes

- The paper shows that τ_K might $=$ upper bound forever
- Bounds on τ_K translate into bounds on *changes* of consumption taxes
- From Diamond-Mirrlees optimal τ_C is constant
- Are these bounds realistic?

Comments

Suppose I_t can be deducted from the tax base (Abel 2007):

$$r_t\, k_t + \underbrace{(1-\delta)\, k_t - k_{t+1}}_{-I_t}$$

in the model is

$$r_t\, k_t + (1-\delta)\, k_t$$

(or capital tax + investment subsidy)

Intertemporal margin:

$$\underbrace{F_1'\left(k_{t+1}, n_{t+1}\right) + 1 - \delta}_{MRT} = \underbrace{\frac{u'\left(c_t\right)}{\beta u'\left(c_{t+1}\right)}}_{MRS^{private}} \left(\frac{1-\tau_{K,t+1}}{1-\tau_{K,t}}\right)$$

Comments

- If τ_K is constant then IM is not distorted!
- Higher welfare than in Chamley
- If it generates enough revenues

  $\rightarrow$ labor tax is 0 for every t