Environmental and Health Economics ECON/ENVR/SOSC 2310

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Demand and Supply

- Buyers determine demand
- Sellers determine supply
- They trade in markets

Competitive Market

- Numerous sellers and buyers so each buyer or seller have no influence over price
- Products are identical
- Buyers and sellers are price takers
  - Examples?
  - (Agricultural markets, street food vendors)

Exercise

- Think about some of the goods you buy: perhaps different kinds of food, clothes, transport tickets, or electronic goods.
  - Are there many sellers of these goods?
  - Do you try to find the lowest price in each case?
  - If not, why not?
  - For which goods would price be your main criterion?
  - Use your answers to help you decide whether the sellers of these goods are price-takers. Are there goods for which you, as a buyer, are not a price-taker?

Demand

- Quantity demanded is the amount of a good that buyers are willing and able to purchase.

- Law of Demand: quantity demanded decreases as price increases

Demand Curve

- The demand curve is a downward-sloping line relating price and quantity demanded. (Recall the Law of Demand)
- Quantity demanded as a function of price:

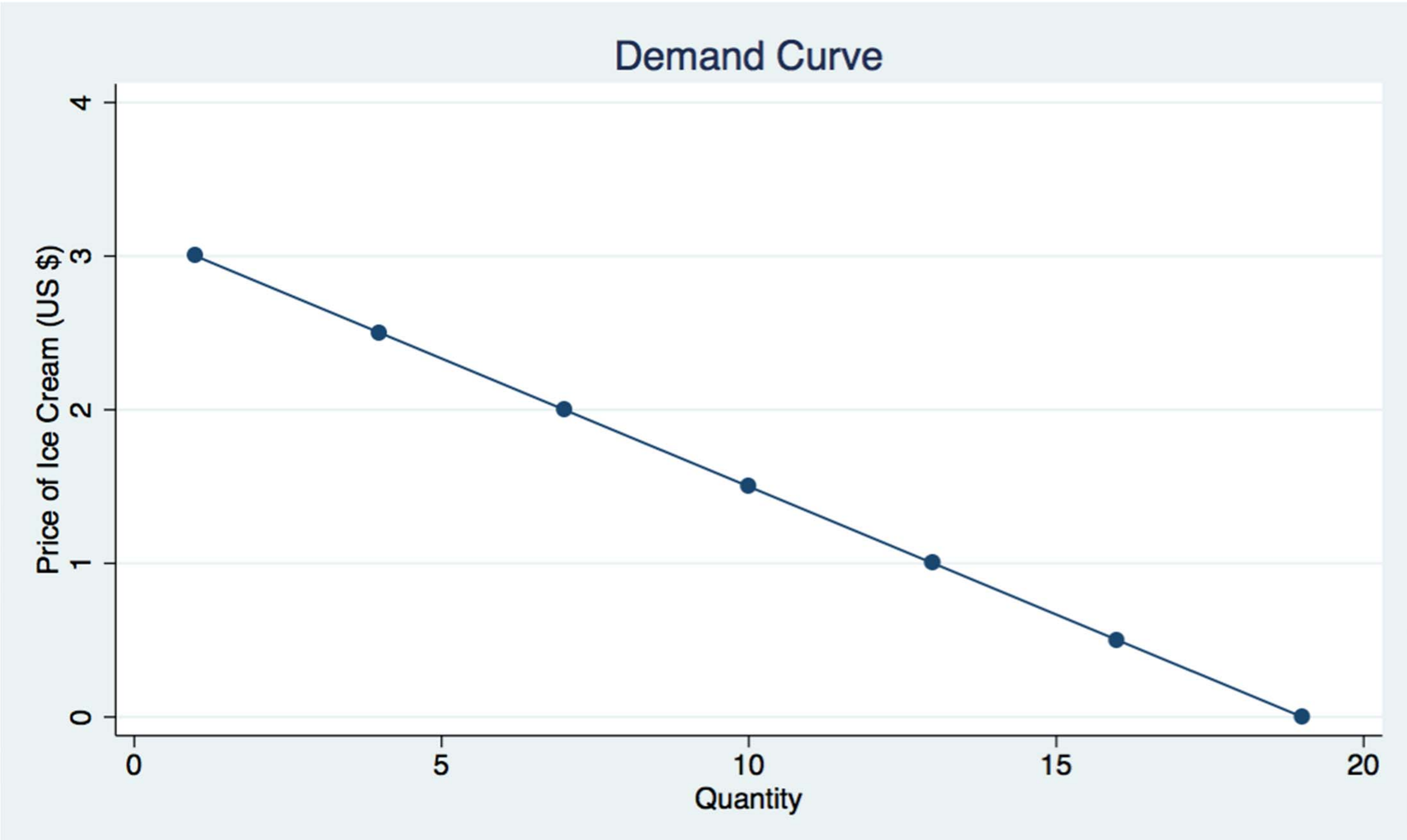
$$Q_D = D(P)$$

The Demand Curve is also the Marginal Willingness to Pay

Demand Schedule for Ice Cream

Price $	Quantity
0.00	19
0.50	16
1.00	13
1.50	10
2.00	7
2.50	4
3.00	1

Demand Curve



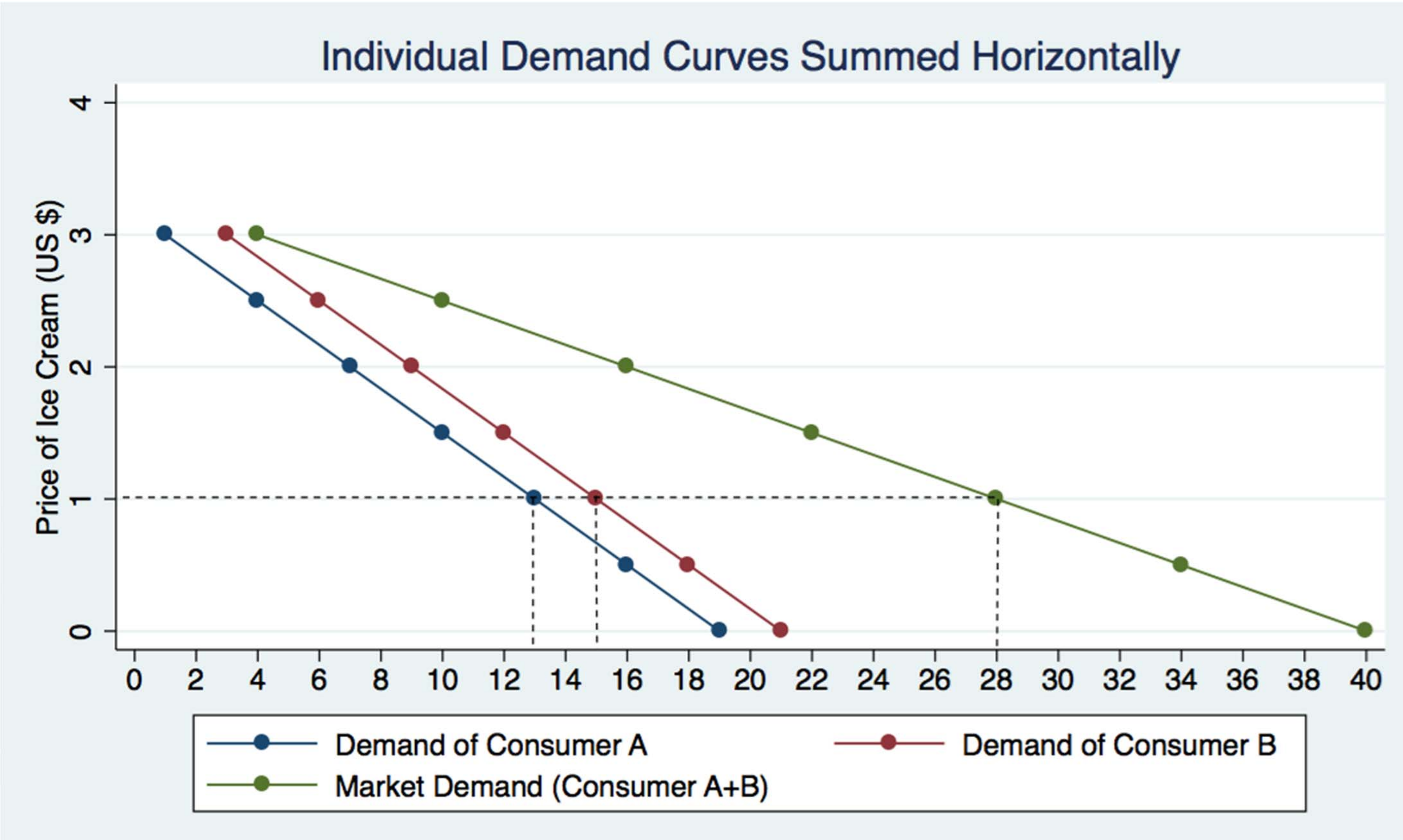
Market Demand

- Market demand refers to the sum of all individual demands for a particular good or service

$$D_{mkt}(p) = D_1(p) + D_2(p) +\ldots D_N(p)$$

- Graphically, individual demand curves are summed horizontally to obtain the market demand curve.

Market Demand



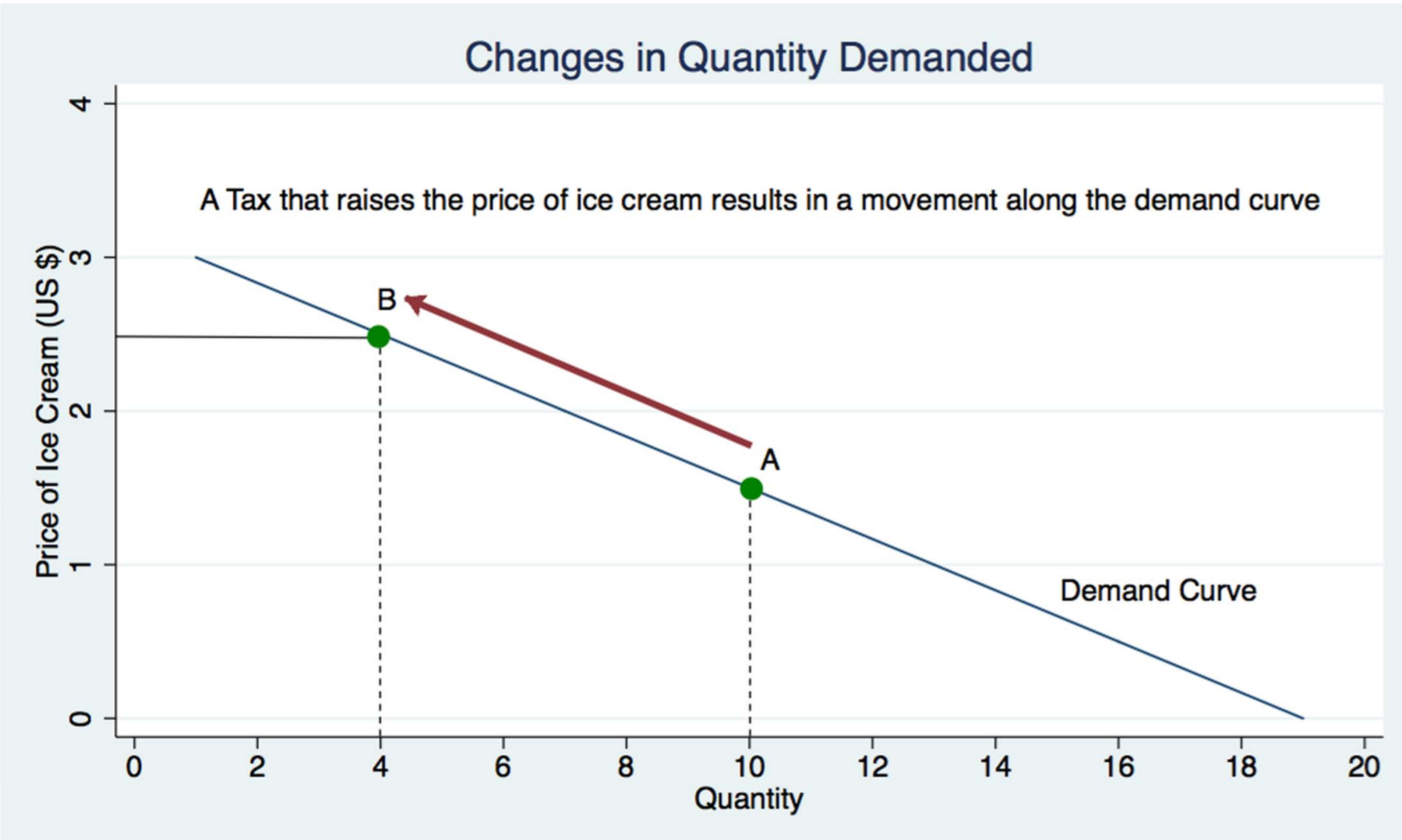
Determinants of Demand

- Market Price
- Consumer Income
- Prices of related goods
- Tastes (Preferences)
- Expectations
- …

Change in Quantity Demanded vs. Change in Demand

- Change in Quantity Demanded:
  - Movement along the demand curve
  - Caused by a change in the price of the product.
- Change in Demand
  - A shift in the demand curve, either to the left or to the right.
  - Caused by change in a determinant other than the price

Changes in Quantity Demanded



Change in Demand (Demand Shifters)

- Consumer Income: As income increases the demand for a normal good will increase, the demand for an inferior good will decrease.
- Examples of normal goods?
- Examples of inferior goods?
  – Public transportation
  – Some inexpensive foods hamburger, mass-market beer, frozen dinners, and canned goods

Change in Demand (Demand Shifters)

- Prices of Related Goods:
  - Two goods are substitutes if an increase in the price of one causes an increase in demand for the other
    - Pizza and hamburgers, Coke and Pepsi…
  - Two goods are complements if an increase in the price of one causes an decrease in demand for the other
    - Computer and software

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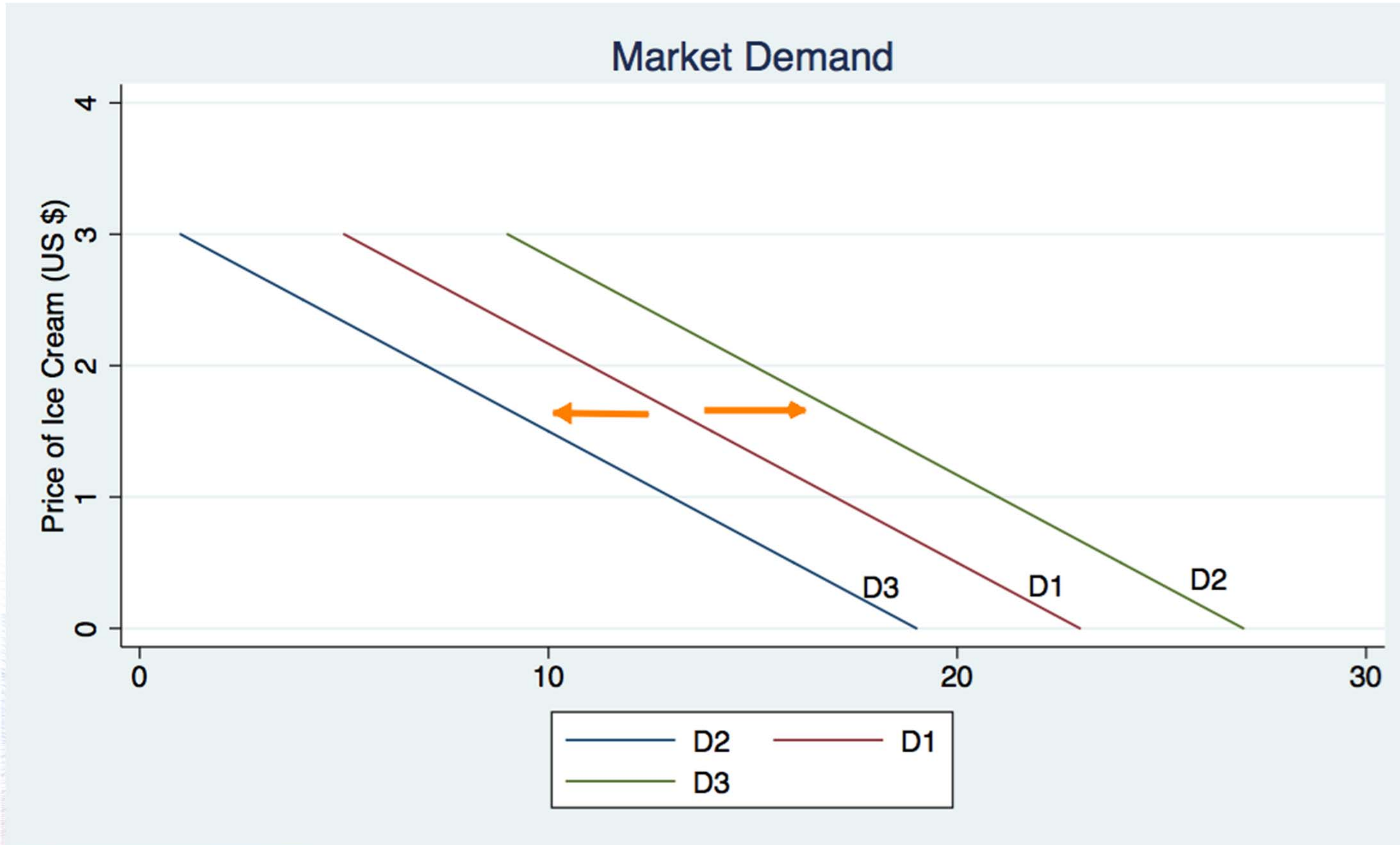
Change in Demand (Demand Shifters)

- Tastes (or Preference)
  - Diet food becomes popular, caused an increase in demand.
- Expectation
  - If people expect their incomes to rise, …
- Number of buyers

Change in Demand



Supply

- Quantity supplied is the amount of a good that sellers are willing and able to sell.
- Quantity supplied as a function of price:

$$Q_S = S(P)$$

- Determinants of Supply:
  - Market price, Input price, Technology, Expectations, Number of producers…

Supply Curve and Market Supply

- The supply curve is the upward-sloping line relating price to quantity supplied

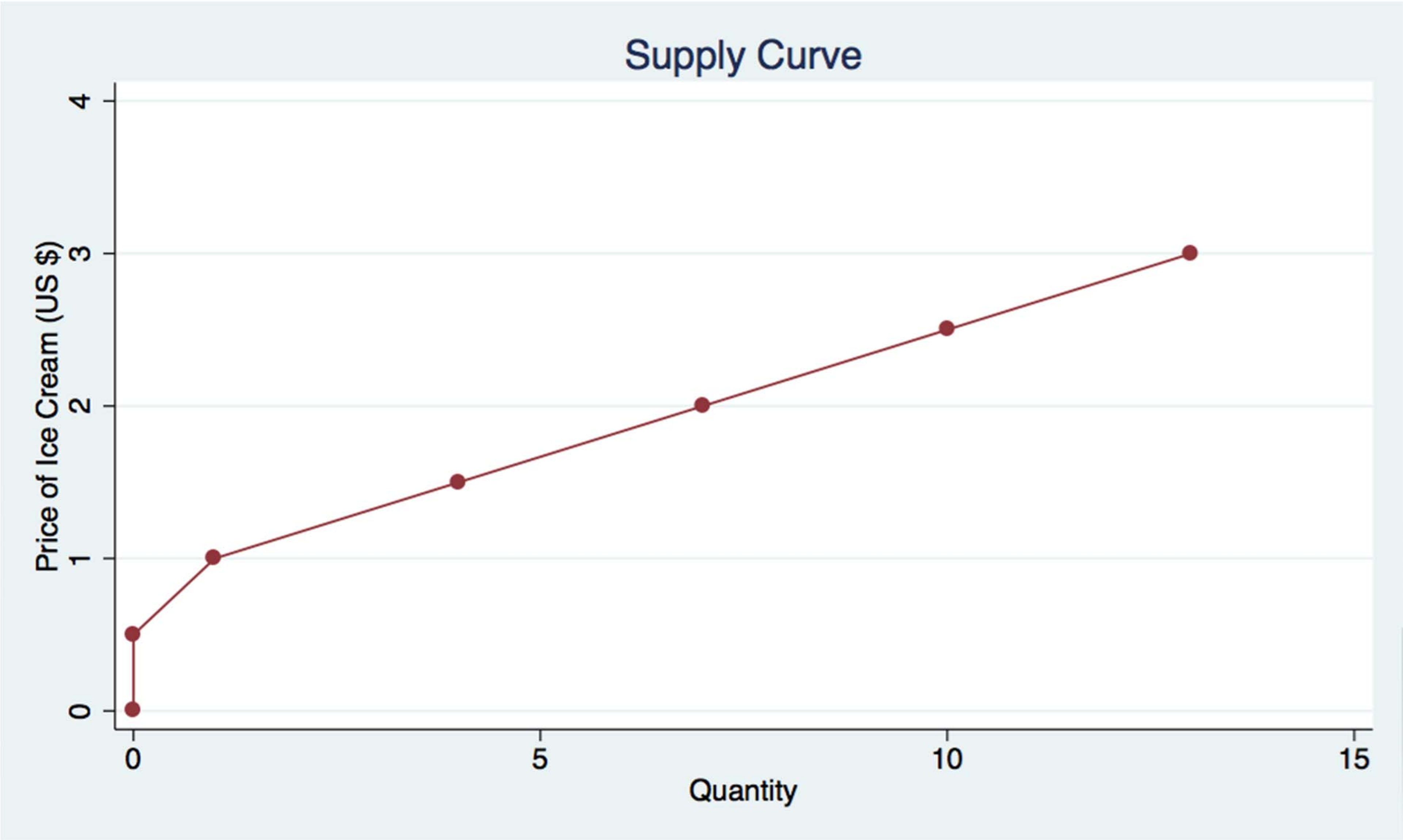
- Market supply is the sum of all individual supplies for all sellers of a particular good or service

$$S_{mkt}(p) = S_1(p) + S_2(p) +\ldots S_N(p)$$

Supply Schedule for Ice Cream

Price $	Quantity
0.00	0
0.50	0
1.00	1
1.50	4
2.00	7
2.50	10
3.00	13

Supply Curve



Supply Curve

Graphically, individual supply curves are summed horizontally to obtain the market supply curve

The Supply Curve is also a product's Marginal Cost to produce

Change in Quantity Supplied vs. Change in Supply

- Change in Quantity Supplied:
  - Movement along the supply curve
  - Caused by a change in the market price of the product
- Change in Supply (Supply Shifters):
  - A shift in the supply curve, caused by a change in a determinant other than price

Change in Supply (Supply Shifters

- Input prices:
  - Wages, prices of raw materials
- Technology
  - Some cost-saving technological improvement
- Expectations
  - Expect oil prices go up, hold up the supply
- Number of suppliers

Equilibrium of Supply and Demand

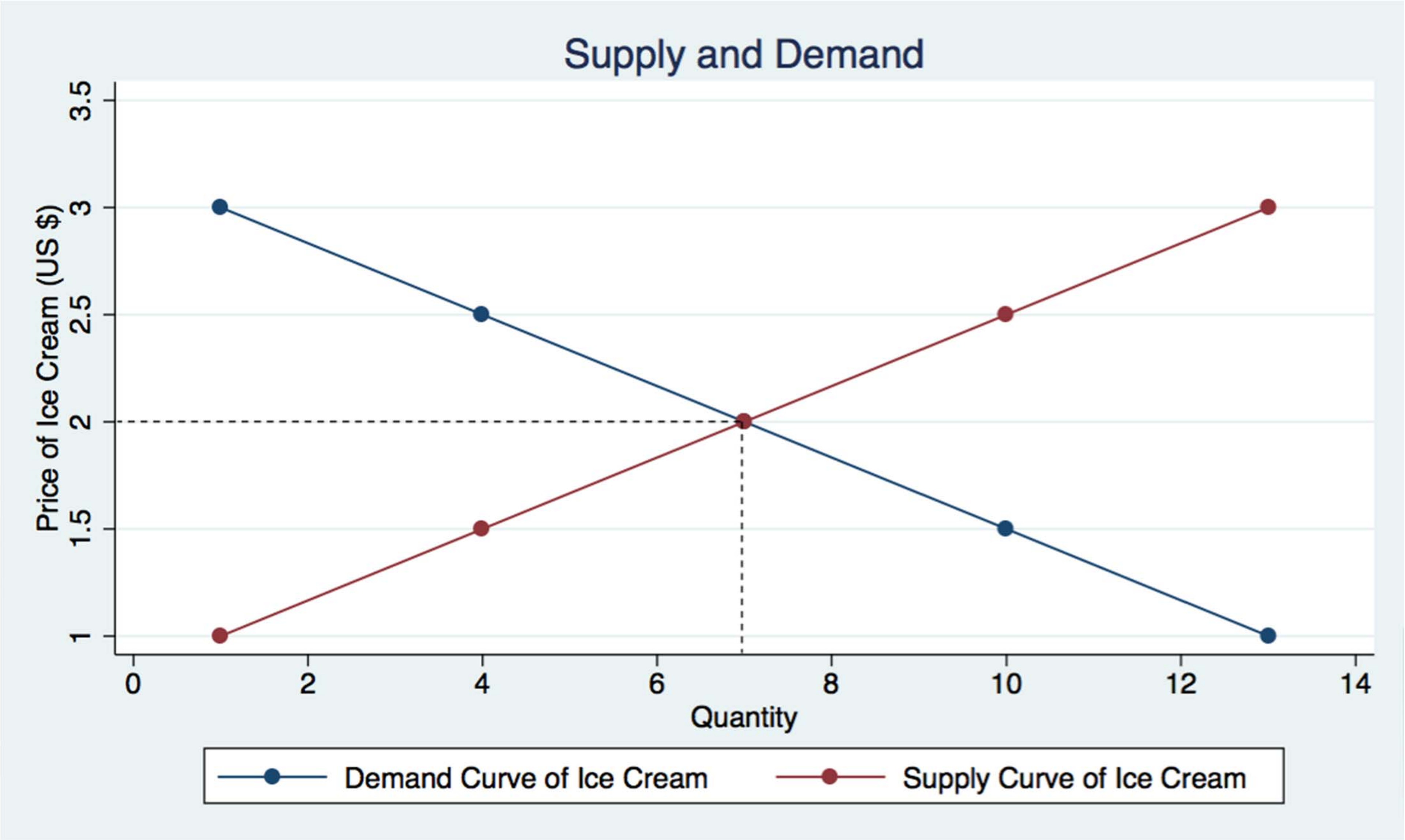
- Equilibrium Price is the price that balances supply and demand. On a graph, it is the price at which the supply and demand curves intersect.

- Equilibrium Quantity is the quantity that balances supply and demand. On a graph it is the quantity at which the supply and demand curves intersect.

Supply and Demand Together

Price $	Quantity Demanded	Quantity Supplied
0.00	19	0
0.50	16	0
1.00	13	1
1.50	10	4
2.00	7	7
2.50	4	10
3.00	1	13

Equilibrium of Supply and Demand



Equilibrium of Supply and Demand

- Demand curve: $Q_D = D(P)$
- Supply curve: $Q_S = S(P)$
- Equilibrium condition: $Q_D = Q_S$
- Supply = Demand, Market clear.

Equilibrium of Supply and Demand

- A Math Example

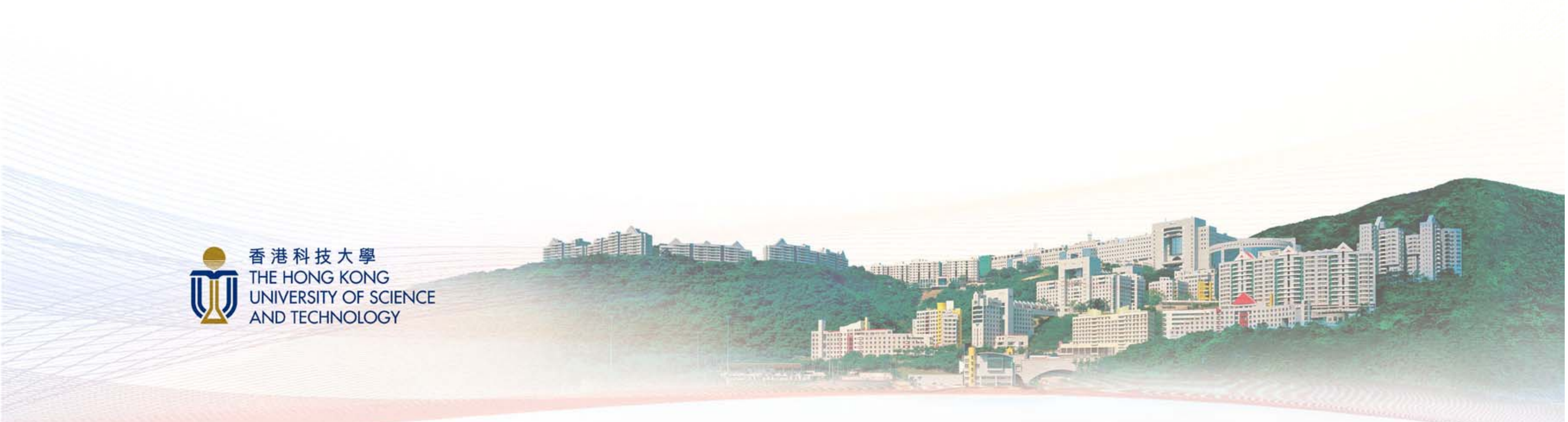
- $Q_S = 3\,p$ is the supply
- $Q_D = 12 - 3p$ is the demand

- What is the equilibrium price and quantity?

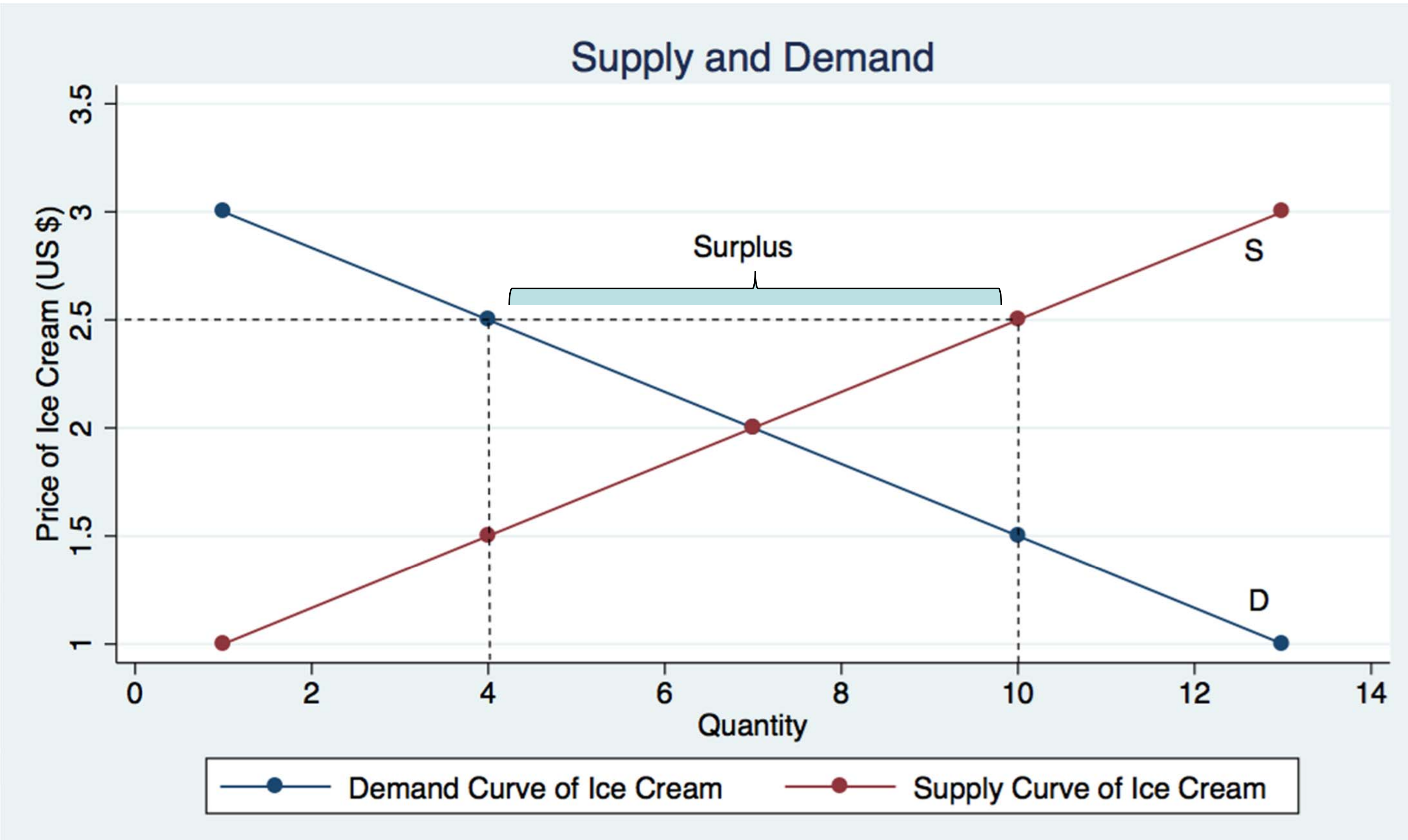
Out of Equilibrium

- Excess Supply and Surplus

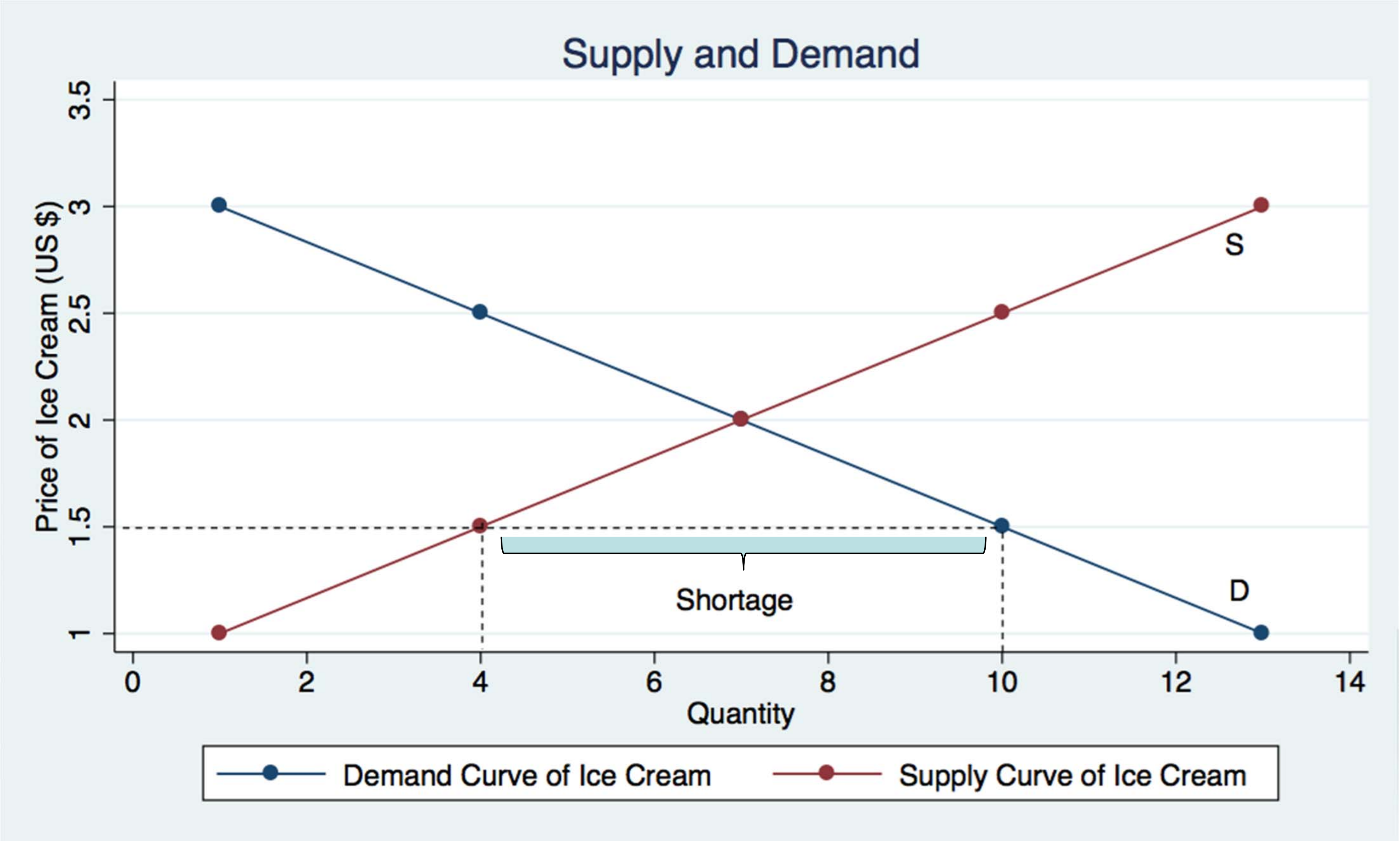
- Excess Demand and Shortage



Excess Supply: Surplus



Excess Demand: Shortage



Comparative Statics and Policies

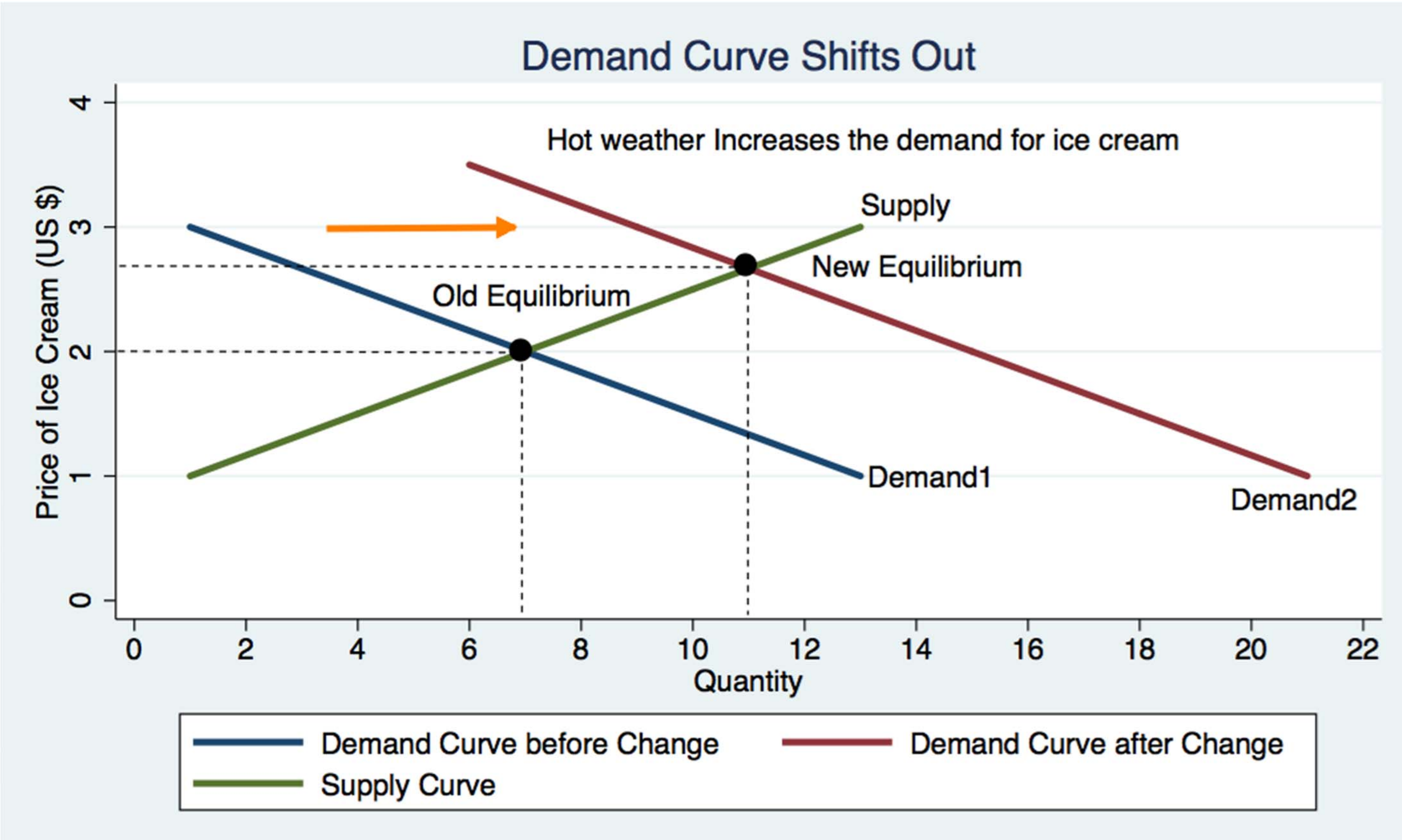
- Comparative Statics: Analyzing Changes in Equilibrium
  - Supply Change
  - Demand Change

- Government Policies
  - Price Controls
  - Taxes

Analyzing Changes in Equilibrium: Comparative Statics

- Economists use the Supply & Demand model to analyze competitive markets
- Comparative Statics: analyzing changes in equilibrium (3 steps):
  - Decide whether the event shifts the supply or demand curve (or both).
  - Decide whether the curve(s) shift(s) to the left or to the right.
  - Examine how the shift affects equilibrium price and quantity

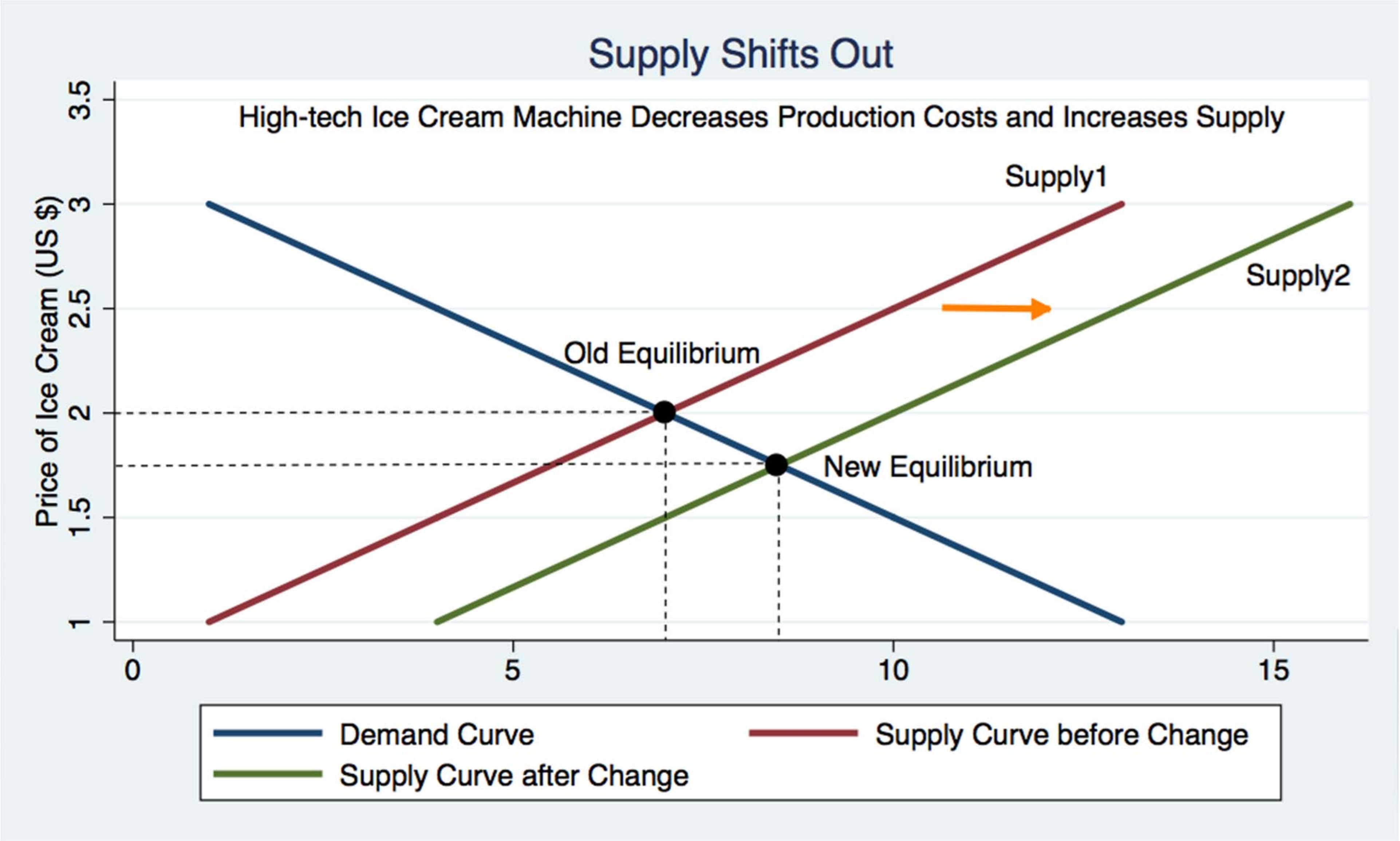
An Increase in Demand and Equilibrium



Shifts in Curves and Movements along Curves

- A shift in the demand curve is called a change in demand.
- A movement along a fixed demand curve is called a change in quantity demanded.
- A shift in the supply curve is called a change in supply.
- A movement along a fixed supply curve is called a change in quantity supplied.

An Increase in Supply and Equilibrium



Government Policies

- We can use the Supply and Demand curve and the comparative statics to study government policies.

- Price Controls:
  - are usually enacted when policymakers believe the market price is unfair to buyers or sellers.
  - price ceilings and price floors

Price Ceilings and Price Floors

Price Ceiling:

- A legally established maximum price at which a good can be sold.

Price Floor:

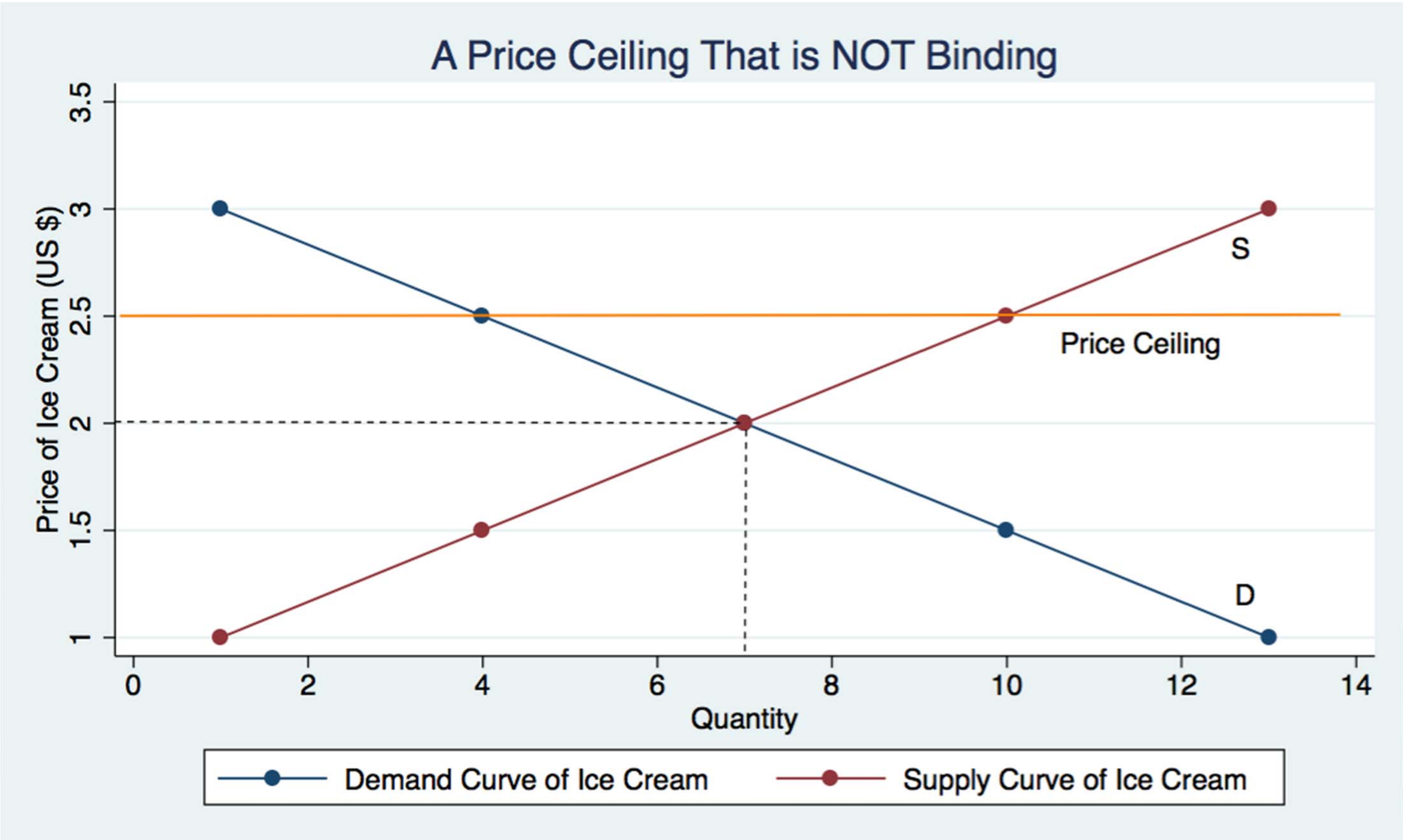
- A legally established minimum price at which a good can be sold.

Price Ceilings

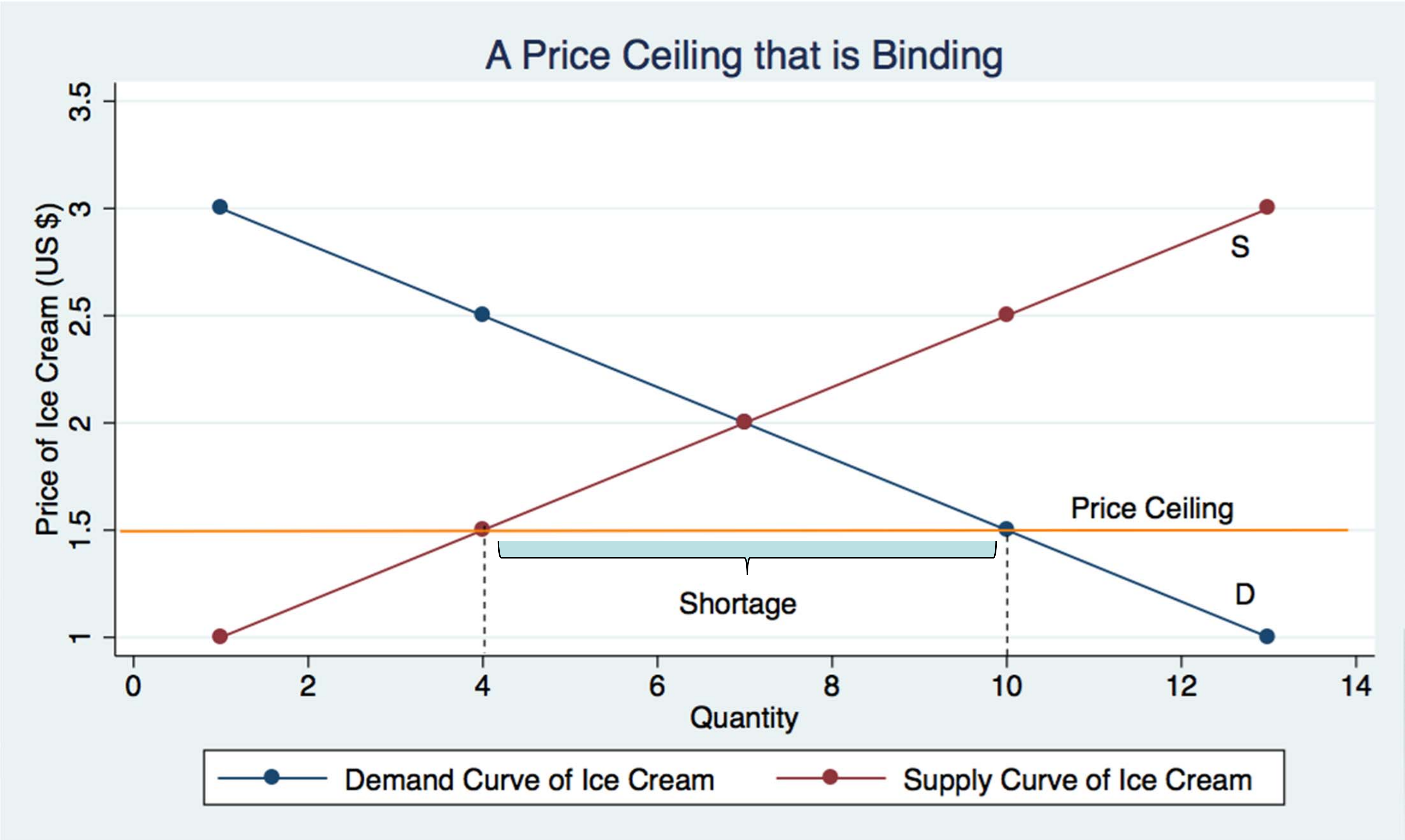
Two outcomes are possible when government imposes a price ceiling:

- The price ceiling *is not binding* if set *above* the equilibrium price.
- The price ceiling *is binding* if set *below* the equilibrium price, leading to a shortage.

A Price Ceiling That is NOT Binding



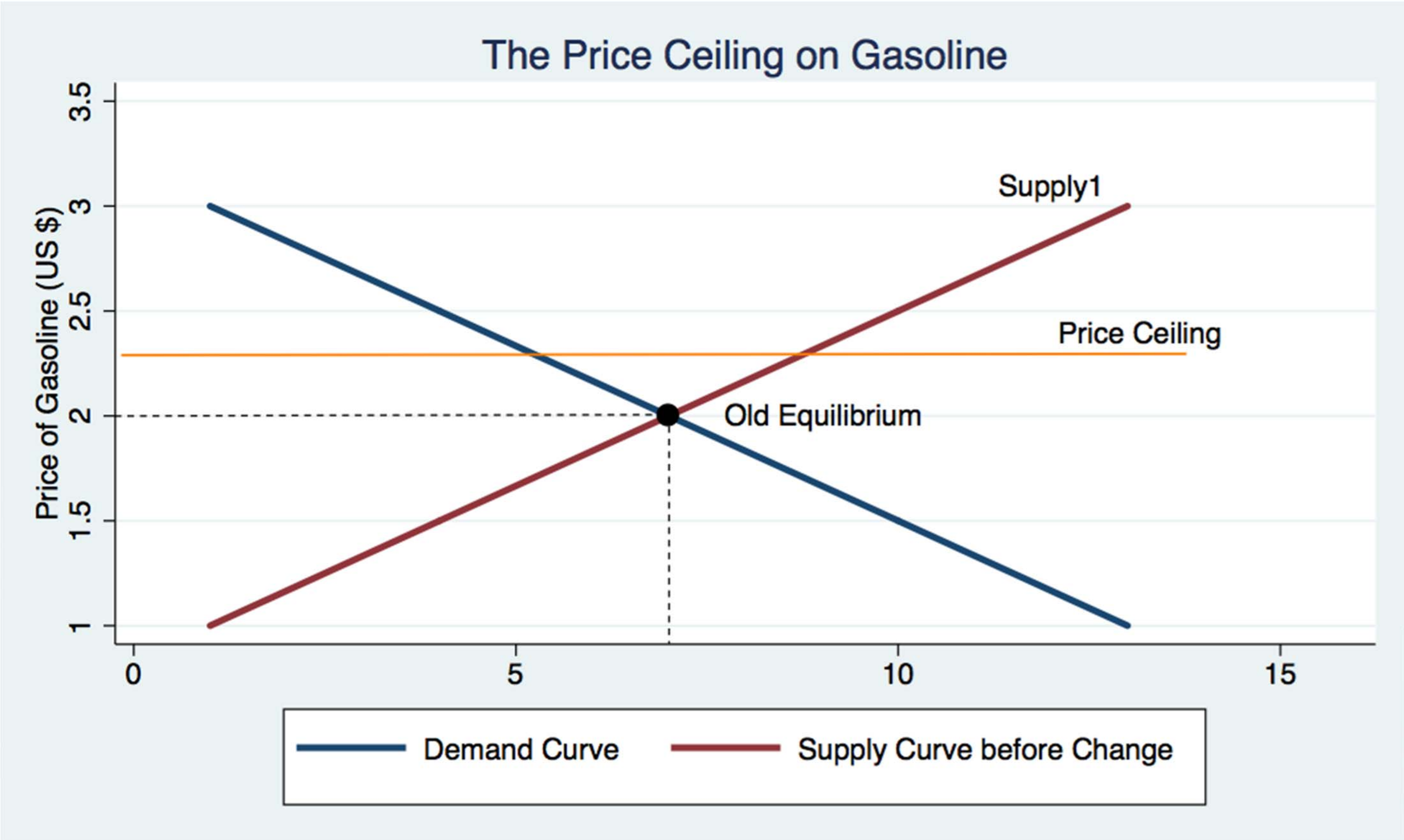
A Price Ceiling That is Binding



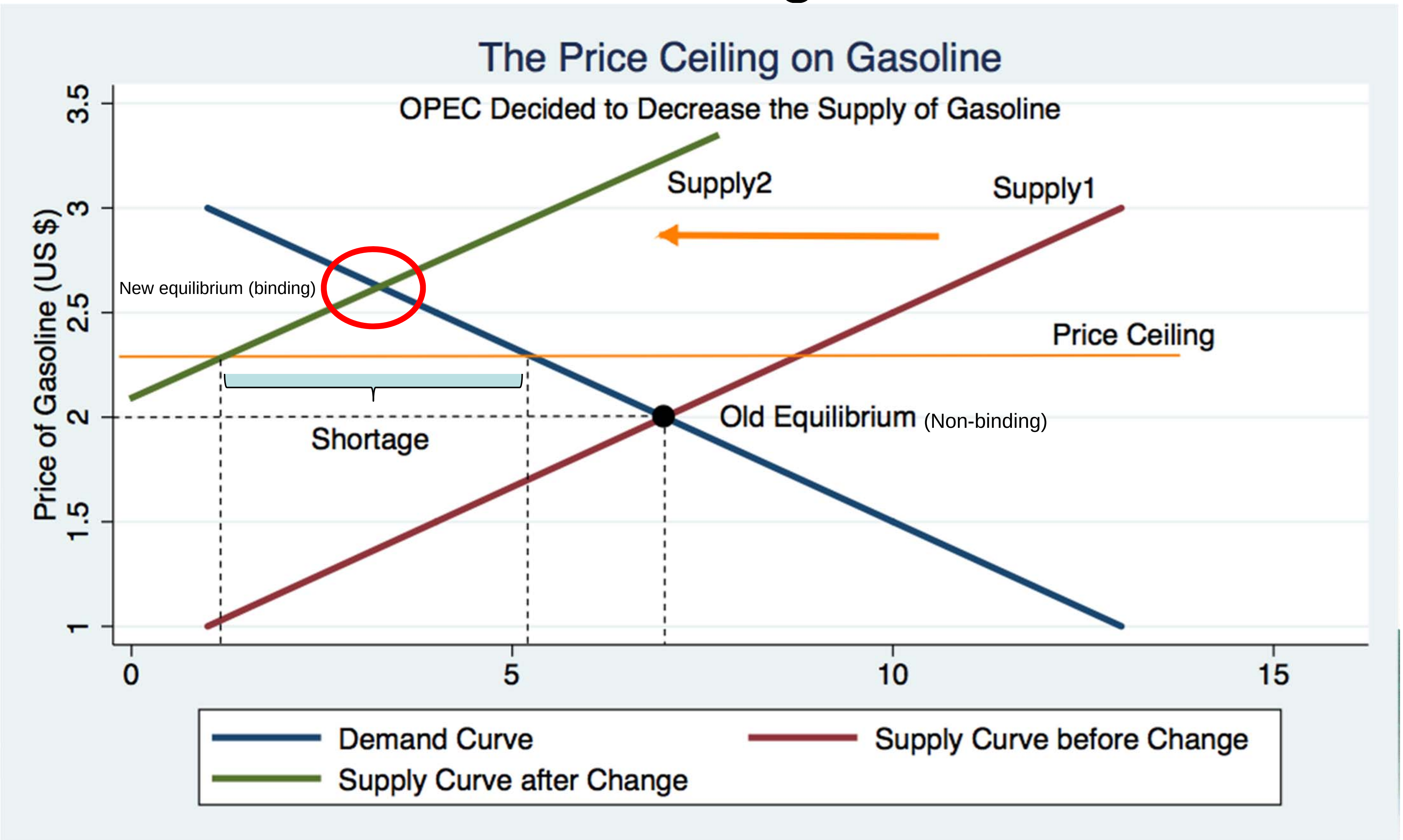
Effects of Price Ceilings

- A binding price ceiling creates shortages
- A binding price ceiling also creates rationing because of shortages
  – Queuing
  – Discrimination
  – Going though a “back door”
  – Economists blame government price controls that limited the price the seller could charge.

The Price Ceiling on Gasoline Is NOT Binding



The Price Ceiling on Gasoline is Binding



Example: Rent Control

- Rent controls are price ceilings placed on the rents that landlords may charge their tenants.
- The goal of rent control policy is to help the poor by making housing more affordable.

- **Rent control in New York City**
  - Soldiers returned from WWII and started families (which increased demand for apartments), but stopped receiving military pay, many could not deal with the high rent
  - The government put in price controls
  - Apartments were rapidly taken, shortage

Discussion:
Does rent control cause a larger or smaller housing shortage in the long run?

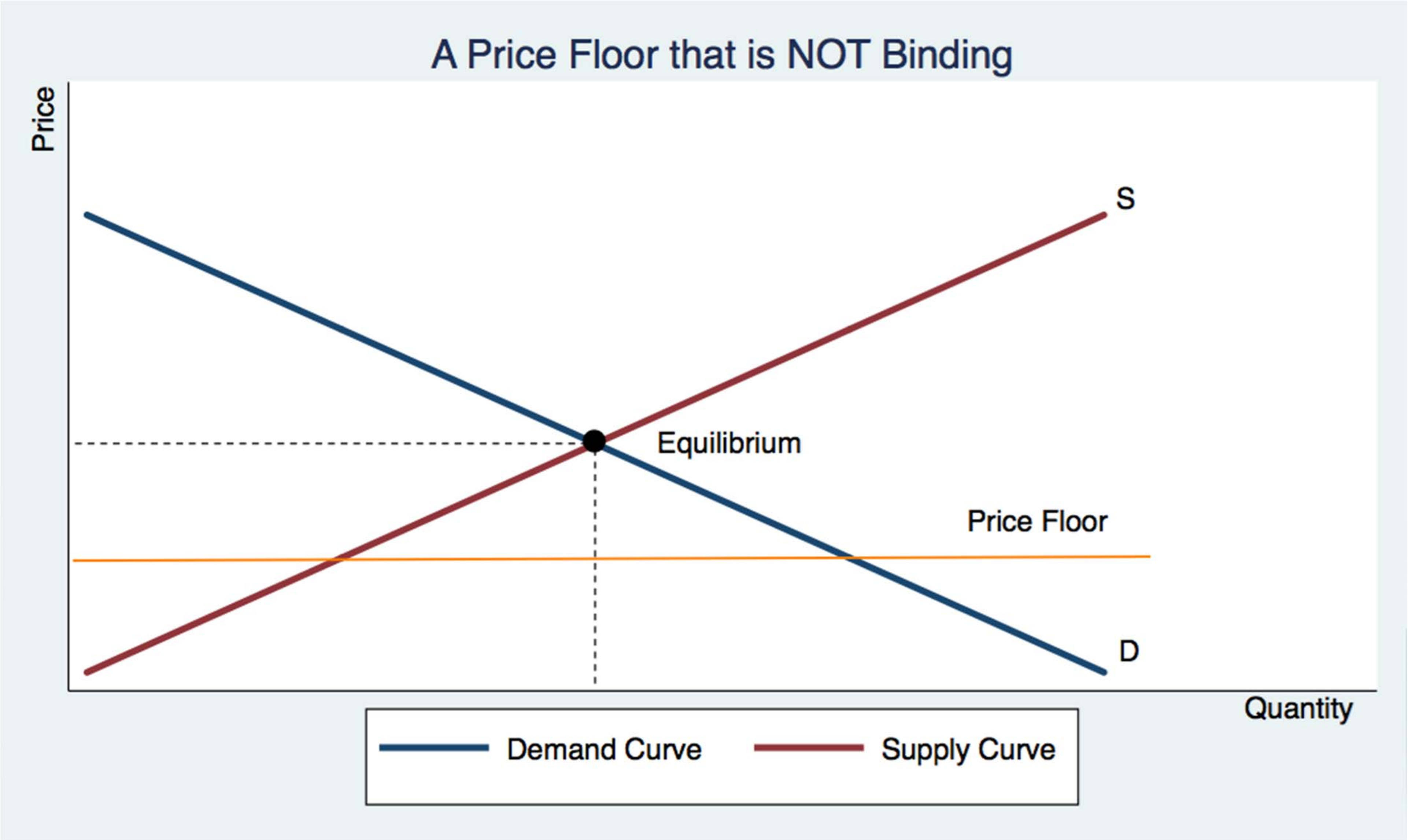
Price Ceiling

- One economist called rent control "the best way to destroy a city, other than bombing."
- Other Examples
  - Interest rate ceiling
  - Ceiling on food price
  - Gasoline price ceiling

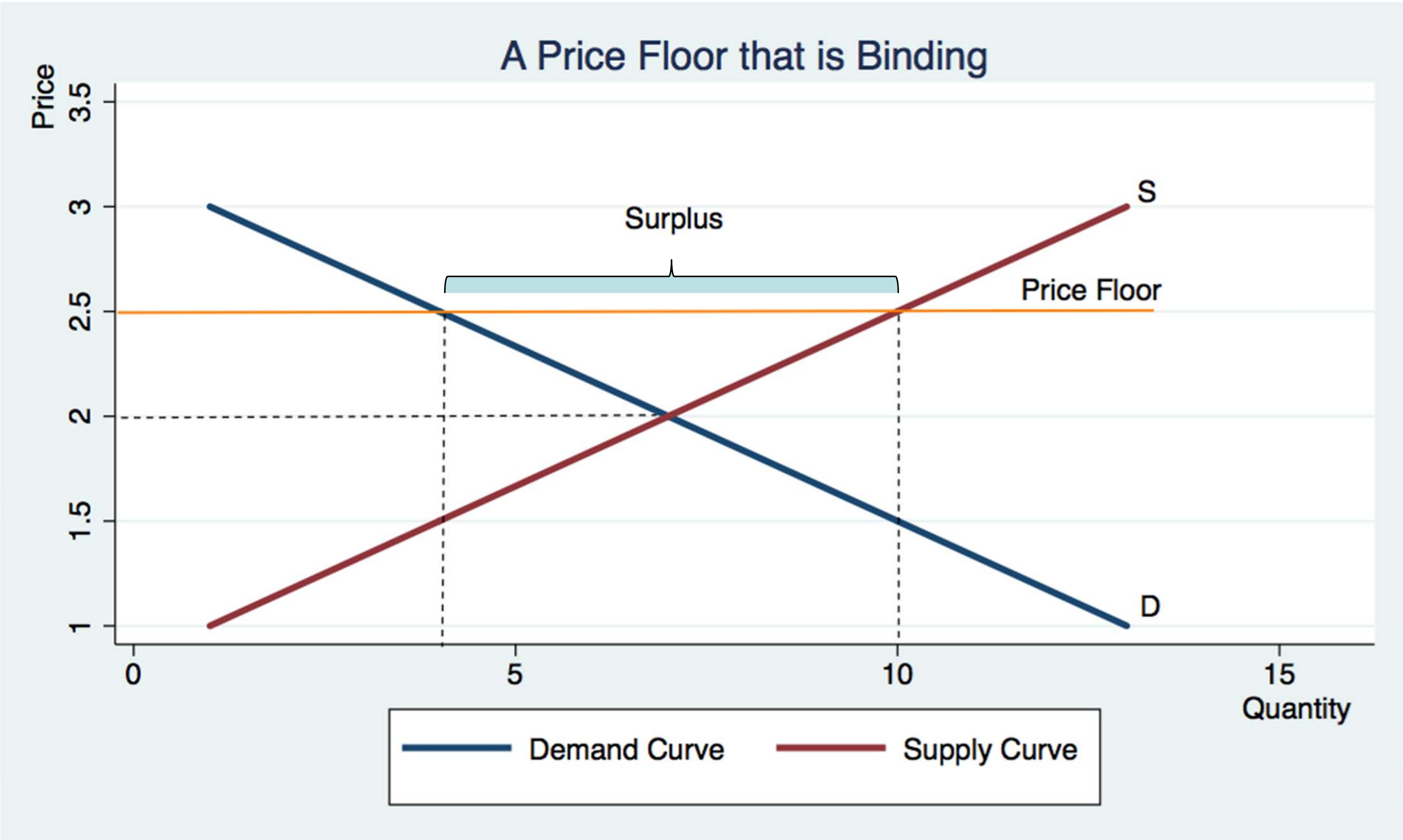
Price Floors

- When the government imposes a price floor, two outcomes are possible.
- The price floor *is not* binding if set *below* the equilibrium price.
- The price floor *is* binding if set *above* the equilibrium price, leading to a surplus.

A Price Floor that is NOT Binding



A Price Floor that is Binding



Effects of a Price Floor

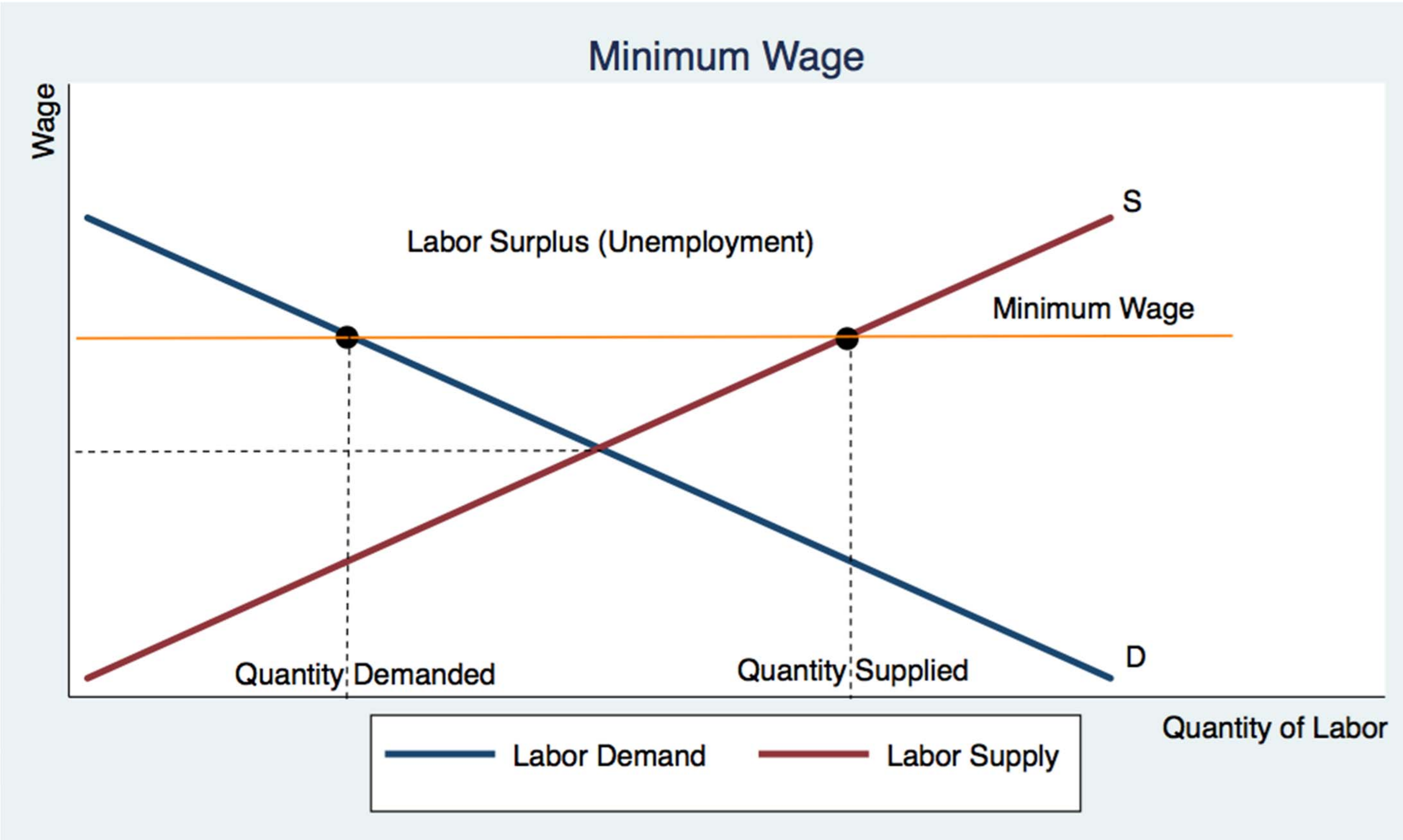
- A price floor prevents supply and demand from moving toward the equilibrium price and quantity.
- When the market price hits the floor, it can fall no further, and the market price equals the floor price.
- **A binding price floor causes a surplus**

Example: The Minimum Wage

- Minimum wage law dictates the lowest price possible for labor that any employer may pay.
- A binding minimum wage leads to labor surplus, or unemployment.


2 out 3 LIKE a Minimum Wage HIKE
I GOT A RAISE!
I GOT A RAISE!
MY BOSS FIRED ME TO PAY FOR THEIR RAISE.
garyvarvel.com

The Minimum Wage



Other examples

- Many countries set price floors on **agricultural produce** to try to protect the farmers.

- Some counties set price floors on **alcoholic beverages**

Taxes

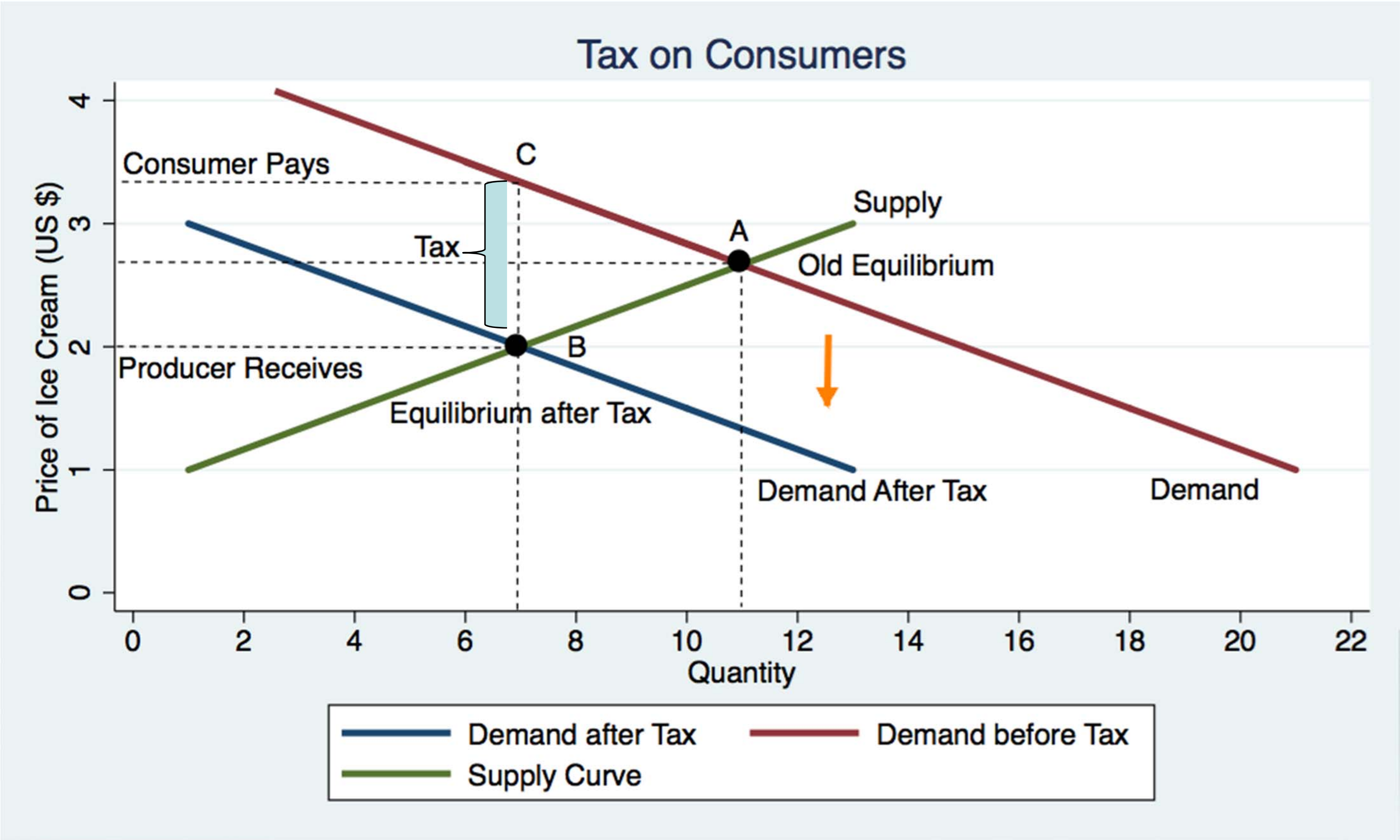
- Governments levy taxes to raise revenue for public projects
- Tax incidence is the study of who bears the burden of tax
- Taxes result in a change in the equilibrium
- Buyers pay more and sellers receive less, regardless of whom the tax is levied on

Taxes

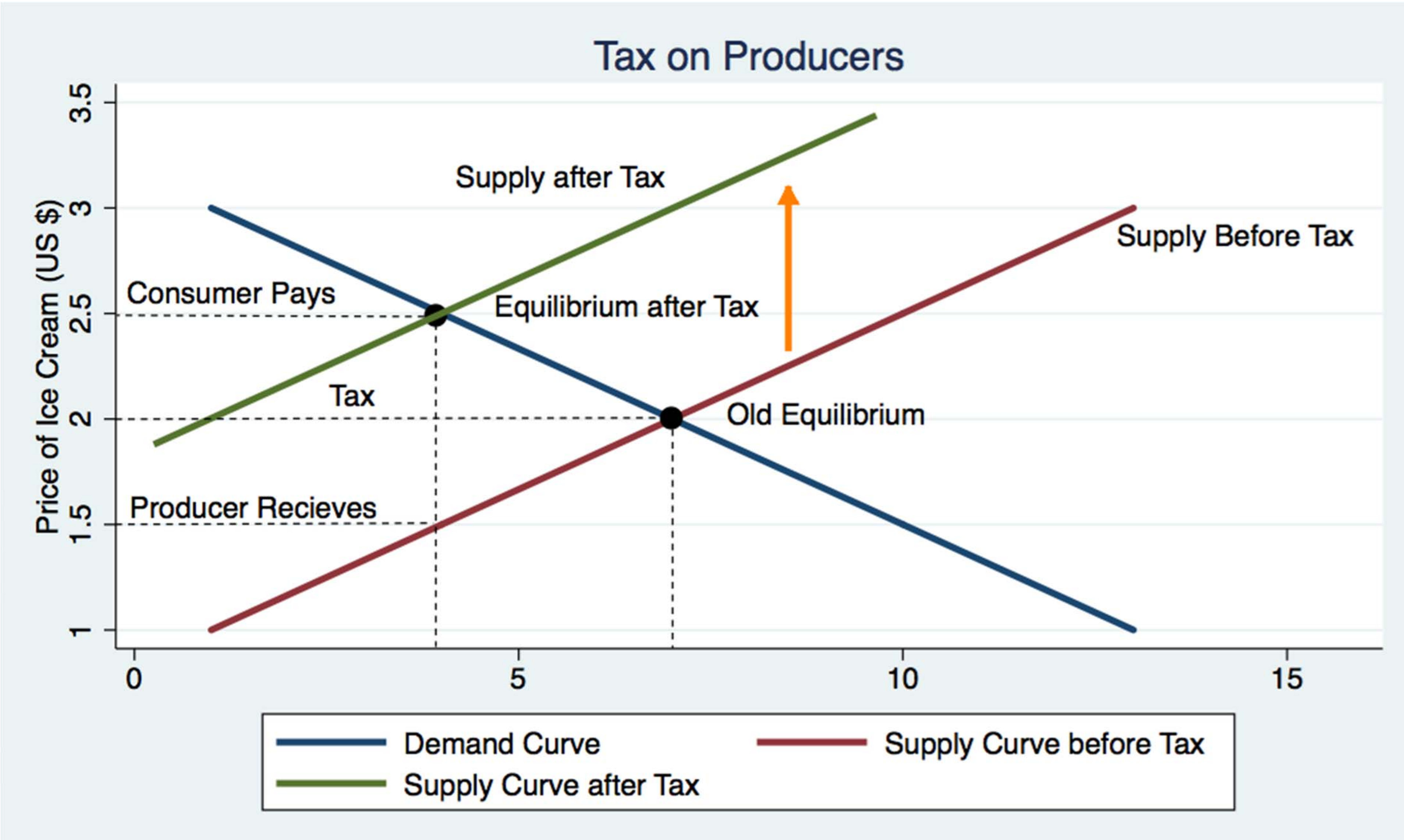
- Specific tax or unit tax
  - Tax per unit produced
  - e.g. per gallon/Liter gas

- Ad valorem tax- value tax
  - Scaled to value of the transaction
  - Sales Tax, Property Tax

Tax on Consumers (buyers)



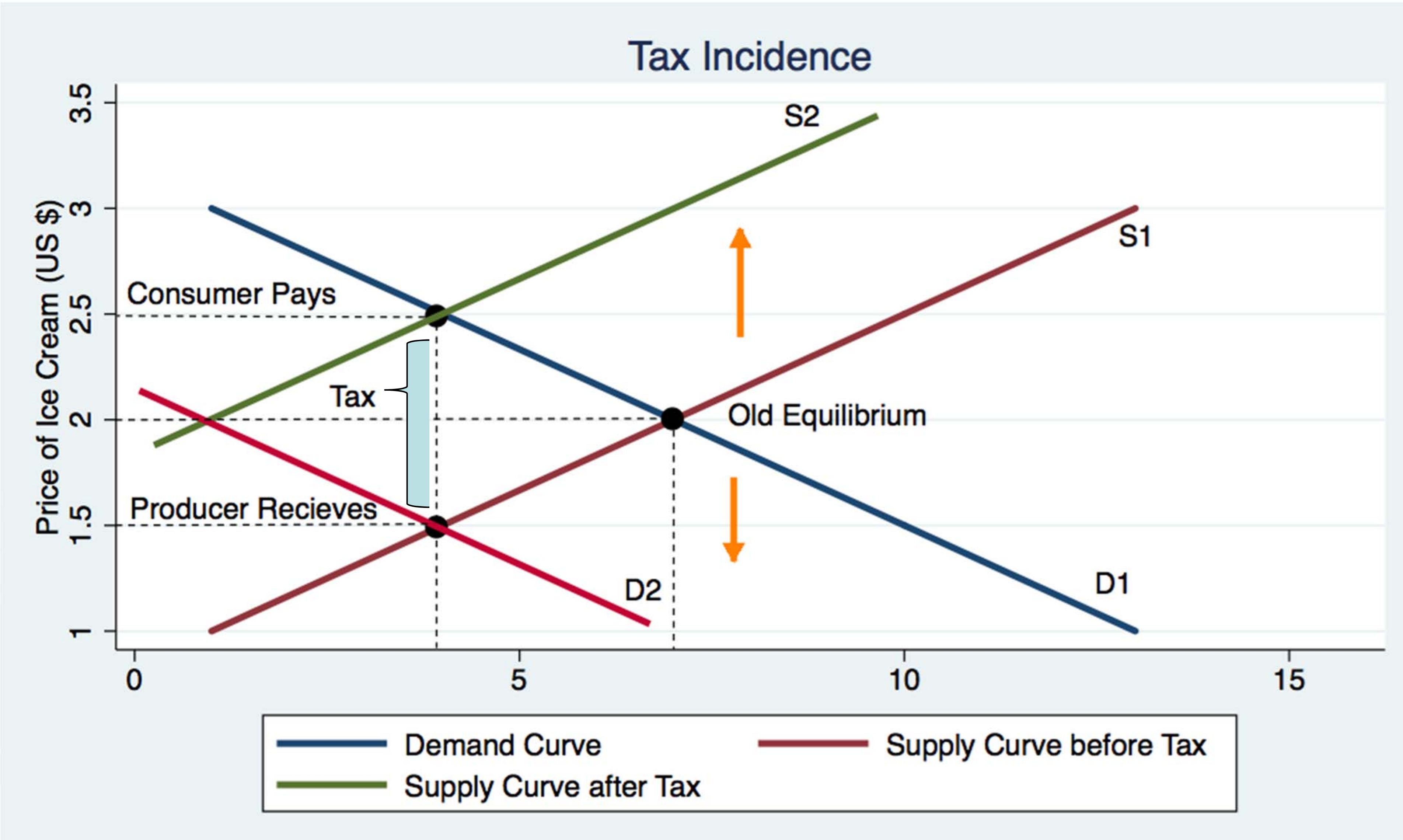
Tax on Producers (sellers)



Impact of Tax

- A tax drives a wedge between demand curve and supply curve
- Taxes discourage market activity. When a good is taxed, the quantity sold is smaller
- The after-tax equilibrium is independent of whether the tax is levied on sellers or buyers
- Buyers and sellers share the tax burden

The after-tax equilibrium is independent of whether the tax is levied on sellers or buyers



Tax Algebra

- $S(P_s) = D(P_d)$
- $P_d = P_s + t$
- Solve for the prices P_d and P_s

- An obvious solution technique is $S(P_s)=D(P_s+t)$

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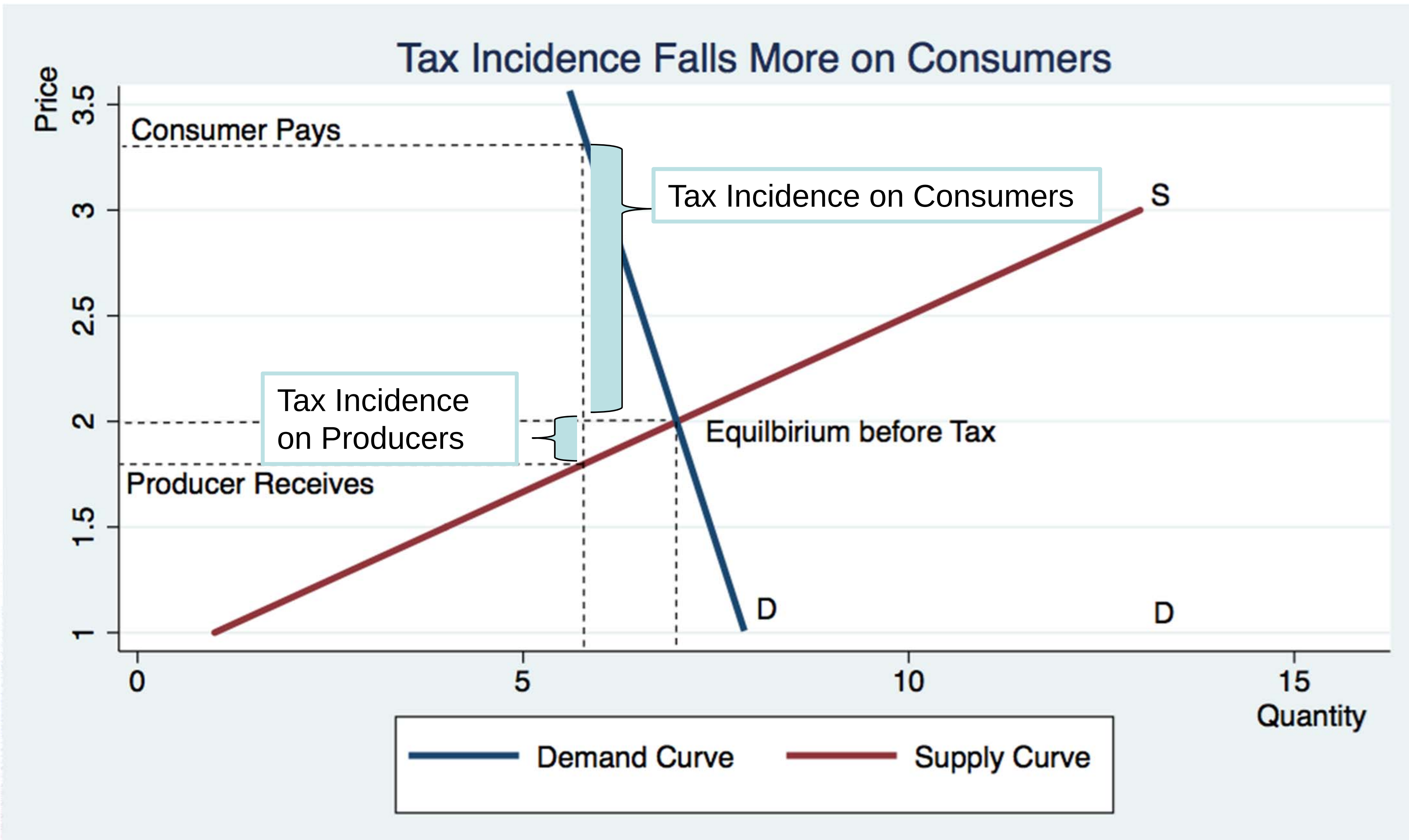
Tax Incidence

- How is the burden of tax divided?

- It depends on the relative slope (relative sensitiveness, elasticities) of the demand curve to supply curve

- The incidence of tax falls more heavily on the buyers if the demand curve is steeper (less sensitive to price) than the supply curve, and vice versa

Tax Incidence



Intuition: Tax Incidence

- Steeper demand curve:
  - As price changes, the quantity demanded cannot change much
  - Less able to adjust in response to price shocks
  - Bad things happens (such as price increase as a consequence of tax), buyers surfer more because of incapability to escape from it
  - We call it the demand is inelastic.

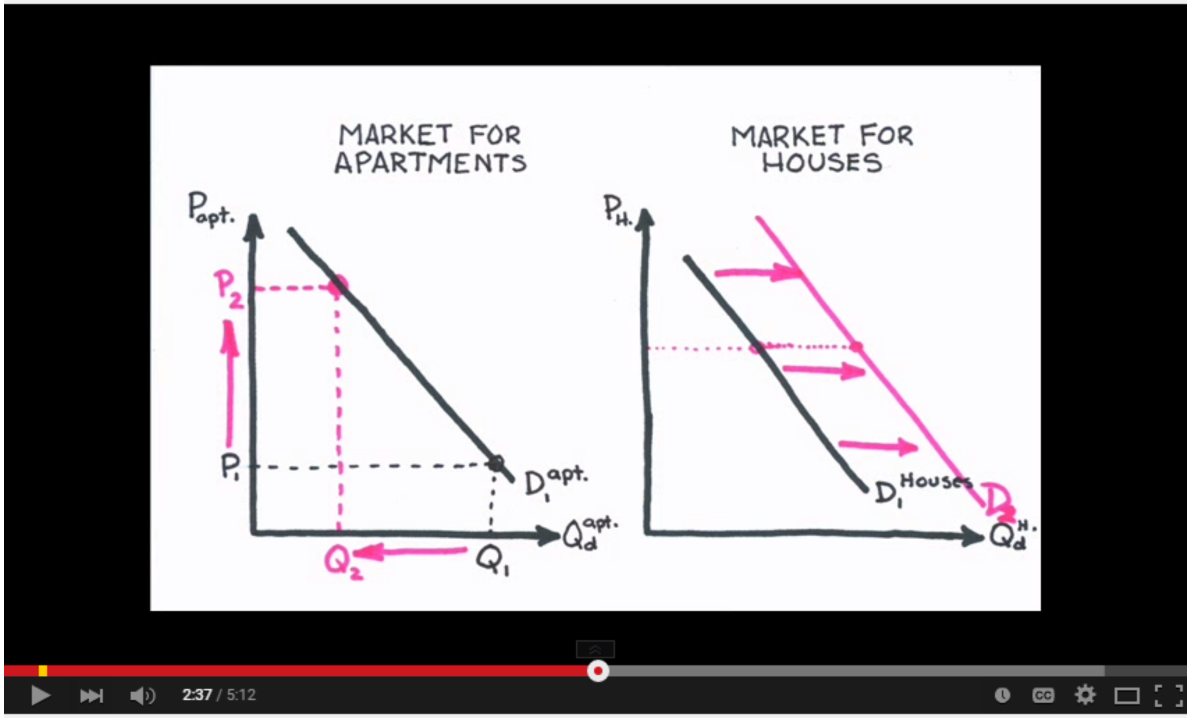
- Exercises:
  - Draw a case where producers bear more tax burden

The implications of Price Floor and Price Ceiling Video (6 min) – additional material after lecture

https://www.youtube.com/watch?v=XgBPAucs-W4

Change in Demand vs Change in Quantity Demanded

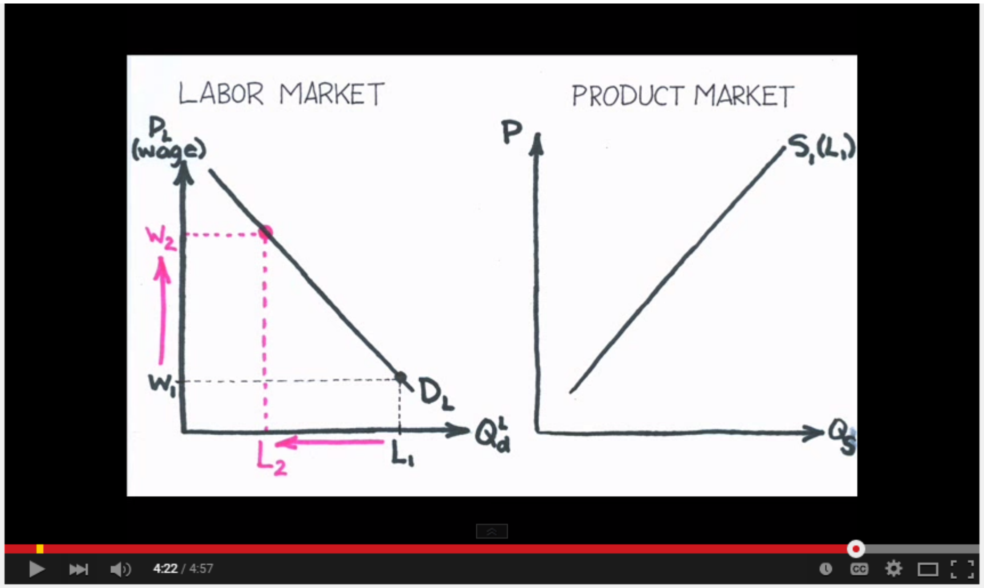
https://www.youtube.com/watch?v=aTSwcXJ700c



Episode 12: Change in Demand vs Change in Quantity Demanded

Supply

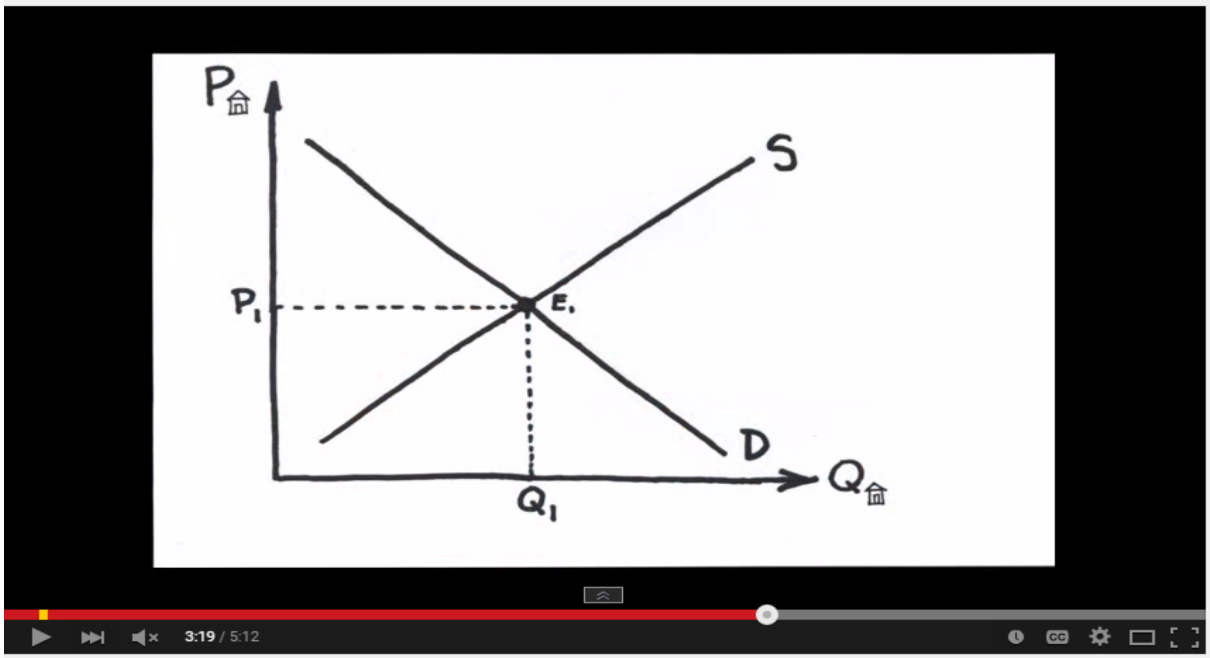
https://www.youtube.com/watch?v=KccMcf_xOQU



Episode 13: Supply

Market Equilibrium (shortage and surplus)-
additional material after lecture (5 min)

https://www.youtube.com/watch?v=W5nHpAn6FvQ



Episode 14: Market Equilibrium