

NATIONAL INCOME

1. What Determines the Total Production of Goods and Services

- Factors of production: the inputs used to produce goods and services
 - (1) Capital (K)
 - (2) Labor (L)

- Production function expresses mathematically how the factors of production determine the amount of output produced
 - $Y = F(K, L)$

 - cf) Constant Returns to Scale (CRS): $zY = F(zK, zL)$

- Supply of goods and services
 - ex) If the factors of production are fully utilized,
 $Y = F(\bar{K}, \bar{L}) = \bar{Y}$

2. How is National Income Distributed to the Factors of Production

→ *Neoclassical theory of distribution*

- Factor price: the amounts paid to the factors of production (wage, rent)
 - determined by the supply and demand for that factor (fig. 3-2, p.47)

(1) *The competitive firm's demand for factors*

- Marginal Product of Labor (MPL): the extra amount of output the firm gets from one extra unit of labor

→ $MPL = F(K, L + 1) - F(K, L),$

$$\text{In general, } MPL = \frac{\Delta Y}{\Delta L} = \frac{\Delta F(K, L)}{\Delta L}$$

→ Diminishing marginal product (fig. 3-3, p.49)

- Profit maximization

$$\begin{aligned} 1) \text{ Profit} &= TR - TC \\ &= PY - WL - RK \\ &= PF(K, L) - WL - RK \end{aligned}$$

2) Profit from hiring an additional unit of labor

$$\rightarrow \Delta \text{ profit} = \Delta TR - \Delta TC = (P \times MPL) - W$$

→ if $(P \times MPL) > W$, continue to hire until the next unit would no longer be profitable

3) Profit maximizing condition

$$\rightarrow (P \times MPL) = W \rightarrow MPL = W / P$$

\rightarrow Marginal product of labor = real wage

- Firm's labor demand curve = MPL schedule
 \rightarrow For any given real wage, the firm hires up to the point at which the MPL equals the real wage (fig. 3-4, p.50)
- Marginal Product of Capital (MPK): the extra amount of output the firm gets from one extra unit of capital
 \rightarrow Firm's capital demand curve = MPK schedule

(2) How the markets for the factors of production distribute the economy's total income

- If all firms in the economy are "competitive" and "profit-maximizing,"

Real economic profit

$$= Y - (MPL \times L) - (MPK \times K) = 0$$

$$\rightarrow Y = F(K, L) = (MPL \times L) + (MPK \times K)$$

\rightarrow The sum of factor payments equals total output

- "Total output is divided between the payments to capital and the payments to labor, depending on their marginal productivities"

3. What determines the Demand for Goods and Services?

- How the output from production is used

$$\rightarrow Y = C + I + G + NX$$

- 1) Consumption (C)
- 2) Investment (I)
- 3) Government purchases (G)
- 4) Net exports (NX)

(1) Consumption (chapter 16)

- **DI (Disposable Income)** is the sum of the incomes of all the individuals in the economy *after* all taxes have been deducted and all transfer payment

$$\mathbf{DI = GDP - Taxes + Transfers = Y - T = C + S}$$

- **Transfer payments:** Government grants to individuals (= negative taxes)

1) The Consumption Function

→ Relationship between aggregate *consumption expenditures* and aggregate *disposable income*

- Change in DI: *movement* along a consumption fn
- Change in any other variable that affects C: *shift* in the entire consumption fn
e.g., wealth, price level, expectation of future income

2) Marginal Propensity to Consume (MPC)

→ $MPC = \text{change in } C / \text{change in } DI$

→ the slope of consumption function

cf) Marginal Propensity to Save (MPS)

→ $MPS = \text{change in } S / \text{change in } DI$

3) Average Propensity to Consume (APC)

→ $APC = C / DI$

→ the slope of a ray from the origin to a point on the consumption function

(2) Investment (chapter 17)

- **Gross Investment** is the spending on *new* plant, *new* equipment, *new* houses, and *additions* to inventories
 - Net investment = gross investment - depreciation
- Investment decisions are influenced by “the expected profit rate” and “the real interest rate”
 - The expected profit rate is affected by the phase of the business cycle, advances in technology, taxes
 - The lower the real interest rate, the greater is the amount of investment

- Nominal interest rate vs. Real interest rate
 - Nominal interest rate(i): the rate of interest that investors pay to borrow money
 - Real interest rate(r): the nominal interest rate corrected for the effects of inflation

$$\rightarrow r = i - \pi \text{ (inflation rate)}$$

(3) *Government purchases* \rightarrow *exogenous*

(4) *Net exports* \rightarrow *exogenous*

4. What Brings the Supply and Demand for Goods and Services into Equilibrium

\rightarrow “*Interest rate*” has the crucial role of equilibrating supply and demand

(1) *Equilibrium in the Market for Goods and Services*

- Demand for good and services

$$Y = C + I + G,$$

$$C = C(Y - T),$$

$$I = I(r),$$

$$G = \bar{G}, \quad T = \bar{T}$$

- Supply of good and services

$$Y = F(\bar{K}, \bar{L}) = \bar{Y}$$

- Equilibrium

$$\bar{Y} = C(\bar{Y} - \bar{T}) + I(r) + \bar{G}$$

- The role of interest rate

- r is the only variable not already determined
- r must adjust to ensure that demand equals supply
e.g., if r is too high, excess supply of goods and services.

(2) Equilibrium in the Financial Market

- National Saving

From $Y = C + I + G$,

$$(Y - T - C) + (T - G) = I.$$

→ National Saving = Private Saving + Public Saving
= Investment

- Equilibrium

$$\bar{Y} - C(\bar{Y} - \bar{T}) - \bar{G} = \bar{S} = I(r)$$

- The role of interest rate (fig.3-7, p.60)
 - At the equilibrium interest rate, households' desire to save balances firms' desire to invest, and the quantity of loans supplied equals the quantity demanded
- e.g., if r is too low, excess demand for loans.

(3) *Change in Savings*

- An increase in government purchase (fig.3-8, p.62)
- A decrease in taxes

(4) *Change in Investment* (fig.3-10 & fig.3-11, p. 65)

- Technological innovation, change in tax laws etc.