Econ 204A: Section 6 Supplemental

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Fiscal Policy

Fiscal Policy: Taxation

- Fiscal policy focuses on how the government finances what kinds spending (i.e. taxes)

- Two types of taxes:
  1) Non-distortionary
  2) Distortionary

- Lump-sum taxes don't affect prices and therefore individual decisions
  - Second Welfare Theorem applies
  - Focus on planner's problem

- Marginal taxes affect prices and therefore decisions
  - Second Welfare Theorem no longer holds
  - Focus on household's problem

$$\dot{a} = w(t) + (1 - \tau) \cdot r(t) \cdot a(t) - c(t) - T$$

Fiscal Policy: Lump-Sum Taxes

Suppose that we are in a standard Ramsey economy, however, with an exogenous public sector that funds spending through lump sum taxation and no population or productivity growth.

$$H = e^{-\rho t} u(c) + \lambda[f(k) - \delta k - c - G] \qquad H = e^{-\rho t} u(c) + \lambda[w + r \cdot a - c - T]$$

$$\Rightarrow \frac{\dot{c}}{c} = \frac{\overbrace{f'(k) - \delta}^{r} - \rho}{\theta} \qquad \Rightarrow \frac{\dot{c}}{c} = \frac{r - \rho}{\theta}$$

and

$$\dot{k} = f(k) - \delta k - c - G \qquad \dot{a} = w + r \cdot a - c - T$$

Using the CRS property of $f(\cdot)$ and that $G = T$, the asset equation aggregates into the capital equation.

Social planner's problem = households problem!

To endogenize G, just define $\tilde{c} = c + G$ in SP problem

Fiscal Policy: Lump-Sum Taxes

Suppose that there is an exogenous public sector in a ramsey economy with no population or productivity growth. Describe the affects of the following two policies.

1. At time t_0, the government announces that it will increase spending (through taxes) permanently.

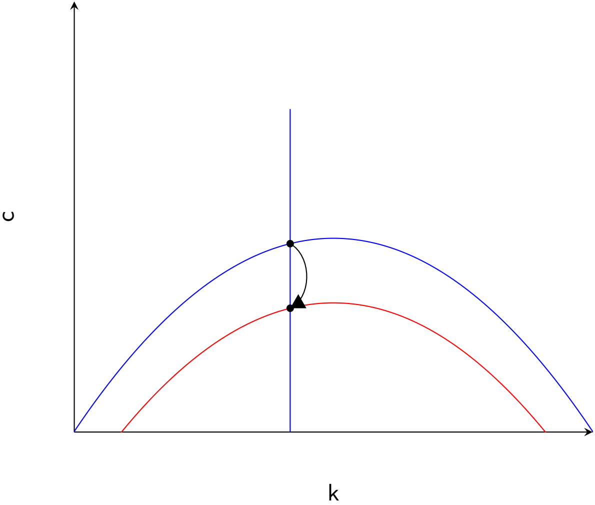
$$\dot{k} = 0 \qquad\qquad \dot{c} = 0$$

$$\Leftrightarrow c = f(k) - \delta k - G \qquad\qquad \Leftrightarrow f'(k^*) = \delta + \rho$$

- $\dot{k} = 0$ decreases (no contraction)
- $\dot{c} = 0$ locus doesn't change
- c immediately jumps down to new steady state

Fiscal Policy: Lump-Sum Taxes

In this case, we can decrease consumption and reach the new steady state instantaneously. This works because the lump sum taxes works only through the budget constraint.



Fiscal Policy: Lump-Sum Taxes

2) At time t_0, the government announces a temporary increase in government spending (through taxes) that will end at t_0.

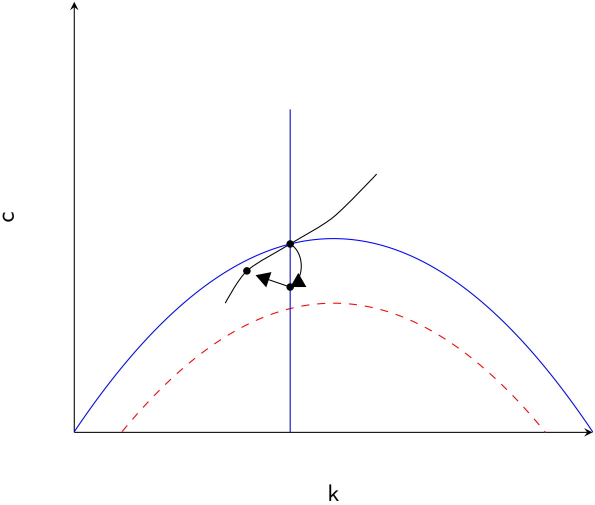
$$\dot{k} = 0 \qquad\qquad \dot{c} = 0$$

$$\Leftrightarrow c = f(k) - \delta k - G \qquad\qquad \Leftrightarrow f'(k^*) = \delta + \rho$$

- $\dot{k} = 0$ locus first shifts down then back up
- $\dot{c} = 0$ locus doesn't change
- Consumption smoothing consumers adjust behavior only once
- Adjust consumption to end up at the FINAL steady-state

Fiscal Policy: Lump-Sum Taxes

Partially decrease consumption so that you end up on the saddle path once the $\dot{k} = 0$ locus returns to its original position.



Fiscal Policy: Marginal Taxes

Suppose that we are in a standard Ramsey economy, however, with an exogenous public sector that funds spending through capital gains taxes and no population or productivity growth.

$$H = e^{-\rho t}u(c) + \lambda[f(k) - \delta k - c - G] \qquad H = e^{-\rho t}u(c) + \lambda[w + (1-\tau)r \cdot a - c]$$

$$\Rightarrow \frac{\dot{c}}{c} = \frac{\overbrace{f'(k) - \delta}^{r} - \rho}{\theta} \qquad \Rightarrow \frac{\dot{c}}{c} = \frac{(1-\tau)r - \rho}{\theta}$$

and

$$\dot{k} = f(k) - \delta k - c - G \qquad \dot{a} = w + (1-\tau)r \cdot a - c$$

Using the CRS property of $f(\cdot)$ and that $G = \tau \cdot r \cdot k$, the asset equation aggregates into the capital equation.

Social planner's problem $\neq$ **households problem**!

To endogenize G, just define $\tilde{c} = c + G$ in SP problem

Fiscal Policy: Marginal Taxes

Let's conduct the same policy experiments as before and compare the differences between the two

1. At time t_0, the government announces that it will increase spending (through taxes) permanently.

The asset equation can be aggregated to be equivalent to the capital dynamics equation using the CRS property of $f(\cdot)$ and that $G = \tau \cdot r \cdot k$:

$$\dot{k} = 0 \qquad \Rightarrow \qquad c = f(k) - \delta k - G$$

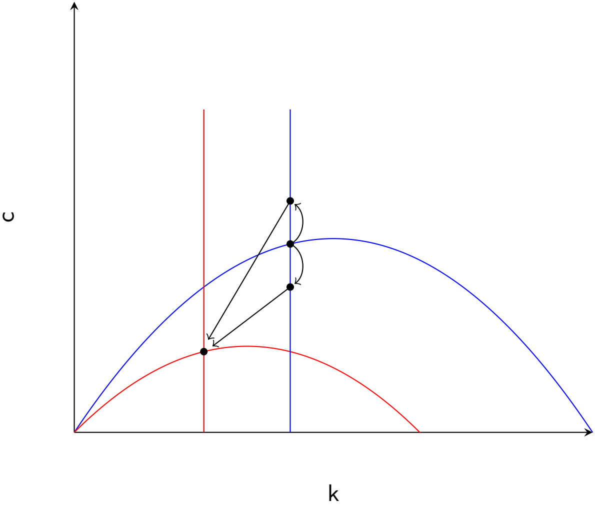
The Euler equation implies the following in equilibrium:

$$f'(k) = \frac{\rho}{1-\tau} + \delta$$

- $\dot{k} = 0$ locus contracts unlike before
- $\dot{c} = 0$ locus shifts left unlike before

Fiscal Policy: Marginal Taxes

Notice that the dynamics from a distortionary tax are quite different than a non-distortionary tax



Monetary Policy

Monetary Policy: Approaches

- Monetary policy focuses on how to regulate the (nominal) money supply in an economy

- Fiat Money: Money that has no intrinsic value
  - The *green paper* in your pocket
  - Valued because of confidence

- Commodity Money: Monet that has intrinsic value
  - Gold, silver, rocks, etc.
  - Valued because they are commodities

- Several approaches to monetary theory
  1) Money in utility $\Rightarrow$ people like money because they like money
  2) Cash in advance $\Rightarrow$ unverifiable credit; need alternative medium of exchange
  3) Money search $\Rightarrow$ double coincidence of wants problem; can't barter

Monetary Policy: Sidrauski Model

- Households have preferences over consumption and real money balances ($m = \frac{M}{p}$)

$$U = \max \int_0^\infty e^{-\rho t} u(c, m) dt$$

- Households save capital, purchase consumption, hold money, and receive transfers:

$$c + \frac{dk}{dt} + \frac{1}{p}\frac{dM}{dt} = w + r \cdot k + T$$

- Re-write budget constraint in terms of choice variables $\Rightarrow$ substitute out $\frac{dM}{dt}$:

$$\frac{dm}{dt} = \frac{1}{p}\frac{dM}{dt} - \underbrace{\frac{M}{p^2}\frac{dp}{dt}}_{m \cdot \frac{d\ln(p)}{dt}} \quad \Leftrightarrow \quad \frac{1}{p}\frac{dM}{dt} = \frac{dm}{dt} + m \cdot \pi$$

Monetary Policy: Sidrauski Model

- Simply substitute this into the budget constraint and define total assets as $a = k + m$:

$$c + \frac{da}{dt} = w + r \cdot a - \overbrace{(r + \pi)}^{nom.\ int.} \cdot m + T$$

- This is now no different than a standard optimal control problem:

$$H = e^{-\rho t} u(c, m) + \lambda[w + r \cdot a + T - (r + \pi) \cdot m - c]$$

$$\Rightarrow \lambda = e^{-\rho t} u_c \qquad \lambda = \frac{1}{r + \pi} e^{-\rho t} u_m \qquad \Longrightarrow \qquad \underbrace{\frac{u_m}{u_c} = r + \pi}_{MRS = \frac{p_1}{p_2}}$$

$$and \qquad \frac{d\lambda}{dt} = -\lambda \cdot r$$

$$Define: \quad \hat{\lambda} = \lambda \cdot e^{\rho t} \qquad \Longrightarrow \qquad \frac{d\hat{\lambda}}{dt} = \hat{\lambda}[\rho - r]$$

Monetary Policy: Neutrality

- From our definition of $\hat{\lambda}$ we see that in the steady state,

$$\hat{\lambda} = u_c(c^*, m^*) = constant \qquad \Longrightarrow \qquad r^* = \rho = f'(k^*) - \delta = constant$$

- **Money is neutral**: Changes in M have no real affect on the aggregate economy

- How does the money growth rate affect the economy?

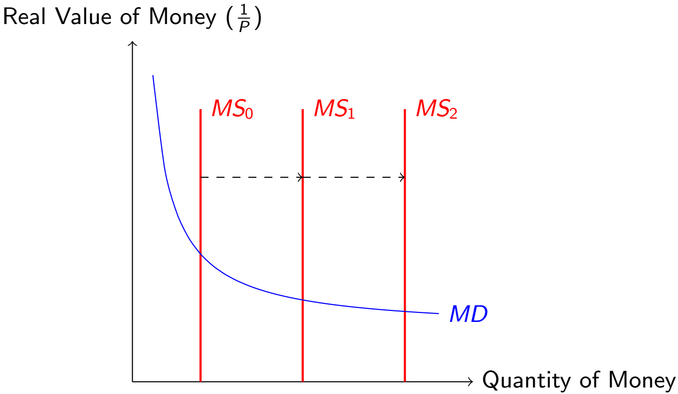
$$\frac{d\ln(m)}{dt} = \frac{d\ln(M)}{dt} - \frac{d\ln(p)}{dt} = \sigma - \pi$$

- The fact that $m^* = constant$ implies $\pi^* = \sigma$

- **Money is super-neutral**: Money growth rate *also* has no real affect on aggregate economy

Monetary Policy: Neutrality

Super neutrality can easily be represented in a supply-demand framework:



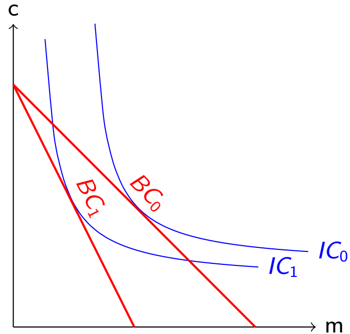
High $\sigma^* \implies \frac{1}{p}$ falls quickly $\implies p$ grows quickly $\iff$ high π^*

Monetary Policy: Friedman Rule

- But how does monetary policy affect welfare?

$$\frac{u_m(c^*, m^*)}{u_c(c^*, m^*)} = r^* + \pi^* = r^* + \sigma$$

- Some intuition from B.C: high σ^* and thus high π^* implies inward shift of instantaneous B.C.:



Friedmand Rule: High $\sigma^* \implies$ lower utility $\implies$ minimize $r^* + \sigma \implies \sigma^{opt} = -r^*$