ECON 421

Inflation

Winter 2015

Monetary Policy

Let $\mu \in (0, \infty)$ be the growth rate of money

$$M_{t+1} = \mu M_t.$$

Change in the money supply

$$\Delta M_{t+1} = M_{t+1} - M_t = (\mu - 1) M_t$$

- transfer of money to the old generation, $a_t(t+1)$
- lump-sum (helicopter drop)
- independent of money holdings
- fully anticipated

Hence: $a_t(t+1) = (\mu - 1)\frac{M_t}{N_t}$

Household Problem

$$\max_{c_t(t),c_t(t+1),m_t} u(c_t(t), c_t(t+1))$$

subject to

$$p(t)c_t(t) + m_t \leq p(t)y$$

$$p^e(t+1)c_t^e(t+1) \leq m_t + a_t(t+1)$$

Transfer $a_t(t+1)$ has a wealth effect

$$c_t(t) + \frac{p^e(t+1)}{p(t)} c_t(t+1) \leq y + \frac{p^e(t+1)}{p(t)} \frac{a_t(t+1)}{p^e(t+1)}$$

Monetary policy has two effects:

- Substitution effect: $\pi^e(t) = \frac{p^e(t+1)}{p(t)}$
- Income effect: $\pi^e(t)w^e(t+1)$

Expected wealth transfer in real terms:

$$w^e(t+1) = \frac{a_t(t+1)}{p^e(t+1)}$$

Expected transfer in real terms at current (period t) prices:

$$\pi^e(t)w^e(t+1) = \frac{a_t(t+1)}{p(t)} = (\mu - 1)\frac{M_t}{N_t}\frac{1}{p(t)}$$

Perfect Foresight Equilibrium

Intertemporal budget constraint

$$c_t(t) + \frac{p(t+1)}{p(t)} c_t(t+1) = y + (\mu - 1)\frac{M_t}{N_t}\frac{1}{p(t)}$$

Money market clearing

$$\frac{M_{t+1}}{M_t} = \frac{N_{t+1}}{N_t}\frac{p(t+1)}{p(t)}\frac{y - c_{t+1}(t+1)}{y - c_t(t)}$$

With stationarity

$$\pi = \frac{p(t+1)}{p(t)} = \frac{\mu}{n}$$

and

$$\begin{aligned} c_1 + \frac{\mu}{n} c_2 &= y + (\mu - 1)(y - c_1) \\ c_1 + \frac{1}{n} c_2 &= y \end{aligned}$$

Summary

- optimality

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

- perfect foresight

$$\pi^e(t) = \pi(t) = \frac{p(t+1)}{p(t)} = \frac{\mu}{n}$$

- market clearing

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

ADD GRAPH

Conclusion

1. With rational expectations, there is no wealth effect in real terms, hence no income effect.

2. There is a pure substitution effect as intertemporal prices are distorted.

3. Inflation (deflation), $\mu > 1$ ($\mu < 1$), imposes a distortionary tax on savings (current consumption).

4. Prices increase 1-1 with the rate of money growth.

5. Allocations with $\mu > 1$ are not pareto-optimal.