The Economy in Equilibrium

Chapter 4.1 and 4.2

Outline

- The determinants of economic growth
- Full employment and potential GDP

4.1 The Determinants of Economic Growth

- Labor
- Capital
- Technology

Growth of Labor

1. Growth in the number of people available for work

- Since the 1970s -- post WWII baby boomers + women entered labor market
- About 67% of the working age population was in labor force in 2001 (***labor force participation rate***)
- This rate is increasing – mainly due to increasing participation rates for women.

Growth of Labor

2. Growth in the number of hours that employees work each year

- Production also depends on the number of hours worked each year (not just the number of workers employed)
- When looking at the effects of employment on production and growth we will count the number of hours that workers actually work
- The total number of hours worked in the economy in a year equals **labor input (N)**

Growth of Capital

- Physical capital = factories, computers, trucks, stores, etc.
- The volume of physical capital is determined by the investment in the last years
- The capital stock grows as long as net investment is positive (gross investment - depreciation)
- An increase in the amount of capital enables the economy to produce more output (a farmer with a tractor produces more wheat than a framer without tractor)
- **Existing capital stock (K)**

Growth of Technology

- Determines how much output can be produced from the amount of labor and capital used in production
- Includes anything that influences the productivity of workers or capital:
  - Technology in the usual sense (e.g., fax machine)
  - How efficiently businesses are organized and managed
- **Technology (A)**

Technological change – increases total factor productivity (Labor and Capital)

The Production Function

- A way to represent how the 3 determinants of production combine to produce output – how much output can be produced from given amounts of labor, capital and technology

$$Y = F(N,K,A)$$

- It depends on labor for a given capital stock and a given level of technology
- **The marginal product of labor** – additional output produced by one additional unit of work – declines as the amount of employment increases

4.2 Full Employment and Potential GDP

- The growth model assumes that the economy is at full employment:

  Demand for Labor = Supply of Labor

- **Potential GDP** = amount of production when labor is fully employed
- To determine potential GDP
  - Calculate N corresponding to full employment
  - Consider A and K given – find N

The Demand for Labor

- Assume markets are competitive: firms takes **W** (nominal wage) and **P** (price of output) as given
- A profit-maximizing firm hires labor if the cost does not exceed the benefit.

  cost = real wage **(W/P)**

  benefit = ***marginal product of labor (MPN)***

  (the extra output the firm can produce using an additional unit of labor, holding other inputs fixed)

Diminishing Marginal Returns

- If a firm's employment is below the real wage, there is an opportunity to improve profit by additional hires until the MPN is reduced to the real wage.
- As a factor input is increased, its marginal product falls (other things being equal).
- Intuition:

  $\uparrow \mathbf{N}$ while holding $\boldsymbol{K}$ fixed

  $\Rightarrow$ fewer machines per worker

  $\Rightarrow$ lower productivity

The Supply of Labor

- Determined by the decisions of individual workers about how much time they spend working
- Real wage – measures the incentive to work (high, work more – low, work less)
- Permanently higher real wages bring lower labor supply (better off, spend more time at home, etc)
- Substitution and income effects

The Supply of Labor

- **Substitution effect** – as something becomes more expensive, people substitute away from it. If time at home becomes more expensive, they substitute away from it and towards time in the labor market
- **Income effect –** As income rises, people tend to consume more of most things – more time at home and less time in the labor market. Permanently higher real wages make people better off and they work less on that account.
- The **net effect** is small. Substitution effect is probably stronger.

Full Employment

- Equilibrium:

  Supply of labor = Demand for labor

- **Full employment** = N* = volume of employment at the intersection of supply and demand = total amount of work that would be done if each worker could find a job after a brief search and earn as much as similar workers are already earning.

Potential GDP
$Y^* = F(N^*,K,A)$

= amount of output produced when the labor market is at full employment

= full employment level of output

- **Potential GDP** grows steadily, while actual GDP fluctuates around a growth trend

The * Economy

- Today
- Y* - Potential output
- N* - Full employment
- Later
- U* - Natural rate of unemployment
- R* - Equilibrium real rate of interest