Market Equilibrium & Efficiency

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Welfare Economics

- **Welfare Economics**: The study of how the allocation of resources affects economic well-being.
- Today we will focus on how consumers and producers in a market are affected and will define measures of their economic well-being.
- In the future, we will analyze how actors outside a market can be affected.

Consumer Surplus

- **Willingness to pay:** The maximum amount that a buyer will pay for a good/service.
- **Consumer surplus:** A measure of how well-off a buyer is due to the purchase of a good/service. Calculated as

$$CS = WTP - P$$

- Consumer surplus is used to measure the well-being of consumers.
- In particular, it measures the benefit buyers receive from a good *as the buyers themselves perceive it*.

Consumer Surplus

Example

Table 1 shows the willingness to pay of Kristina, Josh, Andrea, and Jane for one of Al's Mookie burgers (specifically, the first one they consume). If the market price of these burgers is $5.50, what is the quantity demanded? How much consumer surplus does each consumer realize? What is the total consumer surplus in the market as a whole?

Table: WTP for Mookie Burgers

Buyer	*WTP*
Kristina	*$10.00*
Jane	*$8.50*
Josh	*$5.50*
Andrea	*$4.50*

Consumer Surplus

Example

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Table: WTP for Mookie Burgers

Buyer	*WTP*
Kristina	*\$10.00*
Jane	*\$8.50*
Josh	*\$5.50*
Andrea	*\$4.50*

$Q_D = 3$. Surplus/person: KV: \$4.50, Jane: \$3, Josh: \$0, Andrea: \$0. Andrea does not buy the burger since $P > WTP$. Total CS = \$7.50.

Consumer Surplus

- The demand curve derived from this looks as follows:

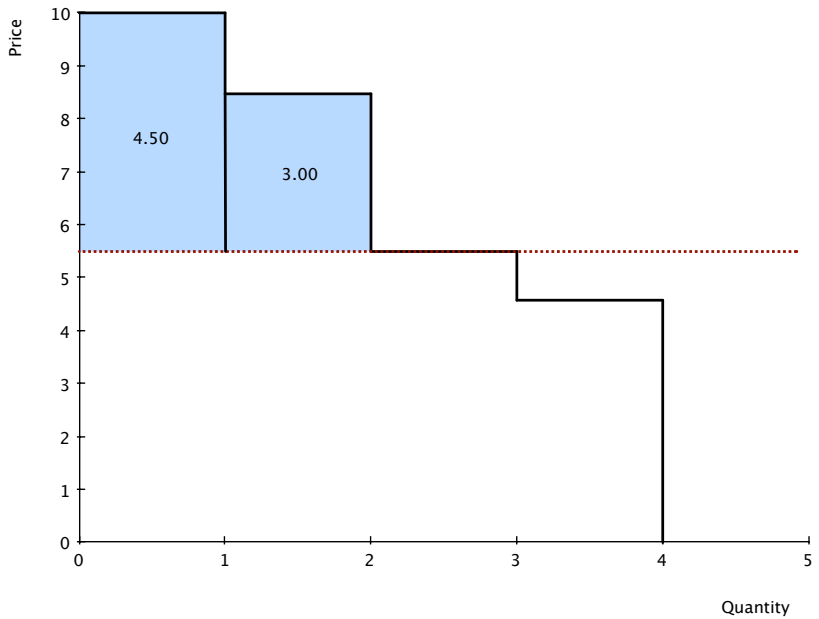

Figure: Demand for Mookie Burgers

Consumer Surplus

- Notice that at any quantity, the demand curve shows the willingness to pay of the *marginal buyer*.
- Thus, we can represent consumer surplus as the area between demand and the price.
- If there were enough people and the good was perfectly divisible, the steps would get smaller and smaller to eventually form a our usual demand curve.

Consumer Surplus

Example

Consider the demand curve for used economics textbooks for our class. If the market price was $40, what would be the consumer surplus? What if it was $30?

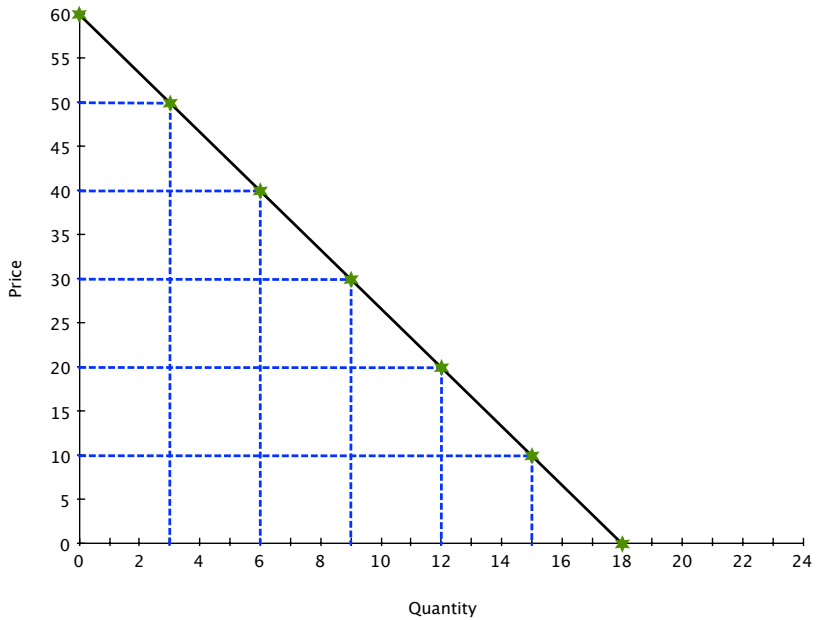

Figure: Demand for Textbooks

Consumer Surplus

Example

Consider the demand curve for used economics textbooks for our class. If the market price was $40, what would be the consumer surplus? What if it was $30?

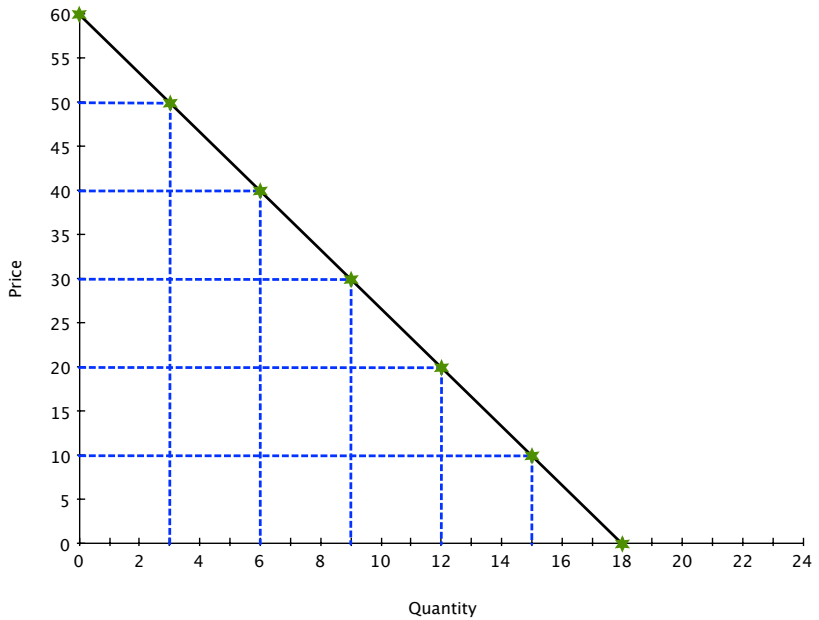

Figure: Demand for Textbooks

At $40, CS $= (1/2)(20)(6) = \$60$.

Consumer Surplus

Example

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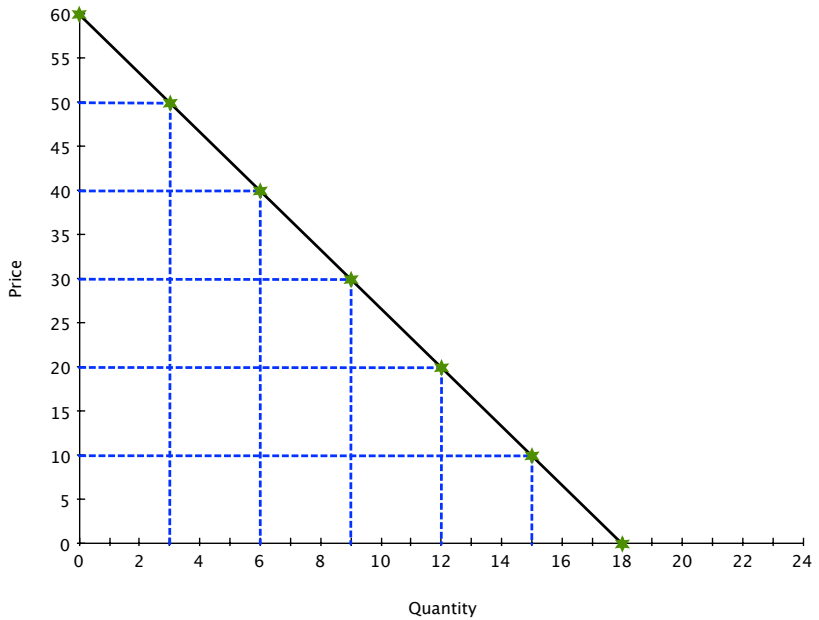

Figure: Demand for Textbooks

At $40, CS $= (1/2)(20)(6) = \$60$.
At $30, CS$=(1/2)(30)(9) = \$135$.

Consumer Surplus

- Notice that when prices decrease, consumer surplus increases.

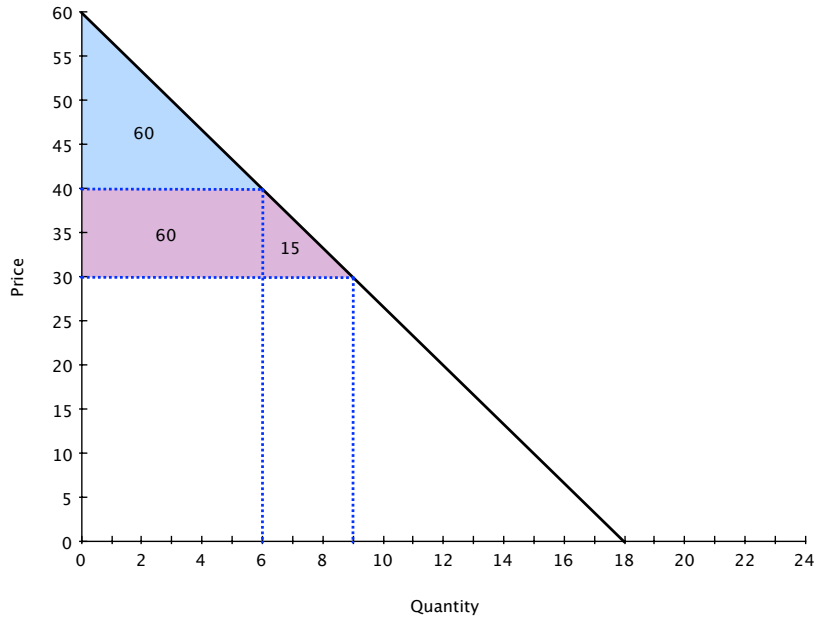

Figure: CS in the Market for Textbooks

1. The decrease in prices increases CS for individuals who were already purchasing the good
2. New buyers enter the market due to the lower price and realize CS

Producer Surplus

- **Seller Cost:** The value of everything a seller must give up to produce a good/service.
- **Producer Surplus:** A measure of well-being for producers who sell a good/service. Calculated as

$$PS = P - SC$$

Producer Surplus

Example

Consider the market for homes. There are four builders in this market, each of which can build a house with the costs shown in Table 2. Consider what the supply curve would look like under this cost structure. If the market price for houses is $150,000, what is the quantity supplied and producer surplus in this market? If the price were $250,000?

Table: Cost of Building

Seller	*Cost*
Ace's Builders	*$100,000*
Three Brothers	*$50,000*
ATP	*$200,000*
Craig's Housing	*$300,000*

Producer Surplus

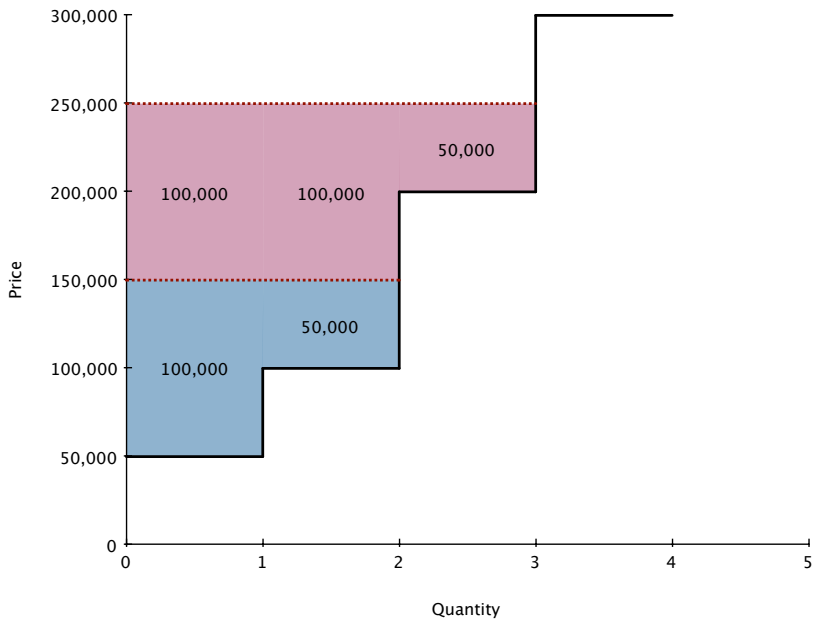

Figure: Supply of Homes

- At P = 150k: $Q_S = 2$, PS = (150K - 50K) + (150K - 100K) = \$150K.
- At P = 250K: $Q_S = 3$, PS = (250K - 50K) + (250K - 100K) + (250K - 200K) = \$400K.
- At any quantity, the price given by the supply curve shows the cost of the *marginal seller*.
- Thus, we can represent producer surplus as the area b/w the price and the supply curve.

Efficiency

- **Total Surplus:** A measure of the economic well-being of a society.
- Calculated as

$$TS = CS + PS = (WTP - P) + (P - SC) = WTP - SC$$

- Simply the value to buyers minus the cost to sellers.
- Other actors may realize surplus from markets, even if they don't participate. We will study how that affects surplus later.

Efficiency

- Consider a market at its equilibrium of supply and demand. Is this equilibrium allocation of resources efficient?

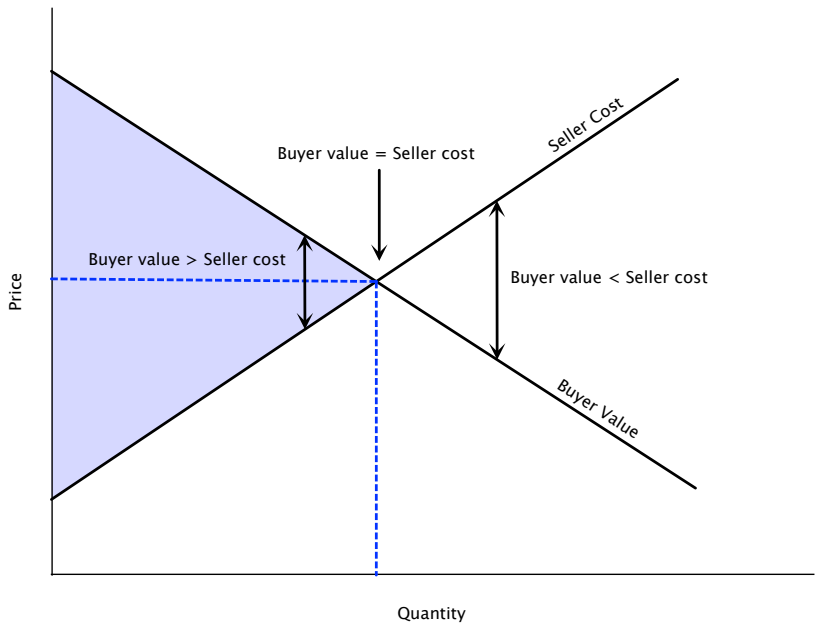

Figure: Total Surplus at Equilibrium

Efficiency

- Insights:
  1. Free markets allocate the supply of goods to the buyers who value them most.
  2. Free markets allocate the demand for goods to the sellers who can produce them at the lowest cost.
  3. Free markets produce the quantity of goods that maximizes the sum of consumer and producer surplus.

Efficiency

- If the quantity of goods exchanged was less than the market quantity, we would have unrealized gains from trade. These are transactions for which $BV > SC$, so TS would increase if these occurred.
- If the quantity of goods exchanged was greater than the market quantity, we would have inefficient transactions. These are transactions for which $BV < SC$, so TS would decrease if these occurred.
- **In a perfectly competitive market, the market outcome is efficient.**

Efficiency

Example

Table 3 shows the willingness to pay and seller costs of four buyers and sellers in the market for white Vans. Assume each seller has one pair of shoes to sell and each buyer only wants to buy one pair.

Table: Market for White Vans

WTP	*Seller Cost*
\$45	*\$20*
\$35	*\$40*
\$60	*\$35*
\$40	*\$45*

1. *What is the equilibrium price and quantity in this market? What is the value of total surplus?*

Efficiency

Example

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WTP	*Seller Cost*
\$45	*\$20*
\$35	*\$40*
\$60	*\$35*
\$40	*\$45*

1. *What is the equilibrium price and quantity in this market? What is the value of total surplus?*

$P^* = \$40,\ Q^* = 3$

Efficiency

Example

Table 3 shows the willingness to pay and seller costs of four buyers and sellers in the market for white Vans. Assume each seller has one pair of shoes to sell and each buyer only wants to buy one pair.

Table: Market for White Vans

WTP	*Seller Cost*
\$45	*\$20*
\$35	*\$40*
\$60	*\$35*
\$40	*\$45*

1. *What is the equilibrium price and quantity in this market? What is the value of total surplus?*

$P^* = \$40,\ Q^* = 3$
$TS = WTP - SC = (60 - 20) + (45 - 35) + (40 - 40) = \$50.$

Efficiency

Example

Table 4 shows the willingness to pay and costs of five sellers and buyers in the market for new textbooks. Each buyer would like one textbook and each seller has one book to sell. Use the table to answer the following questions.

Table: WTP and Seller Costs for Textbooks

WTP	*Seller Costs*
$180	*$85*
$150	*$150*
$100	*$100*
$200	*$125*
$125	*$60*

1. *What is the equilibrium price and quantity in this market?*
2. *At the market equilibrium, what is the consumer, producer, and total surplus realized?*
3. *Suppose the demand curve for textbooks shifted such that each buyer values a textbook $50 less than before. What is the new market price and quantity exchanged? What is the new total surplus?*

Efficiency

Table: WTP and Seller Costs for Textbooks

WTP	Seller Costs	CS	PS	TS	WTP′	CS′	PS′	TS′
\$200	\$60	\$75	\$65	\$140	\$150	\$50	\$40	\$90
\$180	\$85	\$55	\$40	\$95	\$130	\$30	\$15	\$45
\$150	\$100	\$25	\$25	\$50	\$100	\$0	\$0	\$0
\$125	\$125	\$0	\$0	\$0	\$75	—	—	—
\$100	\$150	—	—	—	\$50	—	—	—

1. $(P^*, Q^*) = (\$125, 4)$.
2. CS = \$155, PS=\$130, TS=\$285.
3. $(P^{*\prime}, Q^{*\prime}) = (\$100, 3)$. TS′=\$135.

Readings and Assignments

- Today: Mankiw Ch. 7
- Next time: Mankiw Ch. 5
- Problem Set 1, section 4
- **Homework 1 due on 5/23 by 11:55PM**
  - Covers lectures 1A-2B