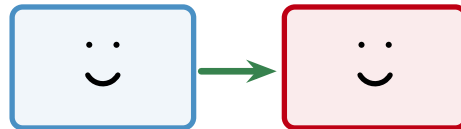


Chapter 7

Consumers, Producers, and the Efficiency of Markets



Gains from Exchange

Definition. **Welfare economics** studies how the allocation of resources affects economic well-being.

A buyer can value a good more than its price. A seller can receive a price above the opportunity cost of providing it. Both can gain from the same trade.

To evaluate an allocation, count the benefits to buyers and sellers, not just the money that changes hands.

Willingness to Pay

Definition. A buyer's **willingness to pay** is the maximum amount the buyer would pay for a good.

Four fans each want at most one copy of a rare album.

Buyer	Taylor	Carrie	Rihanna	Gaga
Willingness to pay (US\$)	100	80	70	50

At a price below willingness to pay, buying yields a positive gain. At equality, the buyer is indifferent.

Consumer Surplus

Definition. **Consumer surplus** is willingness to pay minus the amount paid, summed over the units actually purchased.

If Taylor buys an album for US\$80, her consumer surplus is

$$100 - 80 = \text{US\$}20.$$

If two albums sell for US\$75 each to Taylor and Carrie, total consumer surplus is $(100 - 75) + (80 - 75) = \text{US\$}30$. The other two fans value a copy below US\$75 and do not buy.

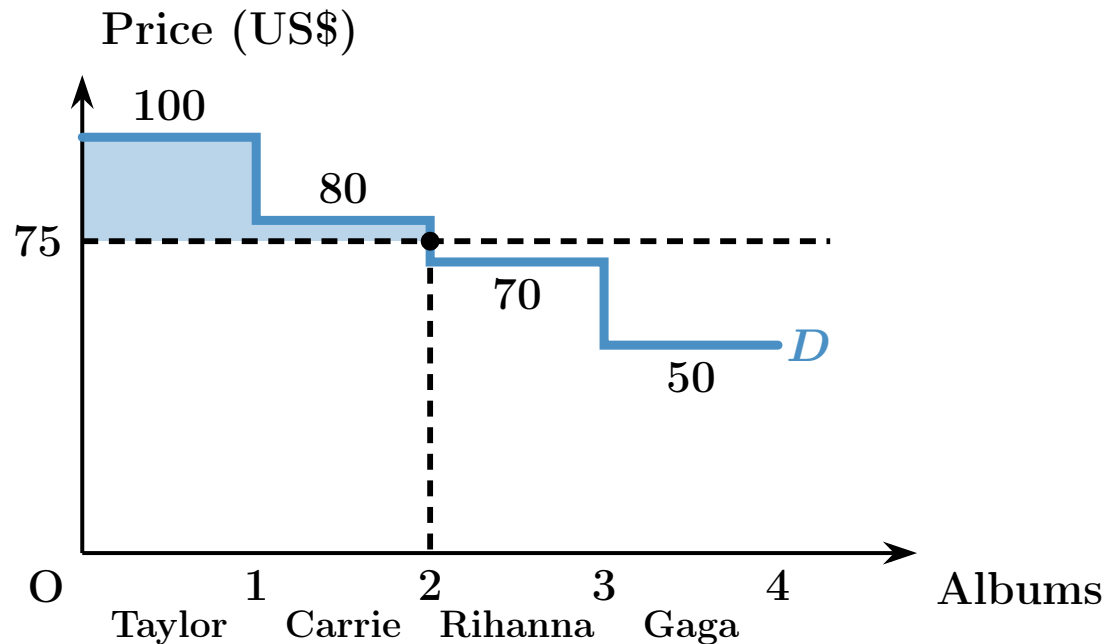
From Willingness to Pay to Demand

At US\$90, only Taylor is willing to buy. At US\$75, Taylor and Carrie are willing. At US\$60, Rihanna joins them. At US\$40, all four want a copy.

Order buyers from highest to lowest willingness to pay. The resulting step-shaped demand curve shows the value of each additional unit.

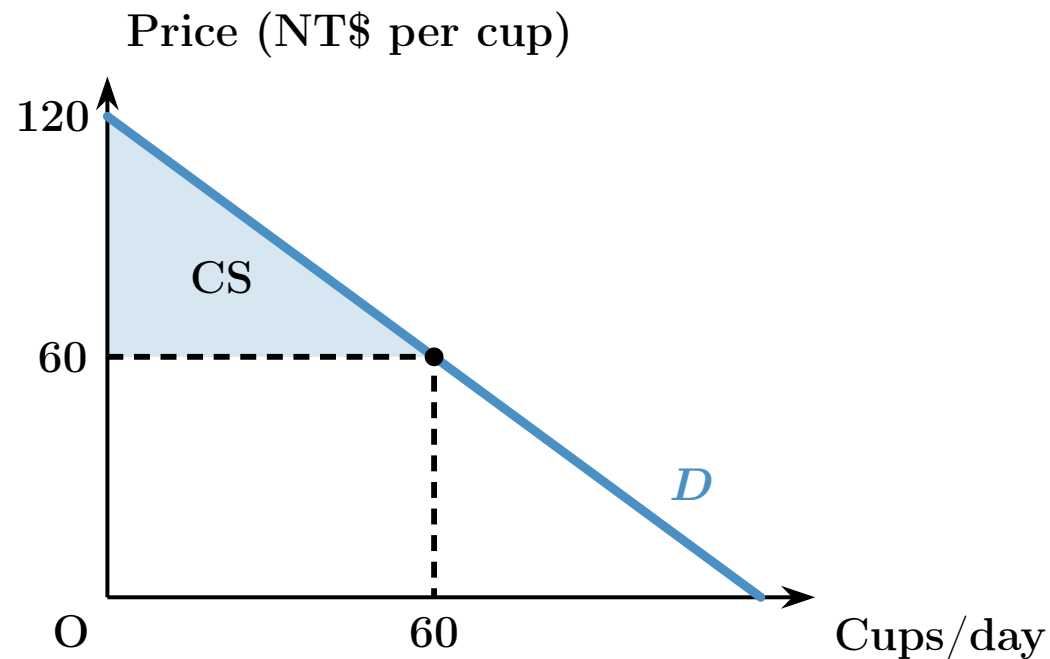
The **marginal buyer** has the lowest willingness to pay among those buying and is the first to leave as the price rises. With many buyers and small units, the steps can be represented by a smooth demand curve.

The Album Demand Curve



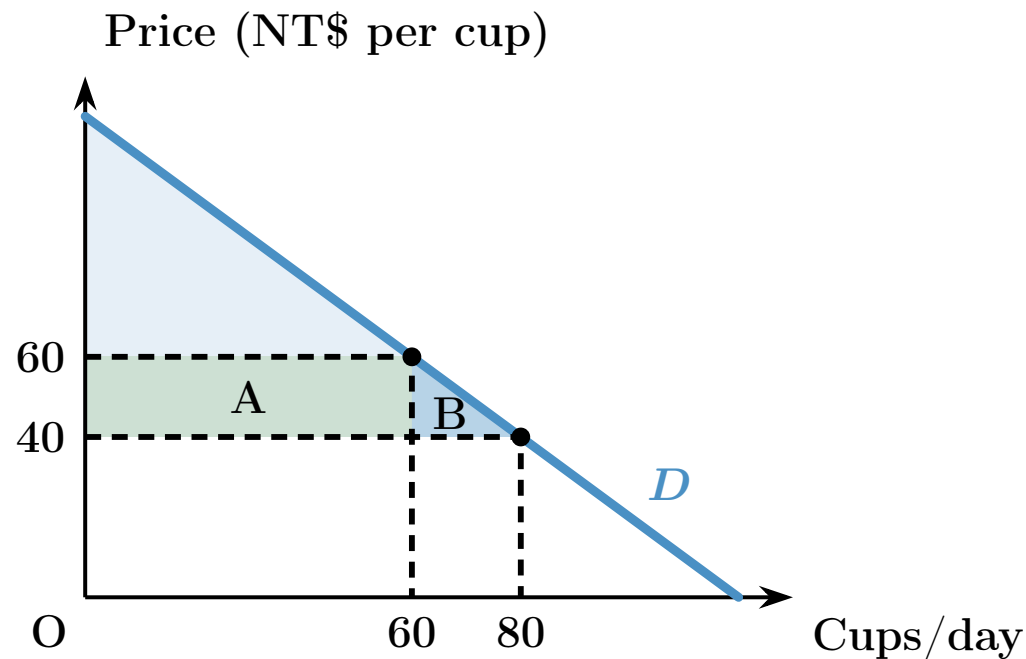
At US\$75, Taylor and Carrie buy. The two shaded rectangles give $CS = (100 - 75) + (80 - 75) = \text{US\$}30$. Each step's height is one buyer's willingness to pay. The shaded area lies below demand and above price.

Consumer Surplus under the Demand Curve



In our hypothetical bubble-tea market, $P = 120 - Q$. At NT\$60, consumers buy 60 cups. Consumer surplus is the area below demand and above price:
 $\frac{1}{2}(120 - 60) \times 60 = \text{NT\$}1,800$ per day.

A Lower Price Raises Consumer Surplus



Holding demand fixed, a price fall from 60 to 40 raises purchases from 60 to 80 if all demand can be served. Existing buyers gain area A , NT\$1,200; new units add area B , NT\$200. Total CS rises from 1,800 to 3,200.

What Consumer Surplus Measures

Consumer surplus measures buyers' gains using their own willingness to pay. It is useful when informed choices reflect the buyers' interests.

Willingness to pay also depends on ability to pay. A higher dollar valuation does not necessarily mean a greater human need.

The measure does not automatically capture harm to third parties, mistakes, or distributional concerns. Those questions require additional analysis.

Discussion: A Lower Ticket Price

Three students each want at most one ticket. Their willingness to pay is NT\$900, NT\$700, and NT\$400. Enough tickets are available for all willing buyers at either price.

1. At a price of NT\$600, who buys and what is total consumer surplus?
2. If the price falls to NT\$300, what is total consumer surplus?
3. Separate the gain to previous buyers from the gain to the new buyer.

Answer: A Lower Ticket Price

1. The first two students buy at 600. Consumer surplus is $(900 - 600) + (700 - 600) = \text{NT\$}400$.
2. All three buy at 300. Consumer surplus is $600 + 400 + 100 = \text{NT\$}1,100$.
3. The two previous buyers each save 300, gaining 600 in total. The new buyer gains $400 - 300 = 100$. The total increase is 700.

Cost and Willingness to Sell

A seller's cost includes the value of resources and time given up to provide the good. It is an **opportunity cost**, not just a cash expense.

Four painters can each paint one house.

Painter	Andy	Pablo	Claude	Vincent
Cost (US\$)	500	600	800	900

A seller is willing to supply at a price above cost and is indifferent when price equals cost.

Producer Surplus

Definition. **Producer surplus** is the amount sellers receive minus the cost of providing the units sold.

If Andy paints a house for US\$600, his producer surplus is $600 - 500 = 100$.

If Andy and Pablo each paint a house for US\$700, their total producer surplus is $(700 - 500) + (700 - 600) = \text{US\$}300$.

With fixed costs, the area above a marginal-cost supply curve measures revenue minus variable cost. Subtract fixed cost to obtain profit.

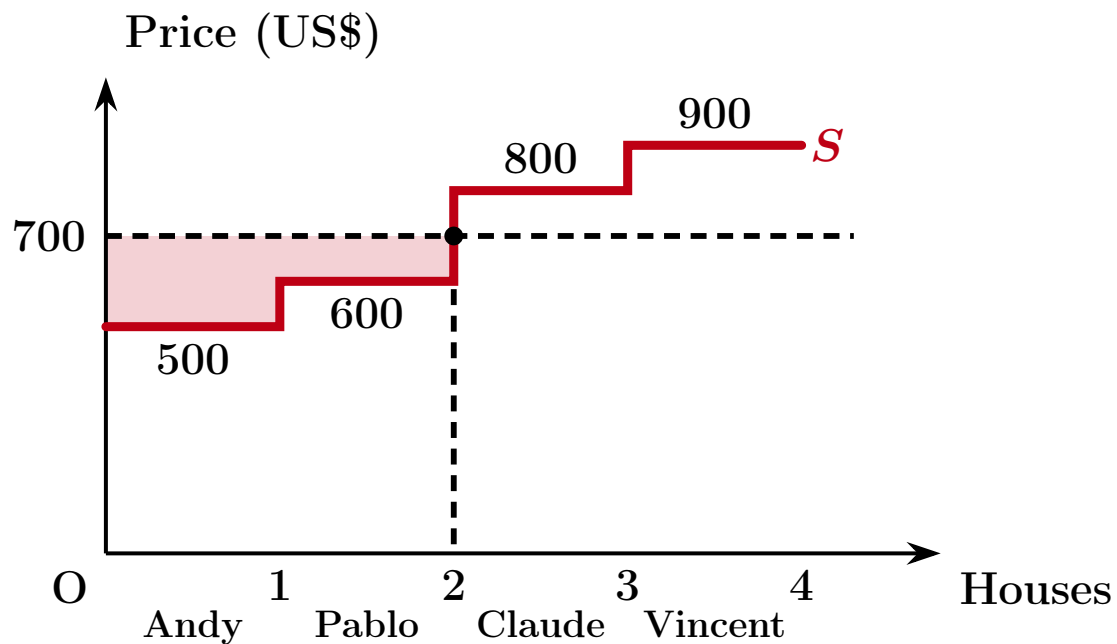
From Costs to the Supply Curve

At US\$550, only Andy is willing to paint. At US\$700, Andy and Pablo are willing. At US\$850, Claude joins them. At US\$950, all four are willing.

Order sellers from lowest to highest cost. The resulting supply curve shows the opportunity cost of each additional unit supplied.

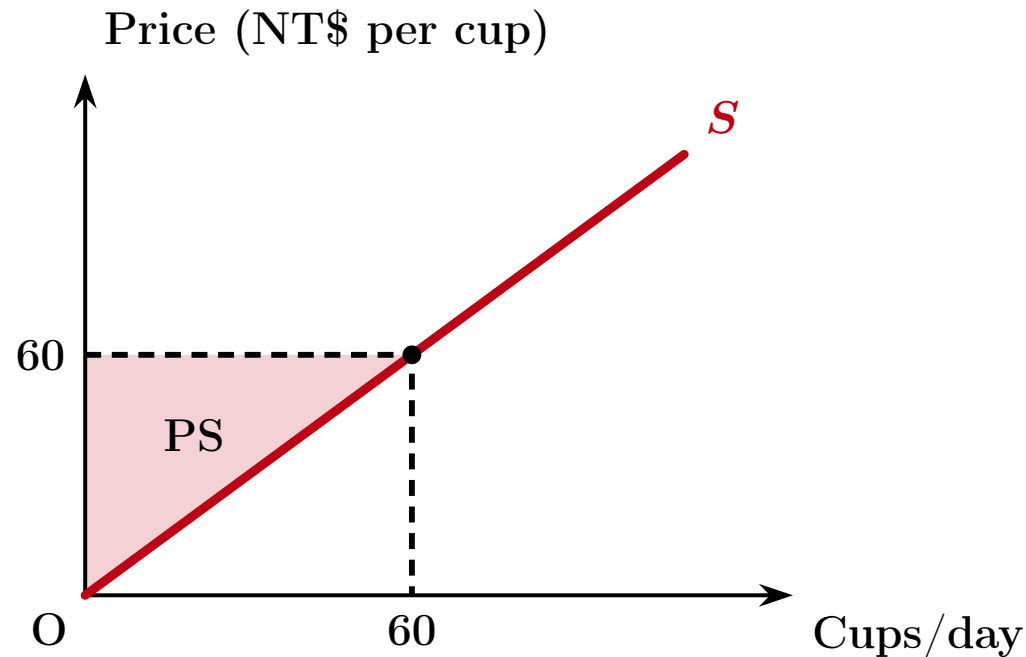
The **marginal seller** has the highest cost among those selling and is the first to leave as the price falls. For a smooth competitive supply curve, its height measures the marginal opportunity cost of production.

The House-Painting Supply Curve



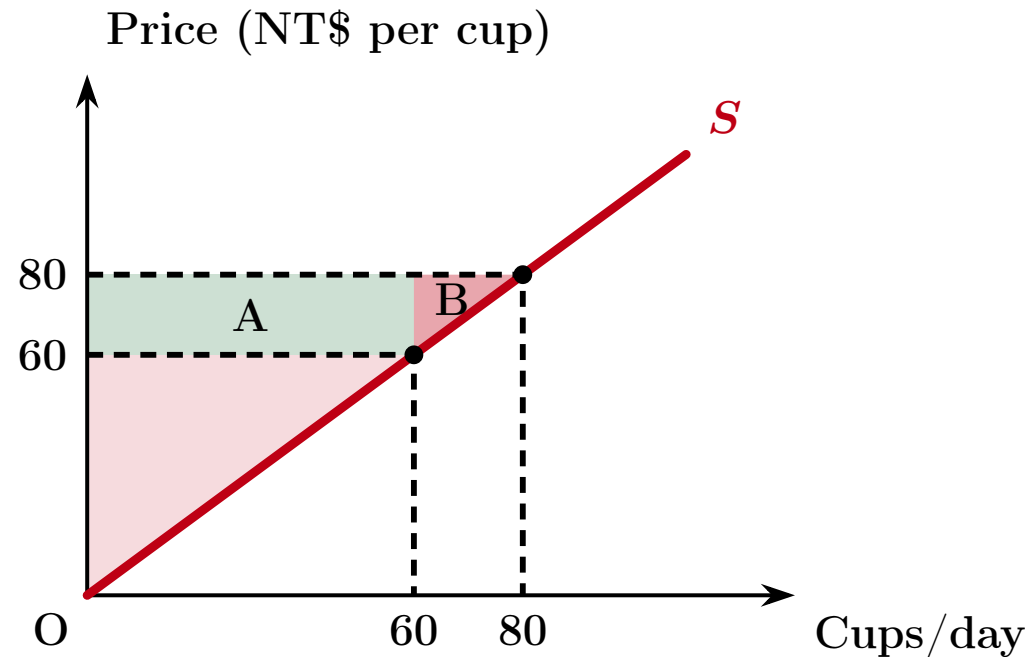
At US\$700, Andy and Pablo supply one painting job each. The shaded rectangles give $PS = (700 - 500) + (700 - 600) = \text{US\$}300$. Each step's height is the opportunity cost of the next job.

Producer Surplus above the Supply Curve



The hypothetical supply curve is $P = Q$. At NT\$60, sellers provide 60 cups. Producer surplus is the area above supply and below price: $\frac{1}{2} \times 60 \times 60 =$ NT\$1,800 per day.

A Higher Price Raises Producer Surplus



Holding supply fixed, a price rise from 60 to 80 increases sales to 80 if buyers purchase all units supplied. The original units gain A, NT\$1,200; additional units add B, NT\$200. Total PS rises from 1,800 to 3,200.

Total Surplus

Without taxes or subsidies, buyers' payments equal sellers' receipts.

Consumer surplus = Value to buyers – Payments,

Producer surplus = Receipts – Costs to sellers,

Total surplus = Consumer surplus + Producer surplus,

= Value to buyers – Costs to sellers.

The payment is a transfer between the two sides. The gain from trade comes from the value of the good exceeding its opportunity cost.

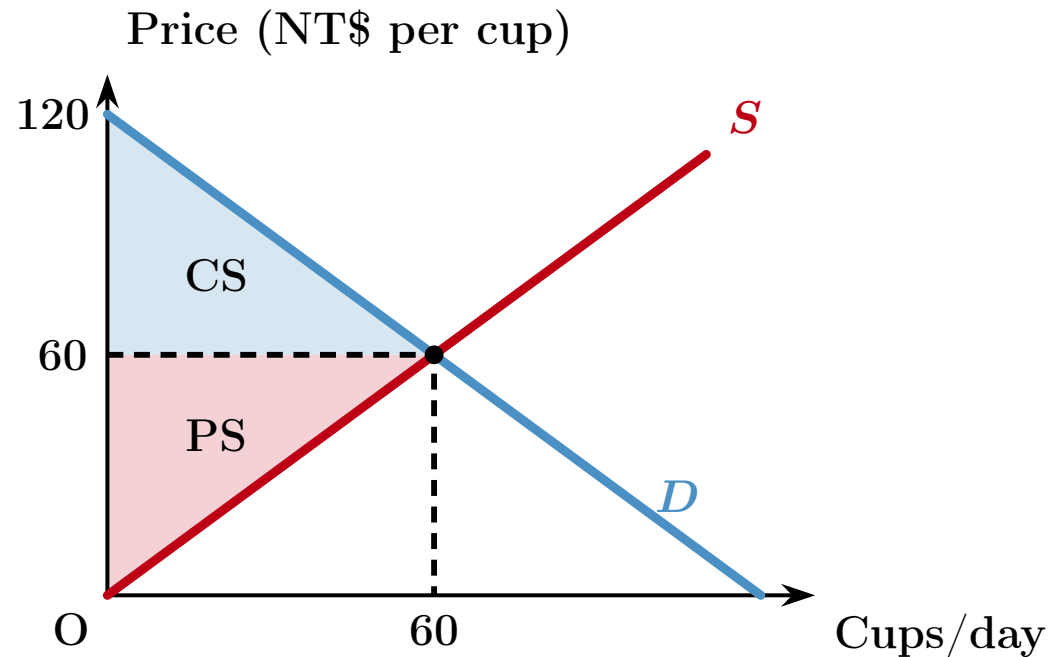
Efficiency and Equality

Definition. An allocation is **efficient** if it maximizes total surplus.

Equality concerns how evenly economic benefits are distributed. A large total surplus can coexist with an unequal distribution.

These are distinct criteria. A policy can change the distribution of gains and the total size of those gains. Calling an allocation efficient does not settle whether its distribution is desirable.

Surplus at the Competitive Equilibrium

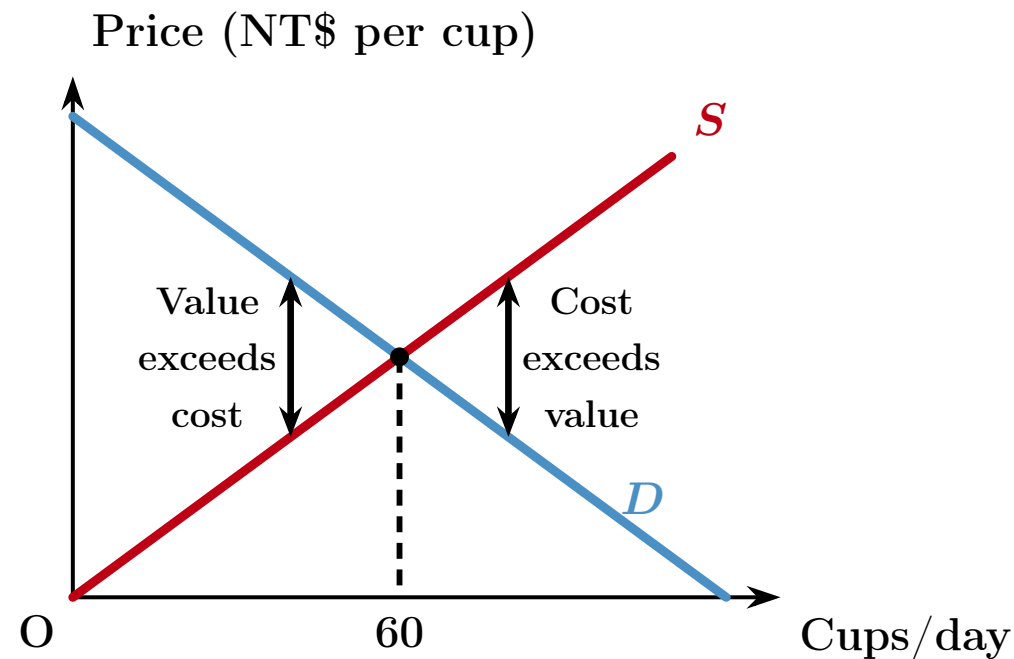


At $P = 60$ and $Q = 60$, consumer surplus is NT\$1,800 and producer surplus is NT\$1,800. Total surplus is NT\$3,600 per day, the area between demand and supply over the units traded.

Who Should Buy, and Who Should Produce?

- For a given quantity, allocate goods to the buyers with the highest willingness to pay. Replacing a lower-value buyer with a higher-value buyer raises total value.
- Use the sellers with the lowest opportunity costs. Replacing a higher-cost producer with a lower-cost producer lowers total cost.
- In a competitive equilibrium, willing buyers value units at least as much as the price, and willing sellers have costs no greater than that price.

Why the Equilibrium Quantity Is Efficient



Below 60 cups, an additional unit has value above its cost, so more trade raises total surplus. Beyond 60 cups, cost exceeds value, so extra production lowers total surplus. At 60, marginal value equals marginal cost.

A Numerical Check of Efficiency

Use $P_D = 120 - Q$ and $P_S = Q$. Suppose the highest-value buyers receive the cups and the lowest-cost sellers produce them.

At quantity 40, total value is $\frac{1}{2}(120 + 80)40 = 4,000$ and total cost is $\frac{1}{2}(40)40 = 800$. Total surplus is NT\$3,200.

At quantity 80, total value is $\frac{1}{2}(120 + 40)80 = 6,400$ and total cost is $\frac{1}{2}(80)80 = 3,200$. Total surplus is again NT\$3,200.

Both are NT\$400 below the NT\$3,600 available at quantity 60.

Discussion: Which Trades Create Gains?

Three buyers each want one used textbook, and three sellers each own one identical copy. Buyers' values are NT\$900, 700, and 400; sellers' opportunity costs are NT\$200, 500, and 800.

1. How many trades maximize total surplus? Match the highest values to the lowest costs.
2. Can a common price of NT\$600 support those trades?
3. Find consumer surplus, producer surplus, and total surplus at that price.

Answer: Which Trades Create Gains?

The first two trades have gains $900 - 200 = 700$ and $700 - 500 = 200$. A third trade would have gain $400 - 800 = -400$. The efficient quantity is two.

At NT\$600, the first two buyers want to buy, and the two lowest-cost sellers want to sell. The other buyer and seller stay out.

$$CS = (900 - 600) + (700 - 600) = 400,$$

$$PS = (600 - 200) + (600 - 500) = 500, \quad TS = 900.$$

The price divides the gains; it does not create the underlying NT\$900 gain.

Example: Reselling a Concert Ticket

Suppose a ticket holder values attending at NT\$400. Another fan values attending at NT\$900. The ticket has already been issued, and resale is allowed without transaction costs.

If they trade at NT\$600, the holder gains $600 - 400 = 200$ and the new attendee gains $900 - 600 = 300$. Total surplus rises by NT\$500, even though the number of tickets is unchanged.

Resale moves the ticket to a buyer with a higher willingness to pay. The original ticket payment is sunk for this decision. This efficiency gain does not imply that access is equally affordable.

When the Efficiency Result Applies

The competitive benchmark assumes price-taking buyers and sellers, informed choices, and no unaccounted effects on people outside the transaction.

Market failure occurs when a market does not allocate resources efficiently. Two possible causes are market power and externalities.

- **Market power** is the ability to influence price. A seller may restrict output to raise its price, leaving mutually beneficial trades unrealized.
- **Externalities** are uncompensated effects on people outside a transaction. If production causes pollution that sellers do not pay for, market supply understates social cost and output can be too high.

Takeaways

Gains from trade depend on value exceeding opportunity cost.

- Consumer surplus is willingness to pay minus payment; it is the area below demand and above price.
- Producer surplus is receipts minus the cost of units supplied; it is the area above supply and below price.
- Total surplus adds both sides' gains. Payments cancel as transfers in an untaxed market.
- Under the competitive benchmark, trade goes to high-value buyers and low-cost sellers, and the equilibrium quantity maximizes total surplus.
- Efficiency does not establish equality or remove the need to check assumptions.