

CH4 Demand, Supply, and Equilibrium & CH5 Consumers and Incentives

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July 14, 2022

Outline

CH4 Review

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Competitive Market

- All sellers sell an **identical good or service**.
- Any individual buyer or seller is **not powerful enough** to affect market price. (**price takers**)
- **Very few** markets are perfectly competitive.
- If there is **lots of competition** and **sellers sell nearly identical goods or service**, then the perfectly competitive market is a **good model (approximation)** of actual market.

Demand

- **Law of Demand:** the quantity demanded rises when the price falls (negatively related), holding all else equal.
- **Willingness to pay:** the highest price that a buyer is willing to pay for an extra unit of good.
 - It is also the height of demand curve at a given quantity.
 - By diminishing marginal benefit, your willingness to pay also declines as you consume more of a good.
- **Demand shifts**
 - Taste and preference (解釋上勿濫用)
 - Income and Wealth (normal goods vs. inferior goods)
 - Price of substitutes and complements
 - Number of buyers
 - Buyers' expectation

Supply

- **Law of Supply:** the quantity supplied rises when the price rises (positively related), holding all else equal.
- **Willingness to accept:** the lowest price that a seller is willing to get paid to sell an extra unit of good.
 - It is the height of the supply curve at a given quantity.
 - It is also the firm's marginal cost.
- **Supply shifts**
 - Input prices
 - Technology
 - Number of sellers
 - Sellers' expectation

Competitive equilibrium

- The market converge to a **competitive equilibrium price** and a **competitive equilibrium quantity**.
- **Quantity demanded equals to quantity supplied.**
- **Excess demand** occurs when quantity demanded is more than quantity supplied at a given price. This will **drive price up** to reach an equilibrium.
- **Excess supply** occurs when quantity demanded is less than quantity supplied at a given price. This will **drive price down** to reach an equilibrium.

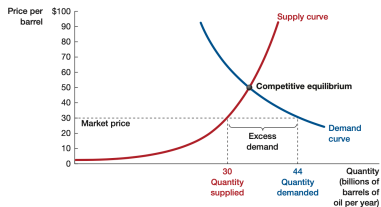


Figure: Excess demand

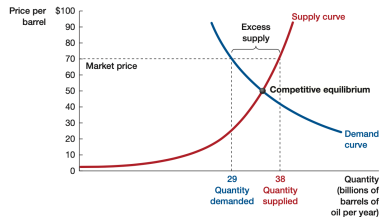


Figure: Excess supply

CH4 Exercises

Exercise1: Problem 4-4 (二版課本題號同)

Sketch generic supply and demand curves for the housing market and label the equilibrium price and quantity.

- A booming economy **increases the demand** for housing. Show the shift in the demand curve on your graph. What does this do to the price and quantity in the market?
- You and a friend both notice that more houses are built in response to this change. Your friend says, **"this is a sign that the supply curve is shifting as well."** You respond, **"no, this is actually just a shift along the supply curve."** To help your friend understand, demonstrate what you mean on your graph.

Answer:

a. The equilibrium price and quantity **both increase**.



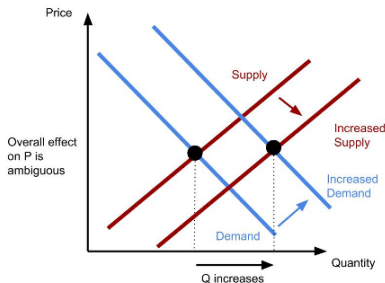
b. There's only **an increase in quantity supplied along the supply curve**, which is represented by the two red arrows in the graph, and there's **no supply shift**.

Exercise1: Problem 4-4 (continued) (二版課本題號同)

- c. As it turns out, there **actually is a shift in the supply curve** due to an unrelated breakthrough in construction that lowers the cost of building houses. **In what direction does the supply curve shift?** Show this on your graph.
- d. Relative to the original price and quantity, what is the **overall effect** of both shifts on price and quantity?

Answer:

c. A reduction in cost lowers the supply curve vertically, which is the same as a shift to the right, or an increase in the supply.

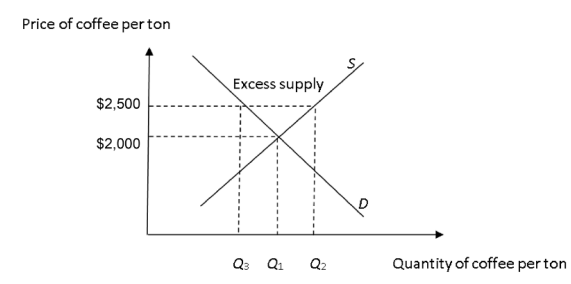


d. Quantity will surely increase, but the overall effect on price is ambiguous as it depends on the size of the supply shift relative to the demand shift. (與最左邊的黑色需求、供給都未變動前的原均衡點比較)

Exercise2: Problem4-13 (二版課本題號同)

The equilibrium price of coffee in an economy, measured in dollars, is about \$2,000 per ton. To help the coffee farmers earn a higher income, **the government set the price to \$2,500 per ton.**

- a. How will this affect the demand and supply of coffee in the coffee market?
- b. Construct a diagram for coffee to show the effect of the government action. Will the coffee farmers be **better off**?

Answer:

At a market price of \$2,500 per ton, there will be an **excess supply** of coffee in the market. Only those farmers who are **able** to sell their product at the higher price of \$2,500 will be better off. Those who are **unable** to do so will be worse off.

Exercise3: Problem4-14 (二版課本題號同)

Suppose the demand for hand sanitizer is $Q_D = 70 - 4P$, and the supply of hand sanitizers is $Q_S = 10 + 2P$, where P is the price of a unit of hand sanitizer.

- Find the equilibrium price and quantity of hand sanitizers.
- Suppose consumers' income increases and hand sanitizers are considered as normal goods. As a result, the demand curve for hand sanitizers becomes $Q_D = 100 - 4P$. Find the new equilibrium price and quantity of hand sanitizers.

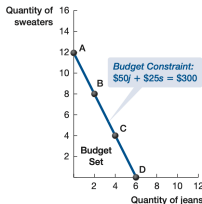
Answer:

- a. At equilibrium, the quantity demanded must be equal to the quantity supplied. Thus we have $Q_D = 70 - 4P = 10 + 2P = Q_s$, which implies $P^* = 10$ and $Q^* = 70 - 4 \times 10 = 10 + 2 \times 10 = 30$.
- b. Equating the new quantity demanded with quantity supplied, we have $Q_D = 100 - 4P = 10 + 2P = Q_s$, which implies $P^* = 15$ and $Q^* = 100 - 4 \times 15 = 10 + 2 \times 15 = 40$.

CH5 Review

What buyers face?

- **Preference:** What you like?
- **Price:** assuming all buyers are now **price takers**
- **Budget constraint**
 - Assume that there's no borrowing or lending now.
 - Slope of budget line represents the **opportunity cost**.



Bundle	Quantity of Sweaters	Quantity of Jeans
A	12	0
B	8	2
C	4	4
D	0	6

- $\text{opportunity cost}_{\text{jeans}} = \frac{\text{loss in sweaters}}{\text{gain in jeans}} = \frac{4}{2} = 2\text{sweaters}$
- $\text{opportunity cost}_{\text{sweaters}} = \frac{\text{loss in jeans}}{\text{gain in sweaters}} = \frac{2}{4} = \frac{1}{2}\text{jeans}$

Elasticity

- Elasticity measures the **sensitivity** of one economic variable to a change in another economic variable.
- In this chapter, we focus on three major kinds of elasticities, which are **price elasticity of demand**, **cross-price elasticity of demand**, and **income elasticity of demand**.

Price Elasticity of Demand (需求價格彈性)

- $\varepsilon_D = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$
- ε_D might be different on different points of a demand curve.
- Arc elasticity is **stable** regardless of the starting point by using the **average price and quantity (mid-point)**.

$$\bullet \text{ Arc } \varepsilon_D = \frac{\frac{(Q_2 - Q_1)}{(Q_2 + Q_1)/2}}{\frac{(P_2 - P_1)}{(P_2 + P_1)/2}} = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_2 + P_1}{Q_2 + Q_1} = \frac{1}{\text{slope}} \cdot \frac{P_2 + P_1}{Q_2 + Q_1}$$

Elasticity Measures (以下 ε_D 皆取絕對值)

- $\varepsilon_D = 0$: Perfectly Inelastic, vertical demand curve
- $\varepsilon_D < 1$: Inelastic
 - Increasing price pushes total revenue up.
 - Decreasing price pushes total revenue down. (ex. 穀賤傷農)
- $\varepsilon_D = 1$: Unit Elastic
- $\varepsilon_D > 1$: Elastic
 - Increasing price pushes total revenue down.
 - Decreasing price pushes total revenue up. (薄利多銷)
- $\varepsilon_D = \infty$: Perfectly Elastic, horizontal demand curve

Cross-Price Elasticity of Demand (需求交叉彈性)

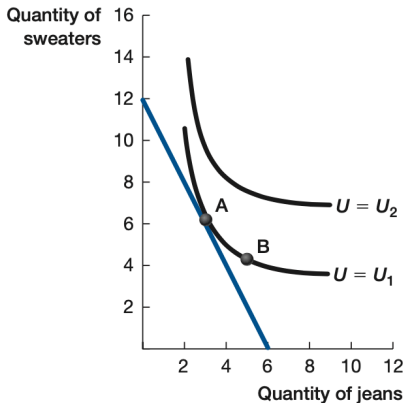
- Cross-price elasticity
= $\frac{\text{percentage change in quantity demanded of good x}}{\text{percentage change in price of good y}}$
- If x and y are **substitutes**, cross-price elasticity > 0 .
- If x and y are **complements**, cross-price elasticity < 0 .

Income Elasticity of demand (需求所得彈性)

- Income elasticity = $\frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$
- For a **normal good**, income elasticity > 0 .
- For a **inferior good**, income elasticity < 0 .

Indifference Curves Analysis (無異曲線分析)

- Economists call a consumer's **level of satisfaction "utility"**.
- An **indifference curve** is the set of bundles that provide an equal utility.

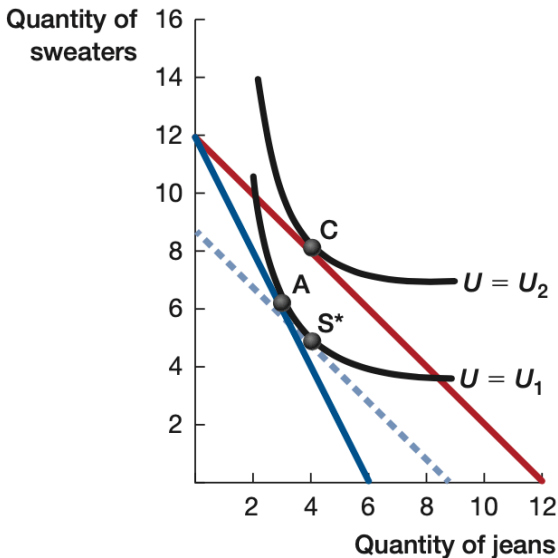


Properties of Indifference Curves

- Indifference curves **don't intersect** each other.
- Indifference curves are **convex to origin**. (凸向原點)
- As indifference curves **move away from the origin**, utility **increases**.
- At point A, the indifference curve U_1 is **tangent to the budget line**, which means you **maximize your utility subject to the budget constraint**.

Income and substitution Effects (見下頁圖)

- The price of jeans drops from \$50 to \$25.
- $A \rightarrow S^*$: **substitution** effect, jeans \uparrow , sweaters \downarrow
- $S^* \rightarrow C$: **income** effect, jeans \uparrow , sweaters \uparrow (assuming both jeans and sweaters are normal goods)
- Quantity of jeans will **surely go up**, but the quantity of sweaters is **uncertain**.



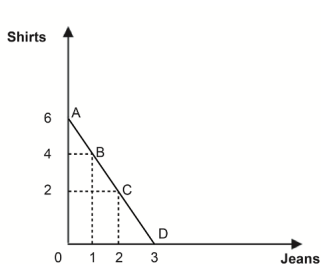
CH5 Exercises

Exercise1: Problem5-6 (二版課本題號同)

Kira will be attending the university soon for which she needs new pairs of jeans (j) and shirts (s). Her budget constraint is given by $40j + 20s = 120$.

a. Graph her budget line.

Answer:



Exercise1: Problem5-6 (continued)

- b. What is the **opportunity cost of jeans** in terms of shirts?
- c. Suppose that the total benefits for each good is shown in the table below. What is the **marginal benefit** on each of the two goods?
- d. What is the **marginal benefit per dollar spent** on each of the two goods?

	Total Benefit (Jeans)	Total Benefit (Shirts)
1	15	30
2	25	50
3	30	60

Answer:

b. The opportunity cost of jeans in terms of shirts is $\frac{6}{3} = 2$

c. d.

	Total Benefit (Jeans)	Marginal Benefit (Jeans)	Marginal Benefit per Dollar Spent (Jeans)
1	15	15	0.375
2	25	10	0.25
3	30	5	0.125

	Total Benefit (Shirts)	Marginal Benefit (Shirts)	Marginal Benefit per Dollar Spent (Shirts)
1	30	30	1.5
2	50	20	1
3	60	10	0.5

Exercise2: Problem4-8 (二版課本題號同)

Consider Sophia and Marcus' total expenditure on sandwiches:

Price	Total Expenditure per month (Sophia)	Total Expenditure per month (Marcus)
5	90	50
4	80	60

- Calculate the **arc** price elasticity of demand for Sophia when the price of sandwiches increases from \$4 to \$5.
- Calculate the **arc** price elasticity of demand for Marcus when the price of sandwiches increases from \$4 to \$5.
- Based on your answers from parts a and b, explain why Sophia would spend more on sandwiches, while Marcus spends less when the price of sandwiches increases.

Answer:

- For Sophia, quantity demanded is **20** when price is \$4 and **18** when price is \$5.
- The arc price elasticity $= \frac{18 - 20}{5 - 4} \cdot \frac{5 + 4}{18 + 20} \approx -0.47$
- Sophia's demand for sandwiches is **inelastic** ($\epsilon_D < 1$).
- As the price of sandwiches increases, **the percentage increase in price is higher than the percentage decrease in quantity demanded.** \Rightarrow total expenditure \uparrow
- For Marcus, quantity demanded is **15** when price is \$4 and **10** when price is \$5.
- The arc price elasticity $= \frac{10 - 15}{5 - 4} \cdot \frac{5 + 4}{10 + 15} = -1.8$
- Marcus' demand for sandwiches is **elastic** ($\epsilon_D > 1$).
- As the price of sandwiches increases, **the percentage decrease in quantity demanded is higher than the percentage increase in price.** \Rightarrow total expenditure \downarrow