(2020.10.24 by XU Gao)

Methodology of Equilibrium Macroeconomics

Problems in the economy
- Supply (How to produce more outputs given factor endowments?)
  - Engineering problems (natural science)
- Demand (How to find more effective demand for outputs?)
  - Economic problems (Equilibrium economics)

Methodology of Natural Science

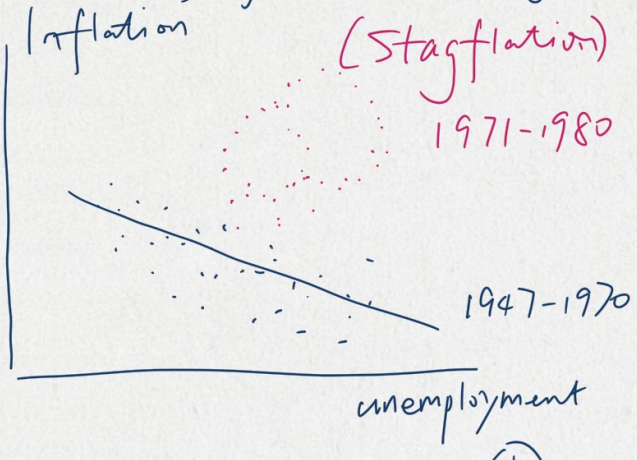
Observations (experiments) → Rules → Predictions

Example:

Brahe (Data on planetary motions)
→ Kepler (Three Laws)
→ Newton (Newtonian Mechanics)
→ Le Verrier 1846 (Discovery of Neptune)

What happened when the methodology of natural science is applied to the study of the economy?

Phillips Curve (1958)



Policeman vs. Thief

	Day 1	2	3	4	5	6
AM	*	*	*	*	*	
PM						

- Lucas Critique 1975
  - People's expectation is important (+Human minds)
  - Quantitative relationships between macro variables are unreliable.
  - Macroeconomic analysis should be based on micro-foundation (Rationality of individuals)

Real World

Reality → Human minds → Human behavior → Future
(mysterious) (unpredictable) (unforeseeable)

Imaginary World (A simplified "mirror image" of the real world — A model)

Rational People → Rational Behavior → Future
(with observable choice set) (Solution of an optimization problem) (Calculated as an equilibrium)

From Rationality to General Equilibrium

A one-period (static) general equilibrium model

- Model Setup

- Households (HH): $\max_{c,\, n^s} \log c + \log(1-n^s)$ s.t $c = wn^s + \pi - t$

  endogeneous variables for HH

  exogenous variables for HH

- Firms: $y = zn^\alpha$

  $\max_{n^d} \{z(n^d)^\alpha - wn^d\} = \pi$

  parameters

- Government $t = g$

- Equilibrium

Definition: Given g, z, α, an equilibrium of the model is $\{w, c, n^s, n^d, \pi\}$, such that

individual rationality
- (i) Given w, π, t, $\{c, n^s\}$ solves HH's problem
- (ii) Given w, z, $\{n^d\}$ solves firms' problem

logically possible
- (iii) Market clear: $n^s = n^d$, $c = z(n^d)^\alpha - g$.

- Solve the model

- HH: $\mathcal{L} = \log c + \log(1-n^s) + \lambda\left[wn^s + \pi - t - c\right]$

$$\frac{\partial \mathcal{L}}{\partial c} = 0 \Rightarrow \frac{1}{c} = \lambda$$

$$\frac{\partial \mathcal{L}}{\partial n^s} = 0 \Rightarrow \frac{1}{1-n^s} = \lambda w$$

$$\frac{1}{1-n^s} = \frac{w}{c} \Rightarrow c = w(1-n^s)$$

- Firms : FOC $\quad w = z\alpha(n^d)^{\alpha-1}$

- In equilibrium :

$$n^d = n^s \triangleq n$$

$$\begin{cases} c = zn^\alpha - g \\ w = z\alpha n^{\alpha-1} \\ c = w(1-n) \end{cases}$$

$$\Rightarrow zn^\alpha - g = z\alpha n^{\alpha-1}(1-n)$$

Homework

5.1, 5.2, 6.1

- Discussions

  - What is an equilibrium, and why it can tell us something about the real world ?
    - What the real world should look like.
      - No one has incentives to deviate from the states quo — Everyone is happy (satisfied, maximized).
      - Logically possible — No violation of physical laws.
  - Correspondence between the model and the real world.
    - Endogeneous variables vs Exogeneous variables
    - Solution of the model vs. price mechanism in the real world.