Linear Algebra

CH6

mailto:eyeofyou@korea.ac.kr

2020년 6월 30일

1 Linear Systems

General Linear Equation

General Linear Equation (multi variable)

$$\sum_{i=1}^{n} \bar{a}_i x_i = \bar{a}_1 x_1 + \bar{a}_2 x_2 + \cdots + \bar{a}_n x_n = \bar{b}$$

More elegantly,

$$\bar{\mathbf{a}} \cdot \mathbf{x} = \bar{b}, \quad \bar{\mathbf{a}} = (\bar{a}_1, \cdots, \bar{a}_n), \mathbf{x} = (x_1, \cdots, x_n)$$

Note: General Linear Equation (one variable) is:

$$\bar{a}x = \bar{b}$$

- $\bar{a}_i, \bar{b}$: parameters (given)
- x_i: variables
- Importance of linearity: Linear approximation

2 Examples of Linear Models

2.1 Markov Models of Unemployment

Ex3.Markov Models of Unemployment

Main Concept and Assumptions

- Binary state: employed (E) or unemployed (U)
- Four possible events with constant probability:

- $\Pr(E \to E) = \bar{q}$
- $\Pr(E \to U) = 1 - \bar{q}$
- $\Pr(U \to E) = \bar{p}$
- $\Pr(U \to U) = 1 - \bar{p}$

- Markov process: Stochastic, memoryless process
- x_t: ratio of employed workers
- y_t: ratio of unemployed workers

Steady state of unemployment rate y^*

Main Question

- Existence of steady state s.t.,

$$x_{t+1} \approx x_t = x^*, \quad y_{t+1} \approx y_t = y^* \quad \forall t > \bar{T}$$

- Stability of above steady state (–> need dynamic analysis: PASS)

- Hall (1966)'s estimation (by Races, male only)
  - $p_W \approx 0.136$, $q_W \approx 0.998$
  - $p_B \approx 0.102$, $q_B \approx 0.996$

$$y_W^* \approx 0.014 < \quad y_B^* \approx 0.037$$

2.2 IS-LM (Linear version)

Model

- Hicks's interpretation of Keynes (1936)

$$Y = C + I + G \qquad \text{(IS Schedule: Real side)}$$

- $C = \bar{b}Y, \quad \bar{b} \in (0, 1)$
- $S = Y - C = (1 - \bar{b})Y = \bar{s}Y$
- $I = \bar{I}^0 - \bar{a}r$

$$\bar{M}_s = M_{dt} + M_{ds} = \underbrace{\bar{m}Y}_{M_{dt}} + \underbrace{\bar{M}^0 - \bar{h}r}_{M_{ds}} \qquad \text{(LM Schedule: Monetary side)}$$

- Endogenous variables: r, Y
- Exogenous variables (given parameters): $M_s, G, a, h, I^0, M^0, m, s, b$