Elements of Macroeconomics

February 2023

4 Economic Efficiency, Government Price Setting, and Taxes

First, let's review some important concepts:

- **Marginal Cost (MC)**: The additional cost of producing one additional good/service
  → Producing one more coffee costs 1$
- **Marginal Benefit (MB)**: The additional benefit of consuming one additional good/service
  → The next coffee would be worth 2$
- **Market Equilibrium**: The point where MC = MB
  → Market price is 1.50$ for a quantity of 20 coffees.
- **Individual Consumer Surplus**: MB - Market price
  → I would pay 2$, but have only to pay 1.50$. My surplus is 0.50$
- **Individual Producer Surplus**: Market price - MC
  → It would cost 1$ to produce, but I can charge 1.50$. My surplus is 0.50$
- **Deadweight Loss**: In comparison to the efficient outcome, there are consumers whose MB is bigger than the efficient market price, but lower than the new market price. Similarly, there are producers whose MC is smaller than the efficient market price, but higher than the new market price. The surplus of these consumers and firms is the DWL.
  → Due to a tax, the coffee costs now 2.50$. Neither the example consumer nor producer will participate in the market.

For the total surplus in an economy, we need the supply and demand curve. This means, we sum all producers and consumers in the economy. Next, we calculate the area underneath the curve:

$$\text{Producer Surplus (PS)} = \frac{(\text{Market Price - Supply curve intercept}) * \text{Market Quantity}}{2}$$

$$\text{Consumer Surplus (CS)} = \frac{(\text{Demand curve intercept - Market Price}) * \text{Market Quantity}}{2}$$

$$\text{Economic Surplus (ES)} = \text{Producer Surplus} + \text{Consumer Surplus}$$

Example Question: You are given a demand and supply curve. Please graph it and calculate Consumer Surplus, Producer Surplus, and Economic Surplus.

$$\text{Demand: } Q^D = 13 - 0.5P$$
$$\text{Supply: } Q^S = -2 + P$$

Cookbook Recipe:

1. Calculate Market Price $P^* \rightarrow Q^D = Q^S$
2. Calculate Market Quantity $\rightarrow$ Plug P^* in Q^S or Q^D
3. Rearrange to $P(Q) = mQ + b$!
4. Draw Graph: Q on X-axis and P on Y-axis
5. Calculate CS, PS, ES: Triangle formula (base* height)/2

Example Question Continue: Tax Now, suppose we have a tax on the producer of 3$ per item. Calculate new consumer surplus, producer surplus, tax revenue and dead weight loss.

Cookbook Recipe: Tax

6. Tax: Which graph shifts (Demand or Supply?)
7. New Equilibrium: (Repeat point 1 and 2)
8. What is the tax revenue? $\rightarrow$ Equilibrium quantity * Tax
9. Calculate CS, PS, DWL
   $\rightarrow$ Make sure that the original ES is equal to CS + PS + Tax revenue + DWL

Example Question Continue: Price Floor Instead of a tax, the government introduces a price floor of 12$. Calculate the amount of shortage/excess, as well as consumer Surplus, Producer Surplus, and Deadweight Loss.

Cookbook Recipe: Price Floor/Ceiling

6. Price Floor/Ceiling: Add horizontal line to graph
7. Is there a shortage or an excess?
   $\rightarrow$ Mark points where horizontal line crosses demand and supply curve
   $\rightarrow$ shortage/excess is the difference between those two points
8. New Equilibrium: Smallest point of 7)
9. Calculate CS, PS, DWL
   $\rightarrow$ Trapezoid formula (a+c)/2 * height
   $\rightarrow$ Make sure that the original ES is equal to CS + PS + DWL

5 Labor Market

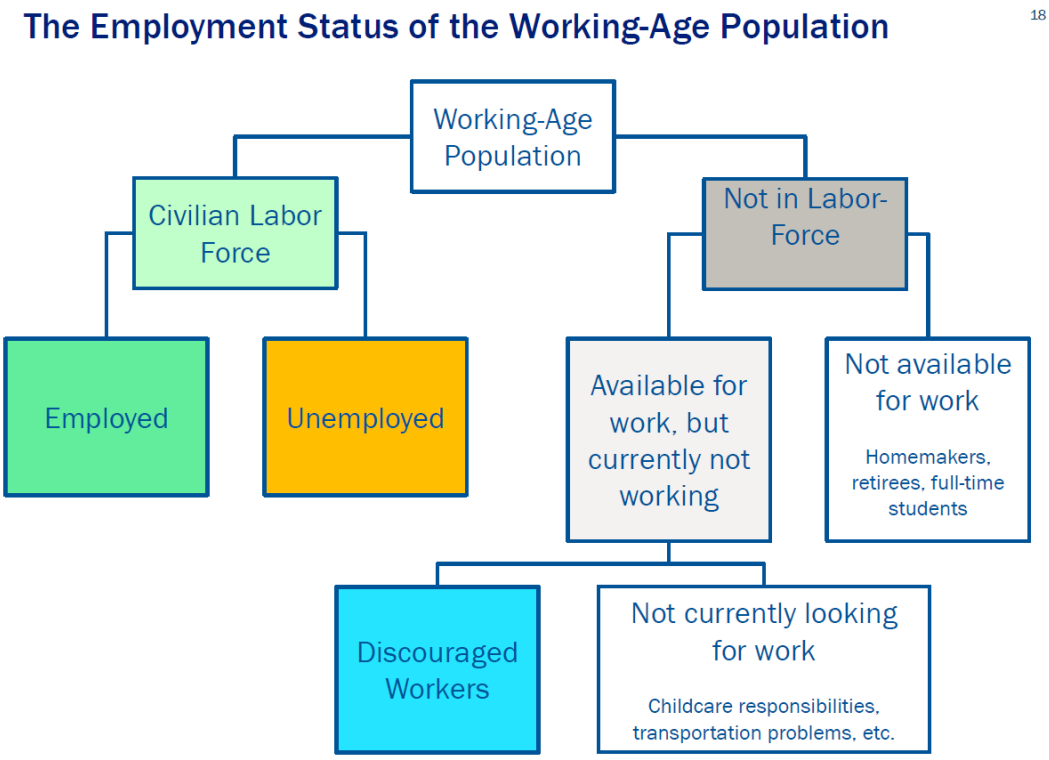
Review concepts:

- **Working Age Population**: Every US citizen above 16
- **Employed**: Worked 1+ hours in reference week (or were temporarily away from job)
- **Unemployed**: If not currently at work but available for work and has actively looked for work during past four (4) weeks
- **Civilian Labor Force**: Employed + Unemployed
- **Discouraged Workers/Marginally Attached**: Not actively looking for jobs, but would have time
- **Unemployment Rate U3**

$$\text{Unemployment Rate U3} = \frac{\text{Number of Unemployed}}{\text{Number Labor Force}}$$

- **Unemployment Rate U6**

$$\text{Unemployment Rate U6} = \frac{\text{Number of Unemployed + Marginally attached + involuntary part-time}}{\text{Number Labor Force}}$$



	2025 (In Millions)	2030 (In Millions)
Total Population	**120**	**140**
Working-age population	**110**	**130**
Number of adults neither working, nor looking for work	**10**	
Number of adults employed	**80**	
Number of adults unemployed		**25**

Question

- How many individuals are unemployed in 2025?
- What is the labor force participation rate in 2025?
- What is the unemployment rate in 2025?
- Assume the unemployment rate remains constant from 2025 to 2030. How many individuals are employed in 2030?
- How many adults are neither working nor looking for work in 2030?

6 National Accounting (Part 2)

Question 1 (textbook 3.4)

Suppose the information in the following table is for a simple economy that produces only four goods and services: shoes, hamburgers, shirts, and cotton. Assume that all the cotton is used in the production of shirts.

	2009		2018		2019	
Product	Quantity	Price	Quantity	Price	Quantity	Price
Shoes	90	$50.00	100	$60.00	100	$65.00
Hamburgers	75	2.00	100	2.00	120	2.25
Shirts	50	30.00	50	25.00	65	25.00
Cotton	100	0.80	800	0.60	120	0.70

a. Use the information in the table to calculate real GDP for 2018 and 2019, assuming that the base year is 2009.

b. What is the growth rate of real GDP during 2019?

c. What is the annualized growth rate from 2009 to 2018?