Chapter 3: Classical Macroeconomics: Output and Employment

1. The starting point

- The Keynesian revolution was against “classical economics” (orthodox economics)
- Keynes refer to all economists before 1936 as classical economics
- This is wrong:
  - Classical economics: Economic theory (price theory) between Adam Smith’s *Wealth of Nations* (1776) and the marginal revolution in 1980s (C. Menger, L. Walras, and S. Jevons.) John Stuart Mill (*Principles of Political Economy* -1848) was the last classic economist
  - Neoclassical economics refer to similar political economy after the marginal revolution, not to similar (price) theory
  - Classical price theory (costs define prices in the long run) is different from neoclassical
    - Classic economics: Costs define prices in the long-run
    - Neoclassical economics: Costs and utility define prices
    - Austrians: Utility (final prices) define costs of production (the opposite to Classical price theory)
- Classical macroeconomics:
  - Output is always at full employment (equilibrium) level
  - Only full-employment points could be positions of even short-run equilibrium
  - There is perfect information
- Classical economics
  - Output is not always at full employment (equilibrium) level
  - There can be no full-employment in the short-run
  - There is no perfect information
- To criticize classical macroeconomics is not the same than to criticize classical economics
2. The Classical Revolution

- Classical economics was a reaction against *mercantilism*
  - The idea that wealth is in the stock of money (precious metals) and not in how much can be consumed
  - The idea that the state needs to impose regulation so that exports have to more than imports so the country accumulates increasing stocks of precious metals
- Economics started as an explanation of why the economies of different kingdoms were not doing well
- Classical economics
  - It is *real* factors what determines the level of wealth
  - A free economy is required for an efficient use of the *real factors*
  - Money is a facilitator for trade by avoiding the problem of “double coincidence of wants”, it is a unit of account, not wealth *per se*
3. Production

- Aggregate production function
  - $Y = Y(K, N, A)$
  - $Y$: Output ($GDP = GNI$); $A$: Technology; $K$: Capital; $N$: Labor input (i.e., in hours)
  - $K \rightarrow$ the amount of capita is fixed $\rightarrow$ short-run analysis
  - Hicks neutral: $Y = A \cdot F(K, N)$
  - Labor-augmenting: $Y \cdot F(K, AN)$
  - Capital-augmenting: $Y \cdot F(AK, N)$

- Three sections
  - 1st: Increasing or constant returns to scale, $MPN_{n+1} > MPN_n, MPN_{n+1} = MPN_n$
  - 2nd: Diminishing returns, $MPN_{n+1} < MPN_n$, and $MPN_{n+1} > 0, MPN_n > 0$
  - 3rd: Negative returns, $MPN_{n+1} < 0$
  - $MPN$ (Marginal Productivity of Labor) $= \frac{\partial Y}{\partial N}$
  - $MPK$ (Marginal Productivity of Capital) $= \frac{\partial Y}{\partial K}$

- Returns to scale
  - $f(kK, kN) = k^n \cdot f(K, N)$
  - $\eta < 1$: diminishing returns to scale (DRS)
  - $\eta = 1$: constant returns to scale (CRS)
  - $\eta > 1$: increasing returns to scale (IRS)

- Some production functions
  - Linear: $Y = aK + bN$
  - Leontief: $Y = \min\{K, N\}$
  - Cobb-Douglas: $Y = A \cdot (K^a N^b), \text{ if } a + b = 1 \rightarrow CRS$
  - CES (Constant Elasticity of Substitution): $Y = A \cdot (aK^\delta + bN^\delta)^{\frac{1}{\delta}}$
  - If $\delta = 1 \rightarrow CES = \text{linear}$
  - If $\delta = 0 \rightarrow CES = \text{Cobb-Douglas}$
  - If $\delta \rightarrow \infty, CES \rightarrow \text{Leontief}$
4. Employment

- Assumptions
  - Firms and individuals optimize efficiently
  - There is perfect information and no barriers to price adjustment
  - Therefore the market clears (is in equilibrium)

- Labor demand
  - Firms are perfect competitors
  - Short-run analysis: Output can only change by changing employment
  - Firm maximizes profits ($\pi$) when marginal revenue (MR) equals marginal cost (MC)
  - $\pi = P \cdot (Y(R, N, A)) - wN - rR, w: wages, r: rent to capital$
  - $\frac{\partial \pi}{\partial N} = P \cdot \frac{\partial Y}{\partial N} - w = 0 \rightarrow P \cdot MPN = w \rightarrow P = \frac{w}{MPN}$
    - $MR = P, MC = \frac{w}{MPN}$ (wage per unit of production)
  - Then: $MPN = \frac{w}{P}$ (real wages)
  - The firm will hire $N$ units of labor until $MPN = \frac{w}{P}$
  - Because $\frac{\partial MPN}{\partial N} < 0$ labor demand has a negative slope
  - Because $MPN = \frac{w}{P} \rightarrow N^d = f\left(\frac{w}{P}\right)$

- Labor supply
  - Individuals maximize utility ($U$)
  - Utility has two components, consumption ($C$) and leisure ($L$)
  - Time is limited to 24hs per day, therefore there is trade-off between $C$ and $L$
  - $U = U(C, L)$
  - There is an indifference curve with $C$ and $L$. At each point $U'_C = U'_L$
  - Therefore, a change in $\frac{w}{P}$ produces analogous income and substitution effects to consumption of two goods (review your microeconomic notes)
    - If $\frac{w}{P}$ increases, then $C$ increases because (1) higher real wage per hour and (2) more hours of work. Then hours of leisure decrease and $U'_L$ also increases
      - Substitution effect $>$ income effect
    - If $\frac{w}{P}$ is high enough, then hours of work may decline to have more hours for leisure until $U'_C = U'_N$
      - Substitution effect $<$ income effect
    - Intuition: $\frac{w}{P}$ is so-high that $U'_C$ is smaller than $U'_L$.
  - $N^d = g\left(\frac{w}{P}\right)$ we assume a positive slope for the whole curve (unless specified otherwise)
5. Equilibrium Output and Employment

- Three functions
  - \( Y = A \cdot F(K, N) \)
  - \( N^d = f\left(\frac{w}{P}\right) \)
  - \( N^s = g\left(\frac{w}{P}\right) \)
- There exists (subject to “mathematical conditions”) a \( \left(\frac{w}{P}\right)_0 \) such that \( N^d = N^s = N_0 \)
- Therefore, equilibrium output is \( Y_0 = A \cdot F(K, N_0) \)
- Assume two periods \( (t = 1 \text{ and } t = 2) \)
- Shock: \( P \) doubles: \( P_2 = 2P_1 \)
  - 1st: \( \frac{w}{P} \) declines
  - 2nd: quantity of labor supplied declines
  - 3rd: \( MPN = \frac{w}{P} \) declines
  - 4th: \( MR > MC \)
  - 5th: \( N^d \) increases (by all firms)
  - 6th: \( w \) increases until \( \left(\frac{w}{P_2}\right) = \left(\frac{w}{P_1}\right) \)
- All this occurs simultaneously
- Shock: Assume an increase in \( K \) or \( A \)
  - 1st: Output increases
  - 2nd: \( MR > MC \)
  - 3rd: \( N^d \) for all firms increase (by all firms)
  - 4th: \( \frac{w}{P} \) increases
  - 5th: New equilibrium: more output, higher real wages, and lower \( P \)
- All this occurs simultaneously
- Shock: Assume an increase in \( N^s \)
  - 1st: Output increases
  - 2nd: \( MPN \) decreases
  - 3rd: \( w \) decreases
  - 4th: \( P \) decreases more than \( w \).
  - 5th: New equilibrium: more output, lower real wages, and lower \( P \)
- All this occurs simultaneously
- To see who \( P \) is determined see next chapter