3.2 — Market Competition & Surpluses

ECON 306 • Microeconomic Analysis • Fall 2022
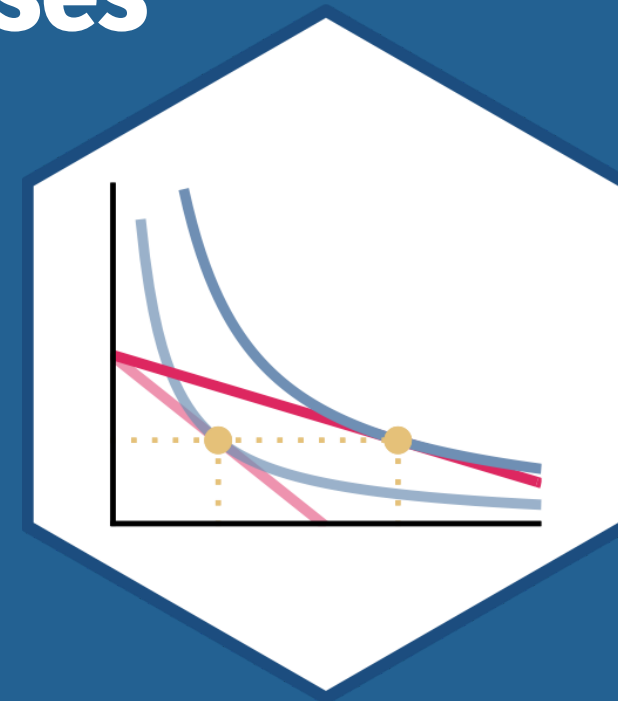
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 [ryansafner/microF22](https://github.com/ryansafner/microF22)

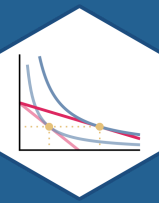 microF22.classes.ryansafner.com

Outline

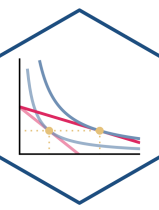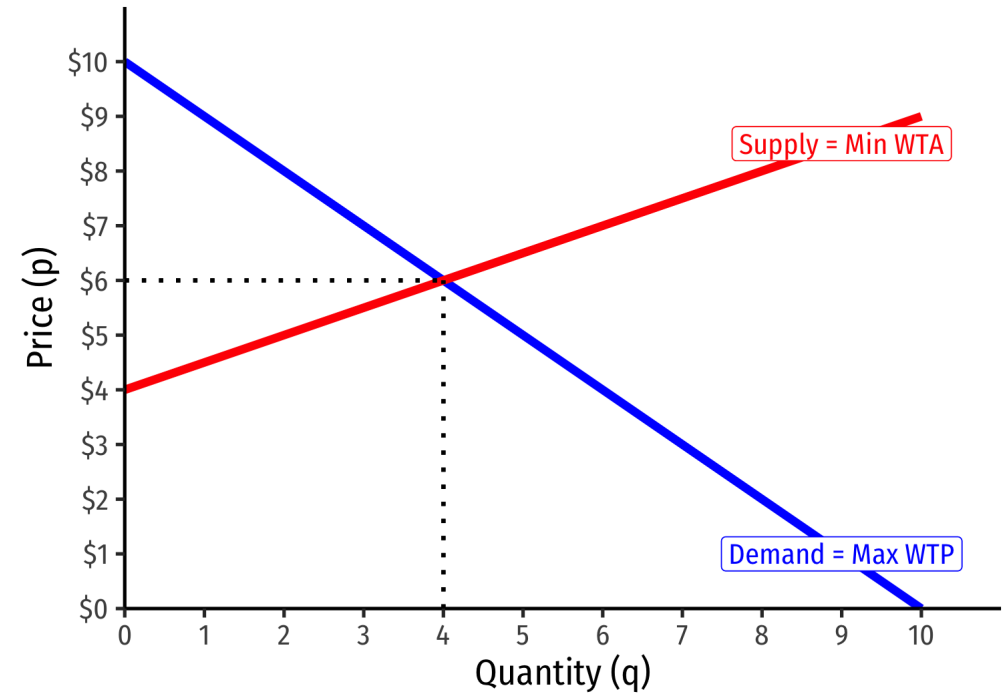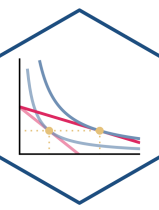# The Algebra of Calculating Equilibrium

The Algebra of Calculating Equilibrium

- Simple algebra to find equilibrium prices and quantities if we know supply and demand functions

- Remember, supply and demand are each mathematical functions relating price to quantity:

  ○ Demand: $q_D = 10 - p$
  ○ Supply: $q_S = 2p - 8$

- We know at equilibrium: $q_D = q_S$
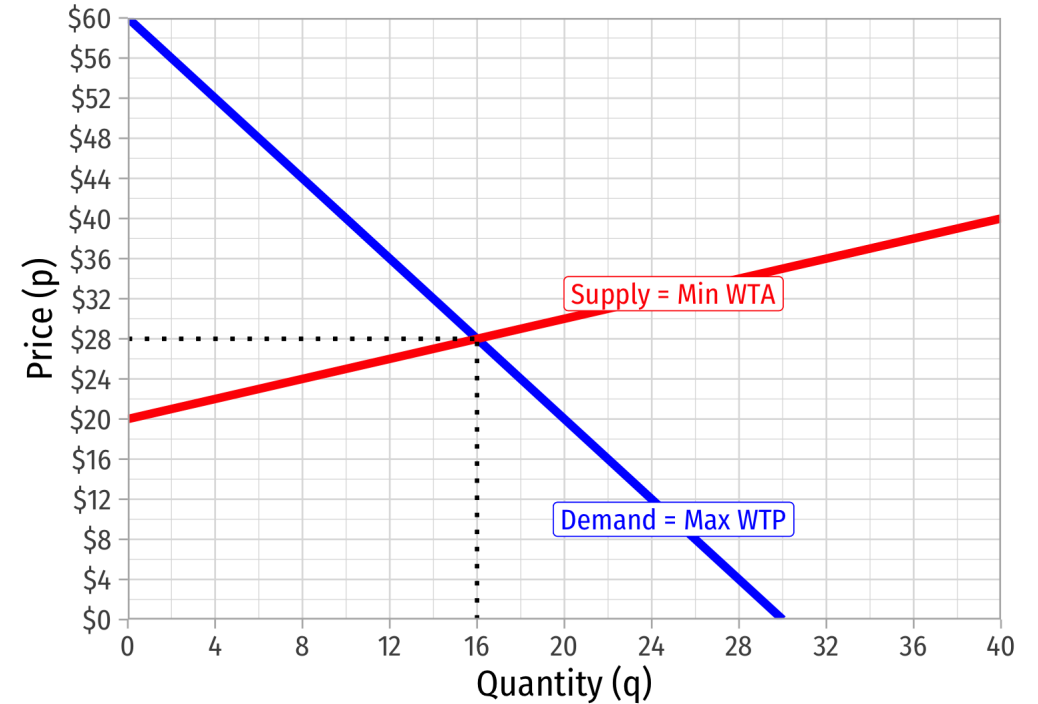
Calculating Equilibrium: Another Example
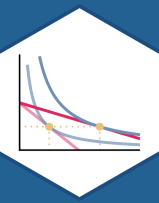
Example: Let the supply and demand functions for a market be:

$$q_D = 30 - 0.5p$$
$$q_S = 2p - 40$$

1. Find equilibrium quantity and price $(q^\star, p^\star)$.

2. Sketch a rough graph.
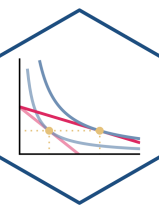
Price Competition in Markets

Price Competition in Markets I

- Markets allocate resources based on individuals' **reservation prices**:

  - Buyers' **max. willingness to pay**
  - Sellers' **min. willingness to accept**

- **Goods flow to those who value them the highest and away from those who value them the lowest**
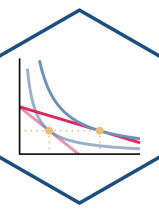
Price Competition in Markets II

- It might <u>look like it</u>, but competition in markets is **NOT** between buyers vs. sellers!

- In markets:

    - **buyers compete with other buyers** &
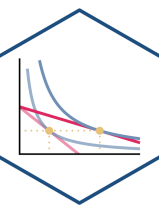   - **sellers compete with other sellers**

Price Competition Between Buyers

- Buyers want to pay the *lowest* price to buy a good

- But they face competition from other buyers over the same scarce goods

- Buyers attempt to *raise their bids above others' reservation prices* to obtain the goods
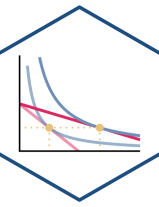
Price Competition Between Sellers

- Sellers want to get the *highest* price for a good they sell

- But they face competition from other sellers over the same potential customers

- Sellers attempt to *lower their asking prices below others' reservation prices* to sell their goods
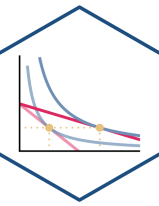
An Example

- Imagine a small public horse market

- 3 people, A, B, and C each own 1 horse

- 3 people, D, E, and F each are potentially interested in buying a horse

This example is based on Eugen von Bohm-Bawerk's famous example in *Capital and Interest* (1884)

An Example

Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
C	Minimum WTA: $600
D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

- Imagine a small public horse market

- 3 people, A, B, and C each own 1 horse

- 3 people, D, E, and F each are potentially interested in buying a horse
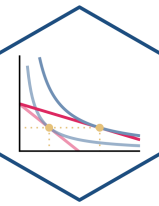
An Example
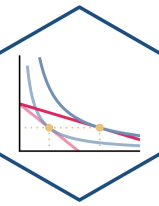
Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
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D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

Price: $400

- Suppose Buyer F announces she will pay **$400** for a horse

- Only Seller A is willing to sell at $400

- Buyers D, E, and F are willing to buy at $400

  - D and E are willing to pay *more* than F to obtain the 1 horse
  - A **shortage**: 3 buyers for 1 seller!
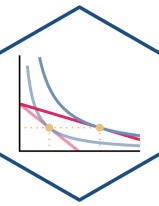 - They raise their bids *above* $400 to attract sellers

An Example

Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
C	Minimum WTA: $600
D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

Price: $600

- Suppose Seller C announces he will sell his horse for $600

- Only Buyer D is willing to buy at $600

- Sellers A, B, and C are willing to sell at $600

  - A and B are willing to accept *less* than C to sell their horses
  - A **surplus**: 3 sellers for 1 buyer!
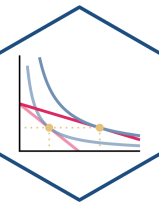 - They lower their asks *below* $600 to attract buyers

An Example

Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
C	Minimum WTA: $600
D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

Price: $500

- If the market price reaches $500 (through bids and asks changing):

- Sellers A and B sell their horses for $500 each
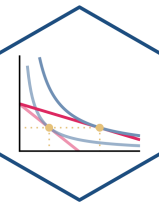
- Buyers D and E buy them at $500 each

An Example

Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
C	Minimum WTA: $600
D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

Price: $500

- At $500, B and E are the **"marginal"** buyer and seller, the "last" ones that *just* got off the fence to exchange in the market

  - B has WTA *just* low enough to sell
  - E has WTP *just* high enough to buy

- The marginal pair actually are the ones that "set" the market price!

An Example

Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
C	Minimum WTA: $600
D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

Price: $500

- Notice the most possible exchanges take place at a market price of $500

  - 2 horses get exchanged

- Any price *above* or *below* $500, only 1 horse would get exchanged

  - Also, at least one other buyer or seller would raise/lower their bid/ask

An Example
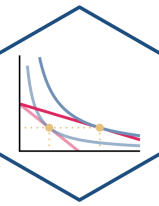
Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
C	Minimum WTA: $600
D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

Price: $500

- At $500, C and F are the **"excluded"** buyers and sellers
  - C has WTA *too high* to sell
  - F has WTP *too low* to buy

An Example
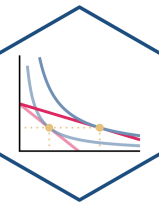
Person	Reservation Price
A	Minimum WTA: $400
B	Minimum WTA: $500
C	Minimum WTA: $600
D	Maximum WTP: $600
E	Maximum WTP: $500
F	Maximum WTP: $400

Price: $500

- At $500, A and D are the **"inframarginal"** buyers and sellers

  - A has WTA *lower* than market price, earns extra $100 surplus from exchange
  - D has WTP *higher* than market price, earns extra $100 surplus from exchange

- These buyers and sellers benefit *the most* from exchange
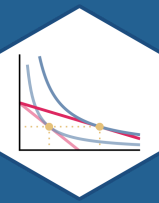
Economic Surplus

Market-Clearing Prices

- Supply and demand set the market-clearing price for all units exchanged (bought and sold)
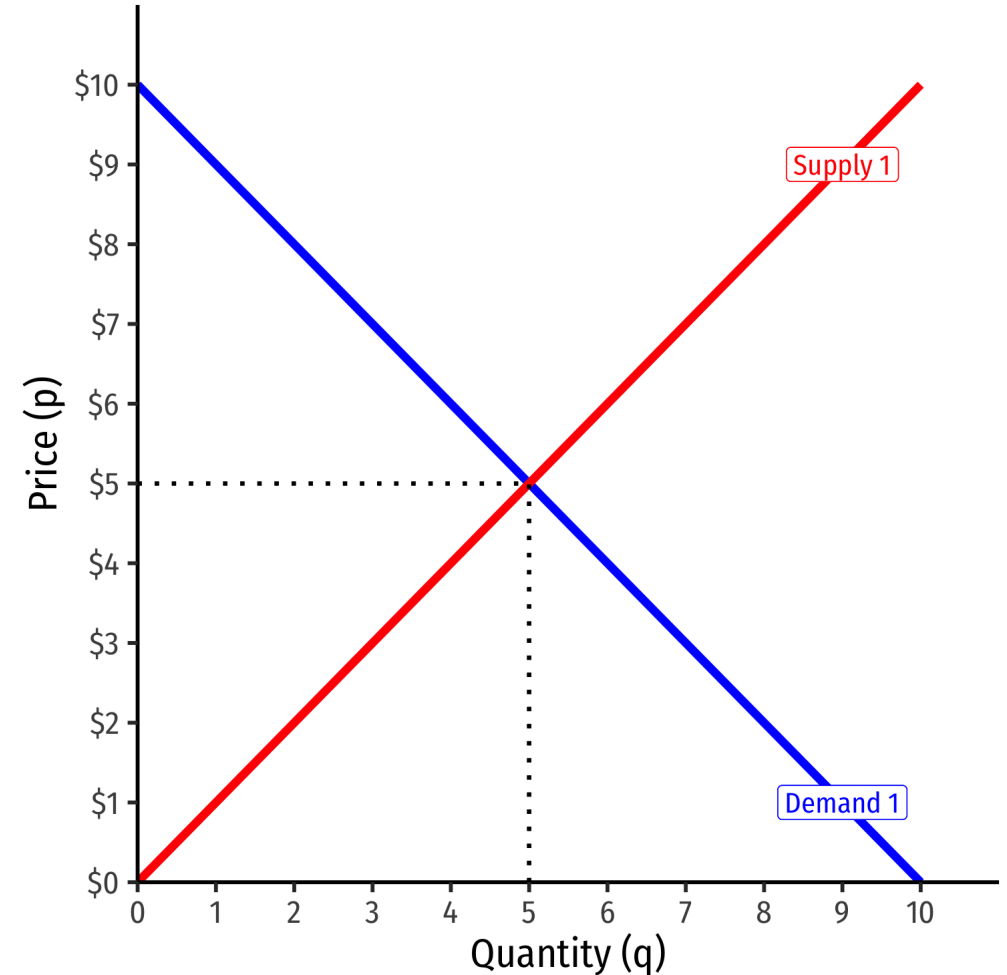
Consumer Surplus I
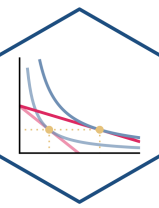
- Demand function measures how much you would *hypothetically* be willing to pay for various quantities

  - "reservation price"

- You often *actually* pay (the market-clearing price, p^*) a lot less than your reservation price

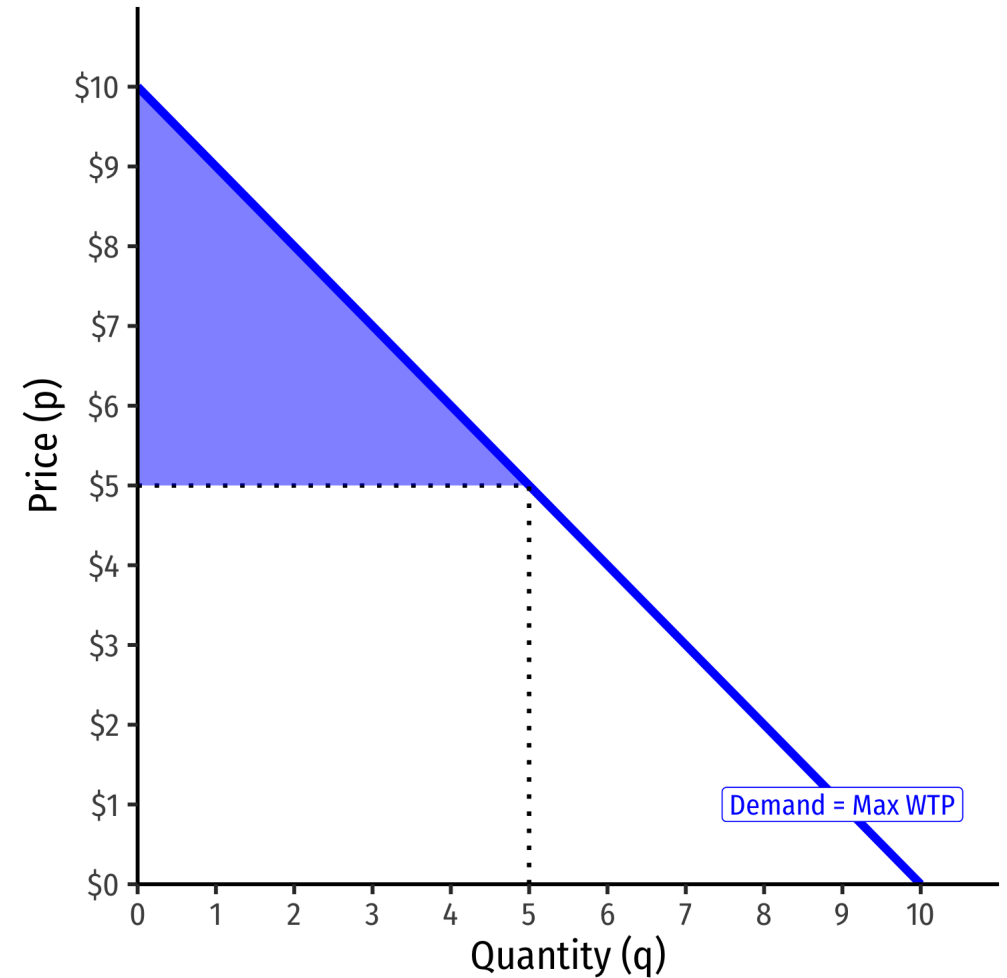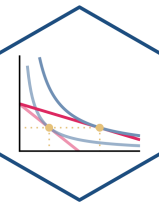- The difference is **consumer surplus**

$$CS = WTP - p^*$$
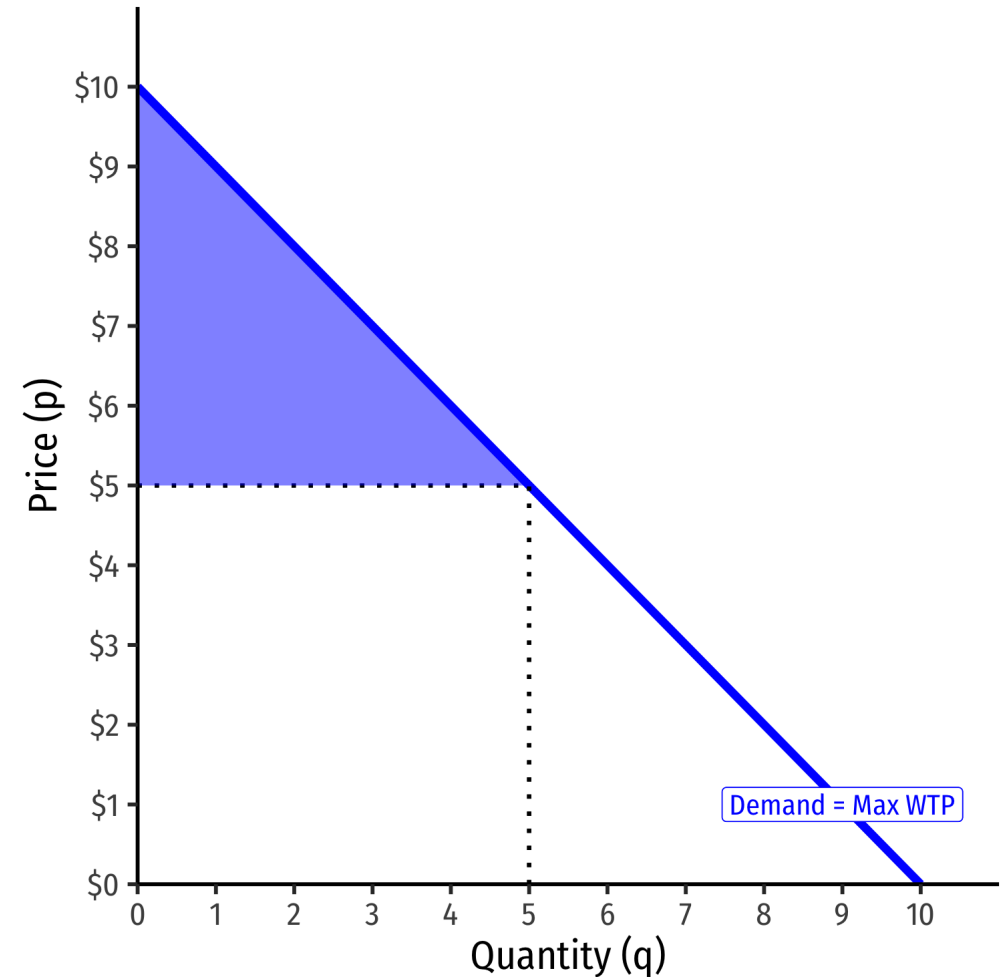
Consumer Surplus II
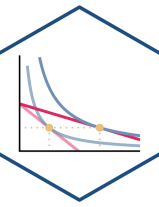
$$CS = \frac{1}{2}bh$$

$$CS = \frac{1}{2}(5 - 0)(\$10 - \$5)$$

$$CS = \$12.50$$

Consumer Surplus III

- An increase in market price *reduces* consumer surplus
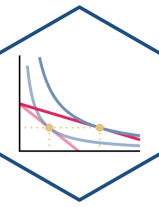
$$CS' = \frac{1}{2}bh$$

$$CS' = \frac{1}{2}(3-0)(\$10 - \$7)$$

$$CS' = \$4.50$$

Demand = Max WTP
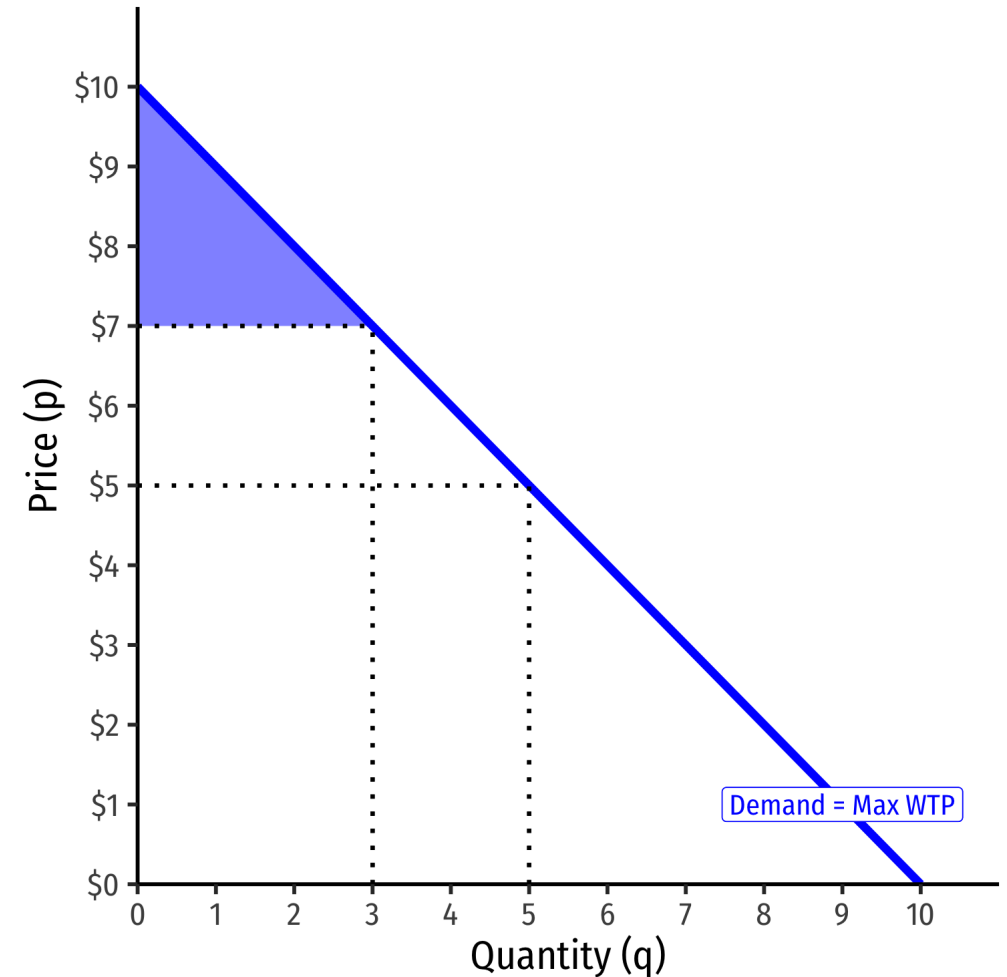
Consumer Surplus IV

- An decrease in market price *increases* consumer surplus

$$CS' = \frac{1}{2}bh$$
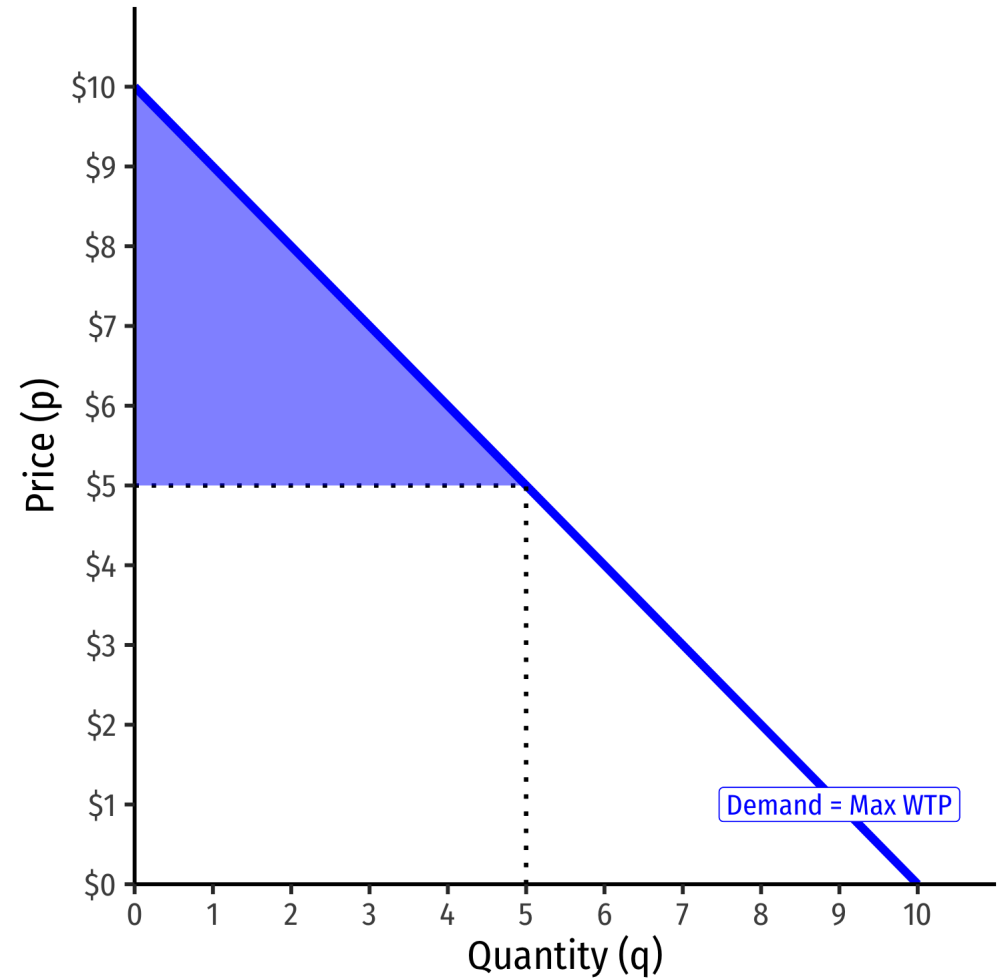
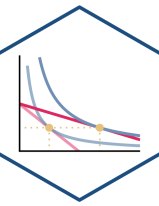$$CS' = \frac{1}{2}(7-0)(\$10-\$3)$$

$$CS' = \$24.50$$

Consumer Surplus V

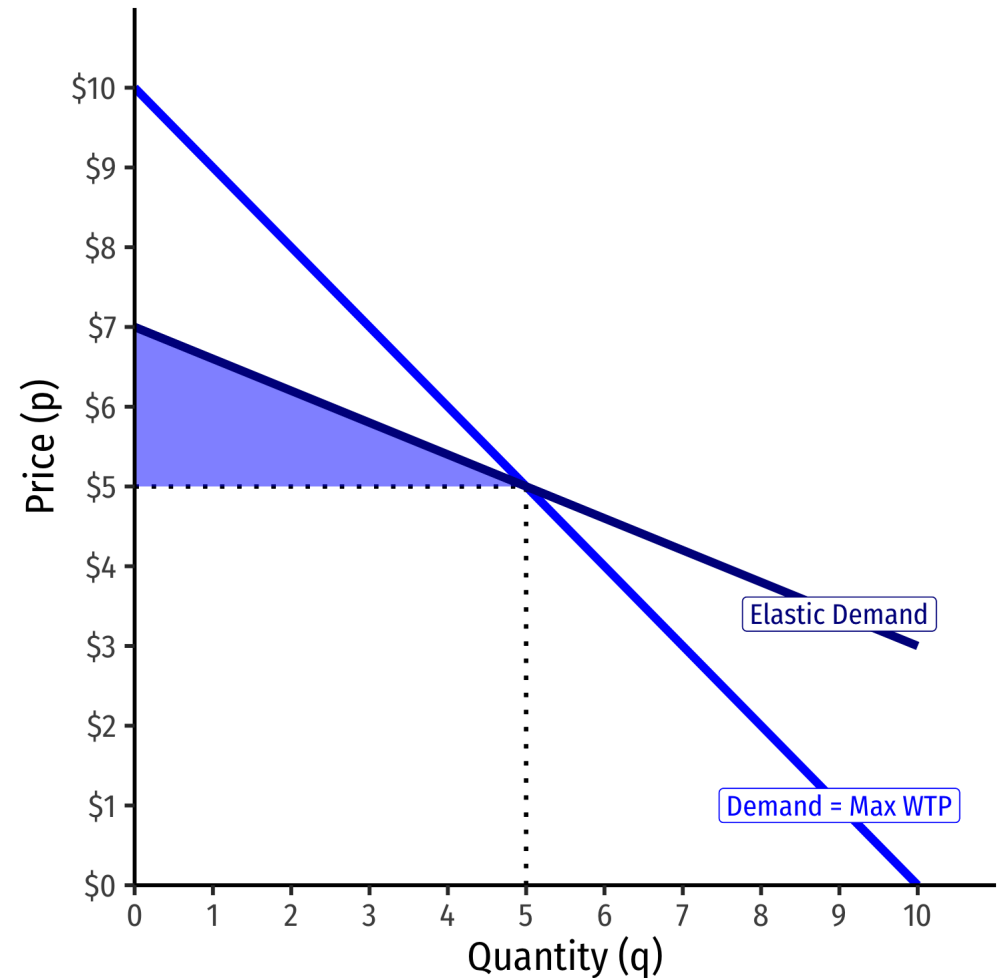- A relatively **inelastic** demand curve generates *more* consumer surplus
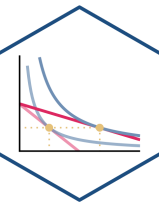
$$CS = \frac{1}{2}(5-0)(\$10 - \$5)$$
$$CS = \$12.50$$

Demand = Max WTP

Consumer Surplus V

- A relatively **inelastic** demand curve generates *more* consumer surplus

$$CS = \frac{1}{2}(5-0)(\$10 - \$5)$$
$$CS = \$12.50$$

- A relatively **elastic** demand curve generates *less* consumer surplus
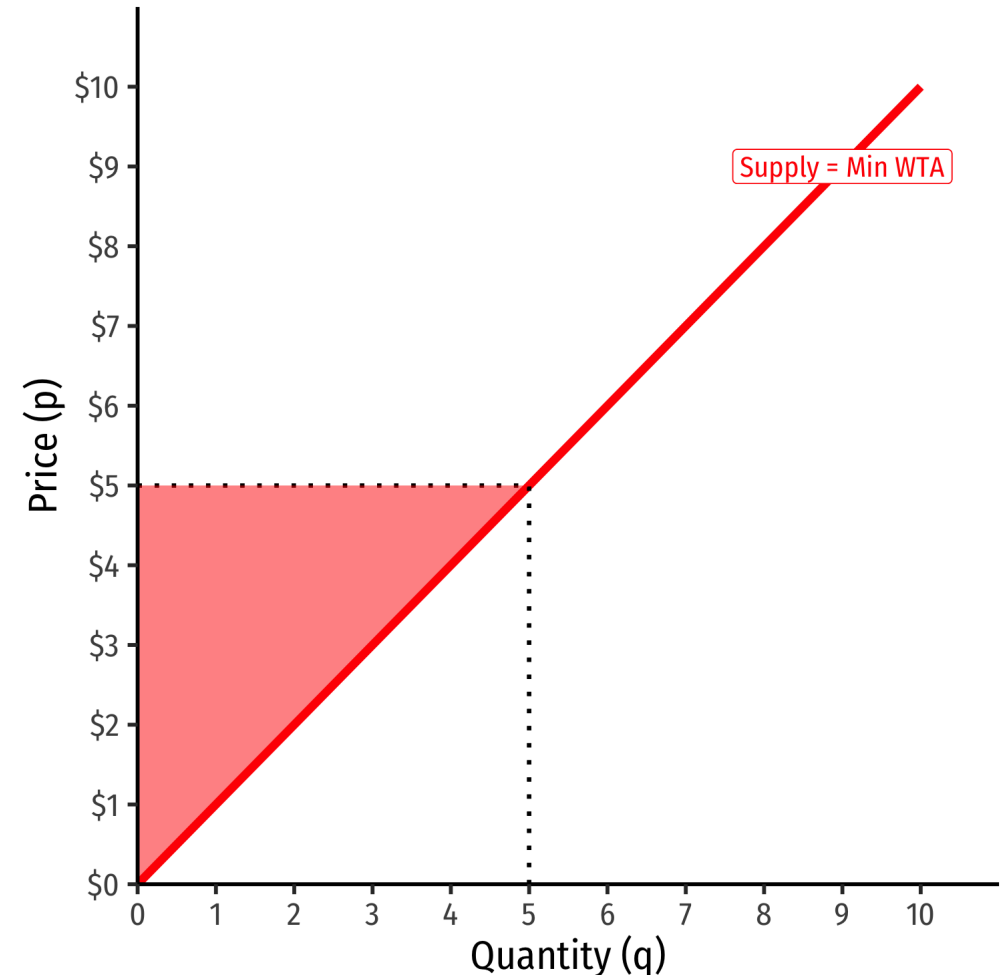
$$CS = \frac{1}{2}(5-0)(\$7 - \$5)$$
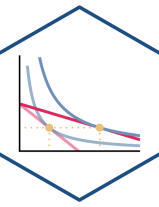$$CS = \$5.00$$

Producer Surplus I

- Supply function measures how much you would *hypothetically* be willing to accept to sell various quantities

  - "reservation price"

- You often *actually* receive (the market-clearing price, p^*) a lot more than your reservation price

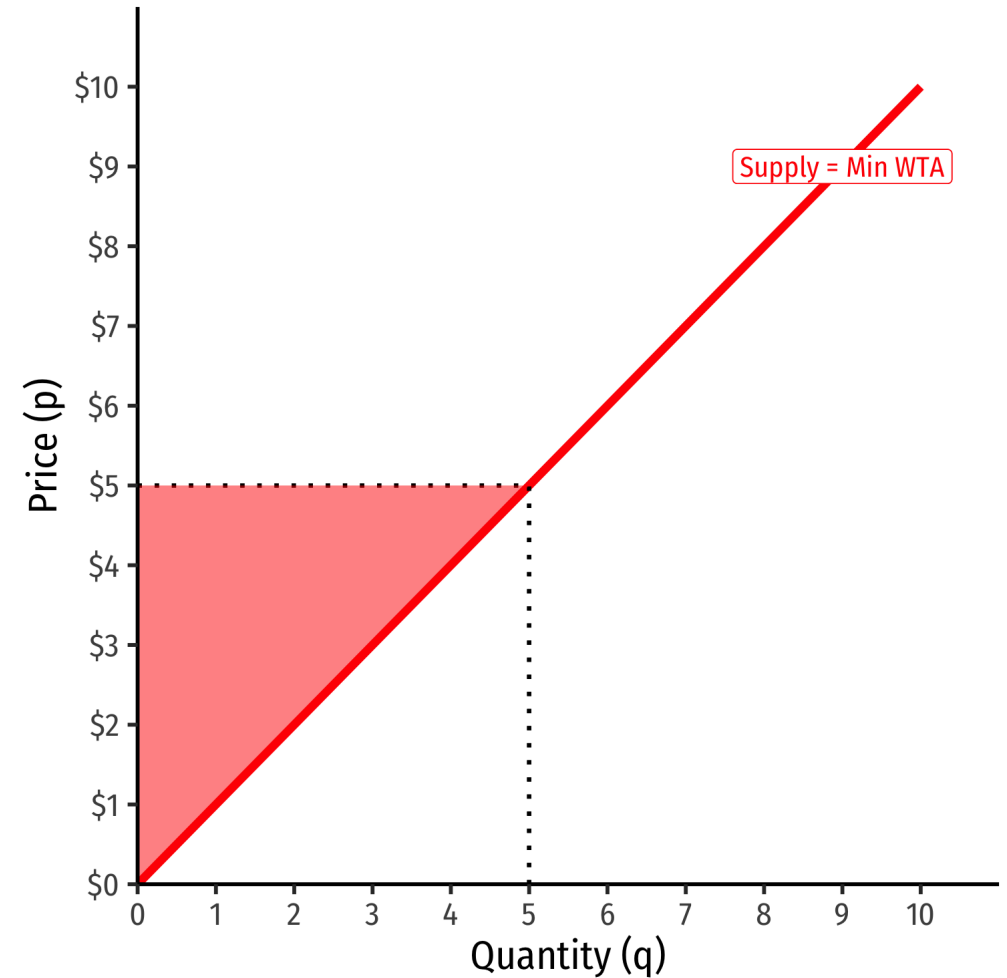- The difference is **producer surplus**

$$PS = p^* - WTA$$
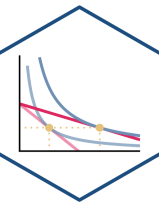
Producer Surplus II

$$PS = \frac{1}{2}bh$$

$$PS = \frac{1}{2}(5 - 0)(\$5 - \$0)$$
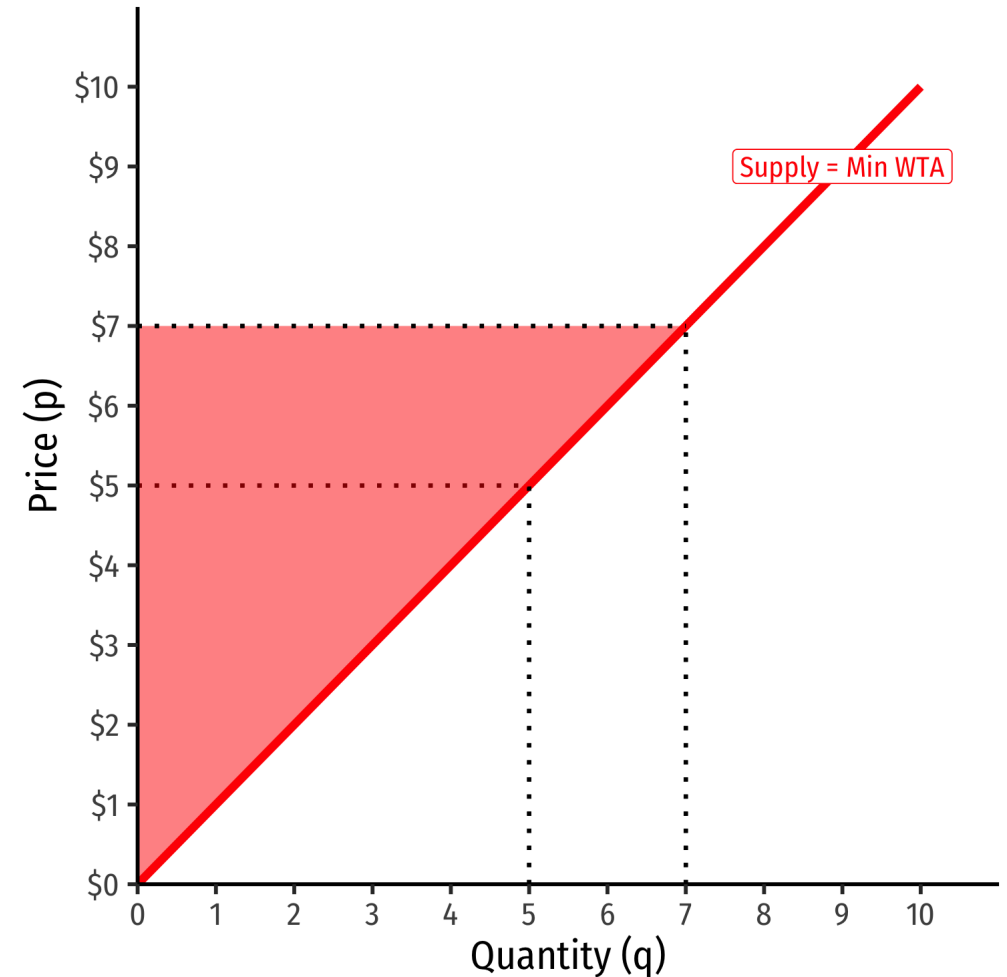
$$PS = \$12.50$$

Producer Surplus III

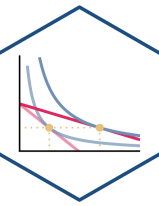- An increase in market price *increases* producer surplus

$$PS' = \frac{1}{2}bh$$

$$PS' = \frac{1}{2}(7 - 0)(\$7 - \$0)$$

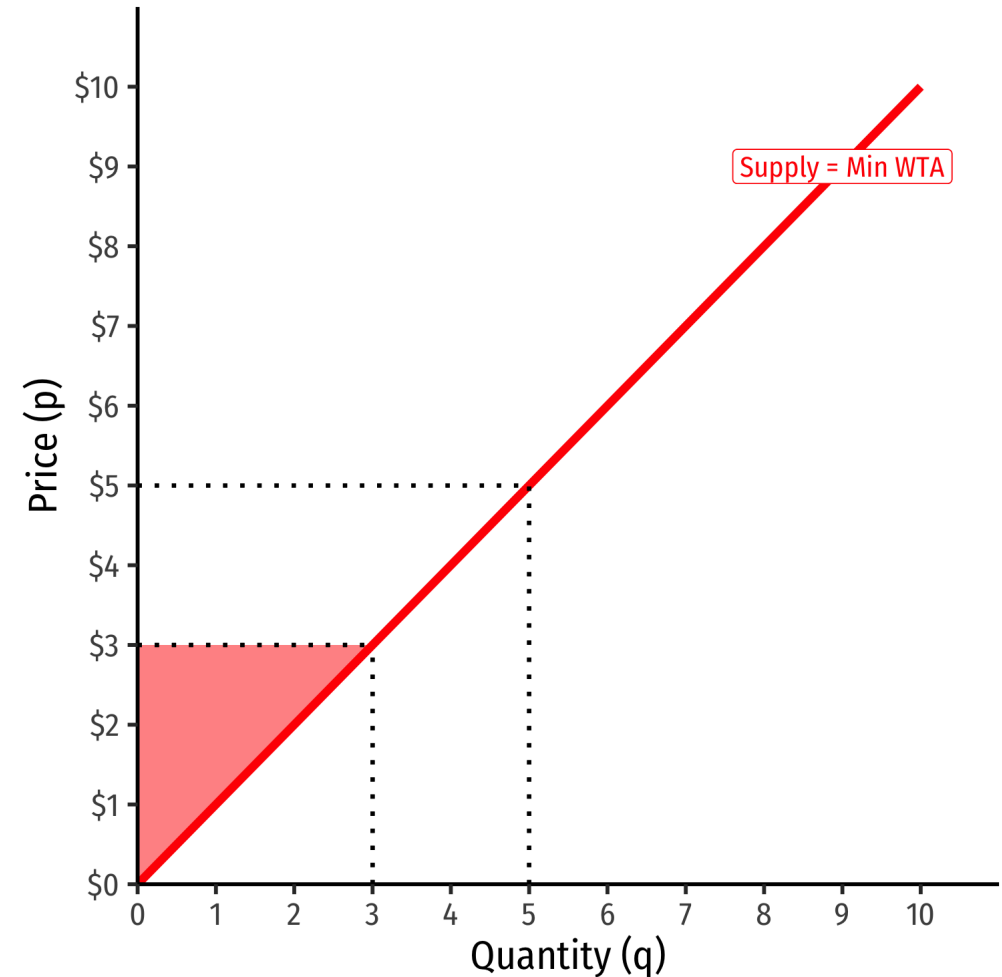$$PS' = \$24.50$$

Producer Surplus IV

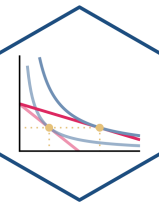- An decrease in market price *decreases* producer surplus

$$PS' = \frac{1}{2}bh$$

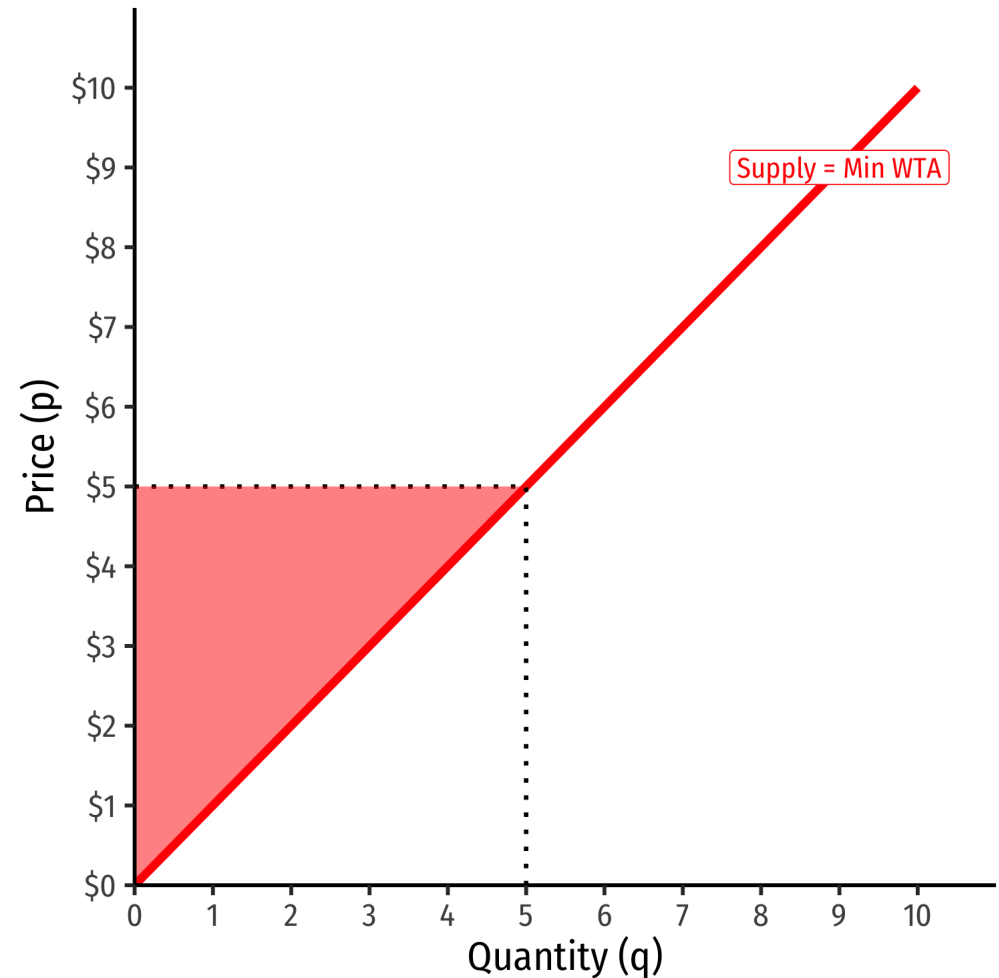$$PS' = \frac{1}{2}(3-0)(\$3-\$0)$$

$$PS' = \$4.50$$

Producer Surplus V

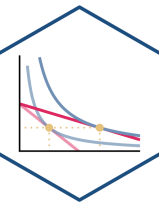- A relatively **inelastic** supply curve generates *more* producer surplus

$$PS = \frac{1}{2}(5 - 0)(\$5 - \$0)$$

$$PS = \$12.50$$

Producer Surplus V

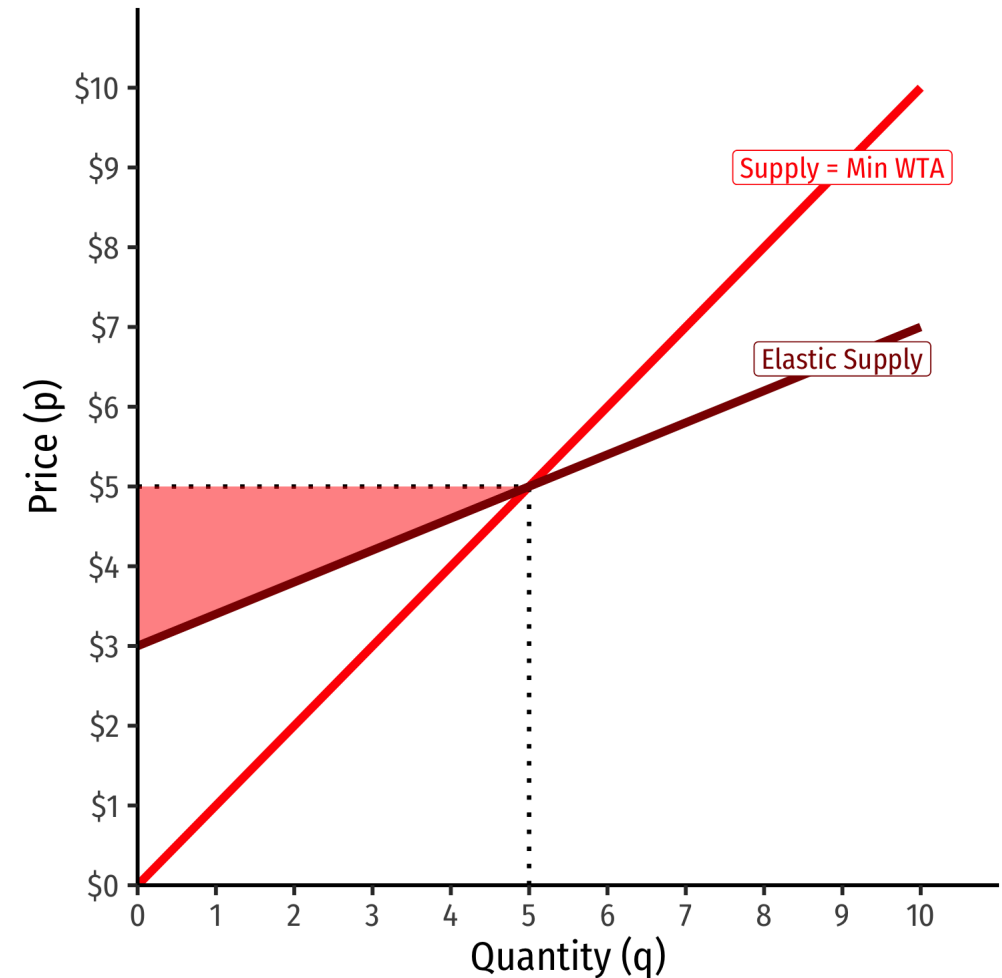- A relatively **inelastic** supply curve generates *more* producer surplus

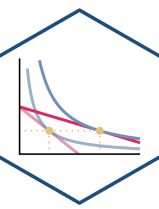$$PS = \frac{1}{2}(5 - 0)(\$5 - \$0)$$

$$PS = \$12.50$$

- A relatively **elastic** supply curve generates *less* producer surplus

$$PS = \frac{1}{2}(5 - 0)(\$5 - \$3)$$

$$PS = \$5.00$$

Elasticities and Surpluses I

- The **more elastic** curve at p^* generates **less** surplus

  - More options, easier to change choices, less benefit from *any one particular* exchange

- The **less elastic** curve at p^* generates **more** surplus

  - Fewer options, harder to change choices, more benefit from *any one particular* exchange

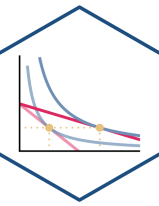- This is important for policies such as price controls, taxes, etc.
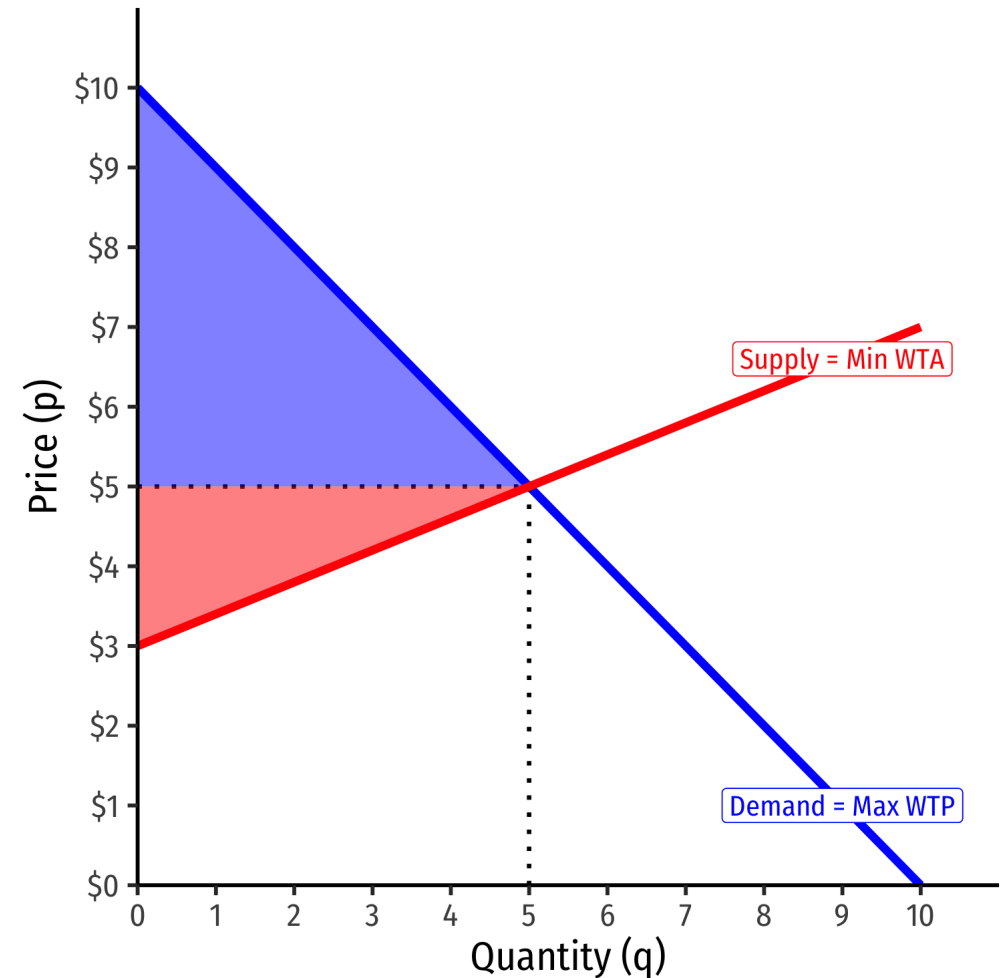
Elasticities and Surpluses II
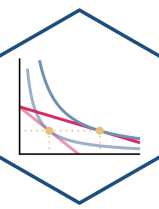
- A good visual rule of thumb:

- Compare distance between choke price and p^* for each curve

- Bigger distance $\implies$ *less* elastic in equilibrium (and vice versa)

    ○ $\implies$ more surplus
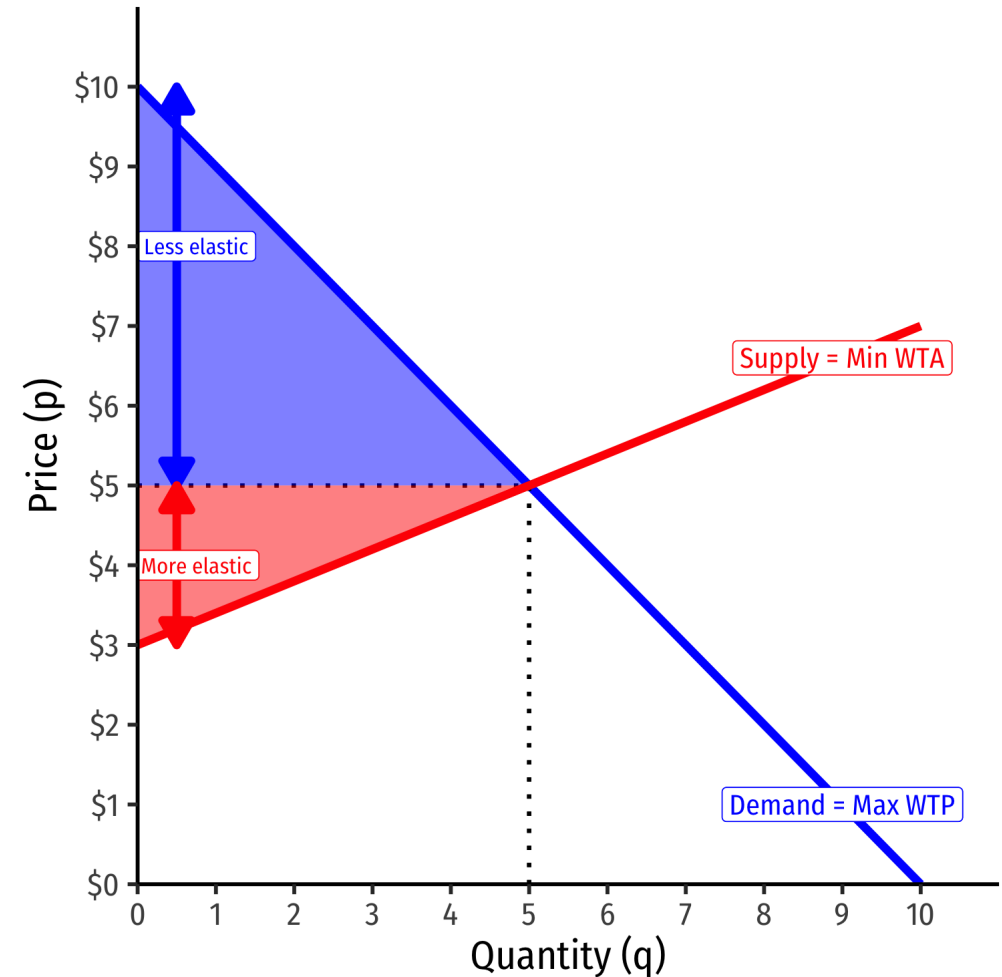
Example

Example: Using last class's supply and demand functions:

$$q_D = 10 - p$$
$$q_S = 2p - 8$$

1. Calculate the price elasticity of demand and the price elasticity of supply in equilibrium.

2. Calculate the consumer surplus and producer surplus. Shade each on the graph.

3. Who gets more surplus, consumers or producers, and why?