ECON 421

Seignorage

Winter 2015

Seignorage

Gov't prints money to buy goods (for useless pyramids).

$$G(t) = \frac{M_t - M_{t-1}}{p(t)} = \left(1 - \frac{1}{\mu}\right)\frac{M_t}{p(t)}$$

There is no transfer to the household anymore.

Two effects:

- Inflation distorts the HH's decisions.
- Gov't purchases lower the amount of goods available for private consumption.

We can view money then as gov't debt that circulates among people forever and never gets paid back.

Impact of Gov't Spending

There is no transfer of money to the old so that their budget constraint remains

$$p(t+1)c_t(t+1) \le m_t$$

The supply of money comes from both, the old and the government, in exchange for goods.

From money market clearing, we obtain money demand

$$\begin{aligned} N_t m_t &= \underbrace{M_{t-1}}_{\text{old}} + \underbrace{(\mu - 1)M_{t-1}}_{\text{gov't}} \\ &= N_{t-1}m_{t-1} + p(t)G(t) \\ m_t &= \frac{p(t)c_t(t-1)}{n} + p(t)g(t) \end{aligned}$$

From the budget constraint

$$p_t c_t(t) + m_t \quad = \quad p_t y$$

we get the market clearing condition

$$c_t(t) + \left(\frac{1}{n} c_{t-1}(t) + g\right) \quad = \quad y_t.$$

Public spending crowds out private consumption.

With stationarity, we thus have for market clearing

$$c_1 + \frac{1}{n} c_2 = y - g.$$

and intertemporal prices follow from the budget constraints when old

$$\frac{p_{t+1}}{p_t} \frac{c_2}{c_2} = \frac{\frac{M_t}{N_t}}{\frac{M_{t-1}}{N_{t-1}}} = \frac{\mu}{n}.$$

Perfect Foresight Equilibrium

- perfect foresight
$$\pi = \frac{\mu}{n}$$
- optimality
$$\frac{\beta u'(c_2)}{u'(c_1)} = \pi$$
- gov't spending
$$g = \left(1 - \frac{1}{\mu}\right)\frac{M_t}{N_t p_t} = \left(1 - \frac{1}{\mu}\right)(y - c_1)$$
- market clearing
$$c_1 + \frac{1}{n} c_2 = y - g$$

ADD GRAPH

Lump-sum Taxes are better

Lump-sum tax $\tau_{t-1}(t)$ on the old people to finance gov't consumption

$$G_t = N_{t-1}\tau_{t-1}(t)$$

or

$$\tau_{t-1}(t) = \frac{G_t}{N_{t-1}} = n\frac{G_t}{N_t} = ng.$$

Budget constraints:

$$\begin{aligned} p_t c_t(t) + m_t &\leq p_t y \\ p_{t+1} c_t(t+1) + p_{t+1}\tau_{t+1} &\leq m_t \end{aligned}$$

Intertemporal budget constraint with stationarity

$$\begin{aligned} c_1 + \frac{p_{t+1}}{p_t}(c_2 + \tau) &= y \\ c_1 + \frac{1}{n}c_2 &= y - g \end{aligned}$$

Perfect Foresight Equilibrium

$$\begin{aligned} \frac{\beta u'(c_2)}{u'(c_1)} &= \pi = \frac{1}{n} \\ c_1 + \frac{1}{n} c_2 &= y - g \end{aligned}$$

Lump-sum taxes reduce wealth, but they do not distort intertemporal savings.

ADD GRAPH

Limits to Seignorage

$$G_t = \left(1 - \frac{1}{\mu}\right) \frac{M_t}{p_t}$$

- tax rate: $1 - 1/\mu$ increasing in μ
- tax base: M_t/p_t decreasing in μ

  Why? FOC gives

$$\frac{\beta u'(c_2)}{u'(c_1)} = \frac{\mu}{n}$$

Hence, we have a so-called "Laffer-curve"

$$G_t = \left(1 - \frac{1}{\mu}\right) N_t \left(y - c_1(\mu)\right)$$

Maximizing Gov't Revenue

$$\max_{\mu} \left(1 - \frac{1}{\mu}\right) N_t \left(y - c_1(\mu)\right)$$

"Ramsey Equilibrium":

- reaction function $c_1(\mu)$
- people change their decisions in response to μ