Demand
oooooo

Supply
oooooo

The Market
ooooooooooo

Elasticity
ooooooooo

# Intermediate Microeconomics. Lecture 1
## Review on Supply and Demand

Oscar Gálvez-Soriano[1]

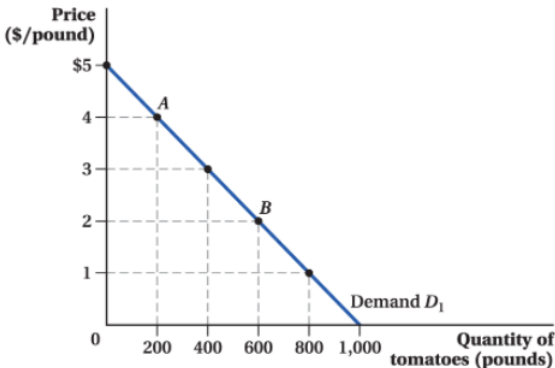[1]University of Houston
Department of Economics

Summer 2021

Demand
oooooo

Supply
oooooo

The Market
ooooooooooo

Elasticity
ooooooooo

# Contents

**Demand**
○○○○○○

Supply
○○○○○○

The Market
○○○○○○○○○○○

Elasticity
○○○○○○○○○

## Contents

**Demand**
○●○○○○

Supply
○○○○○○

The Market
○○○○○○○○○○○

Elasticity
○○○○○○○○○

## Demand curve



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Demand for Tomatoes

▸▸ equation

**Demand**
○○●○○○

Supply
○○○○○○

The Market
○○○○○○○○○○○

Elasticity
○○○○○○○○○

## Factors that influence demand

- Price
- Number of consumers
- Consumer income
- Consumer tastes
- Prices of other goods
  - ✓ substitutes
  - ✓ complements

## Mathematical representation of the demand curve
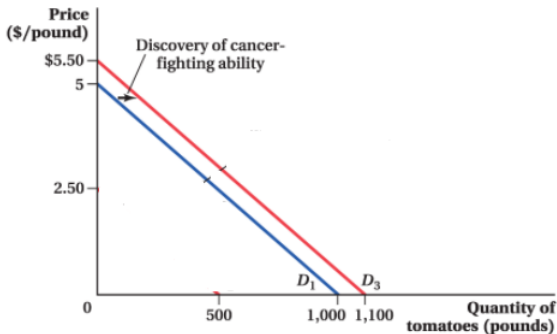
Demand equation: ( ↦ demand curve )

$$Q = 1,000 - 200 * P$$

Inverse demand equation:

$$P = 5 - 0.005 * Q$$

Demand **choke price**: price at which no consumer is willing to buy a good

**Demand**
○○○○●○

Supply
○○○○○○

The Market
○○○○○○○○○○○

Elasticity
○○○○○○○○○

## Shifts in the demand curve

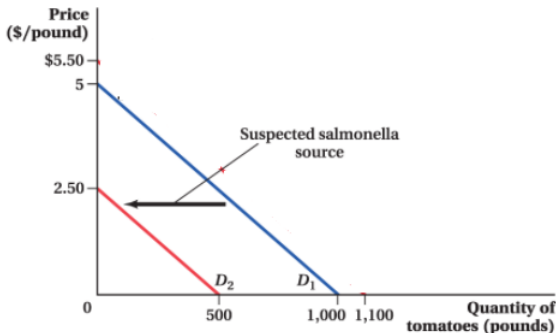$$Q = 1,100 - 200 * P$$



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Consumer testes (positive)

## Shifts in the demand curve
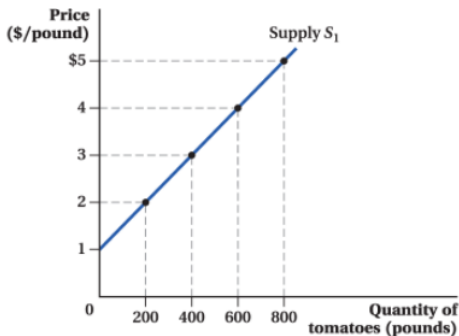
$$Q = 500 - 200 * P$$



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Consumer testes (negative)

Demand
○○○○○○

Supply
●○○○○○

The Market
○○○○○○○○○○○

Elasticity
○○○○○○○○○

## Contents

1  Demand

2  Supply

3  The Market

4  Elasticity

# Supply curve



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Supply for Tomatoes

▶ supply equation

Demand
oooooo

Supply
ooo●ooo

The Market
ooooooooooo

Elasticity
ooooooooooo

## Factors that influence supply

- Price
- Number of sellers
- Sellers outside option
- Suppliers' costs of production
  - ✓ input prices
  - ✓ production technology

Demand
○○○○○○

Supply
○○○●○○

The Market
○○○○○○○○○○○

Elasticity
○○○○○○○○○

## Mathematical representation of the supply curve

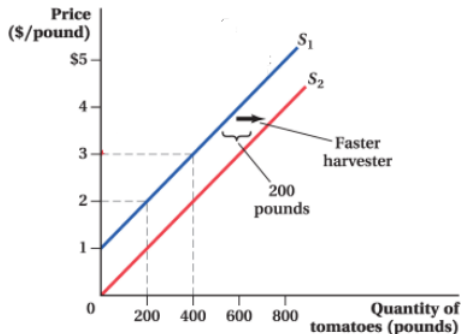Supply equation: $\;$ ⟶ supply curve

$$Q = 200 * P - 200$$

Inverse supply equation:

$$P = 0.005 * Q + 1$$

Supply **choke price**: price at which no firm is willing to produce a good and quantity supplied is zero
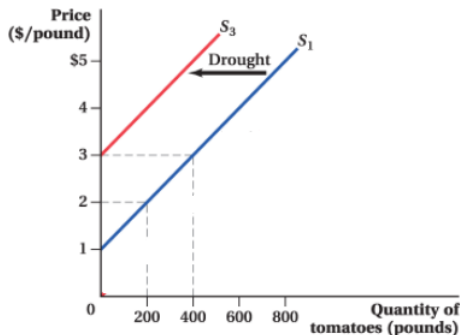
## Shifts in the supply curve

$$Q = 200 * P$$



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Better technology

Demand
oooooo

Supply
ooooo●

The Market
ooooooooooo

Elasticity
ooooooooo

## Shifts in the demand curve

$$Q = 200 * P - 600$$



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Drought

Demand
oooooo

Supply
oooooo

The Market
●ooooooooooo

Elasticity
ooooooooo

## Contents

1. Demand

2. Supply

3. The Market

4. Elasticity

Demand
000000
Supply
000000
The Market
0●0000000000
Elasticity
000000000
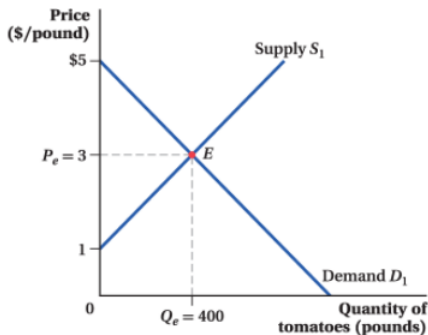
# Market Equilibrium



**Figure:** Market Equilibrium

## Mathematics of Equilibrium

$$Q^D = 1,000 - 200 * P$$

$$Q^S = 200 * P - 200$$

We know that at market equilibrium, quantity demanded equals quantity supplied:

$$Q^D = Q^S$$

$$1,000 - 200 * P = 200 * P - 200$$

$$1,200 = 400 * P$$

$$P = 3$$

## Mathematics of Equilibrium

To find the equilibrium quantity, substitute the equilibrium price either in demand or supply equation:
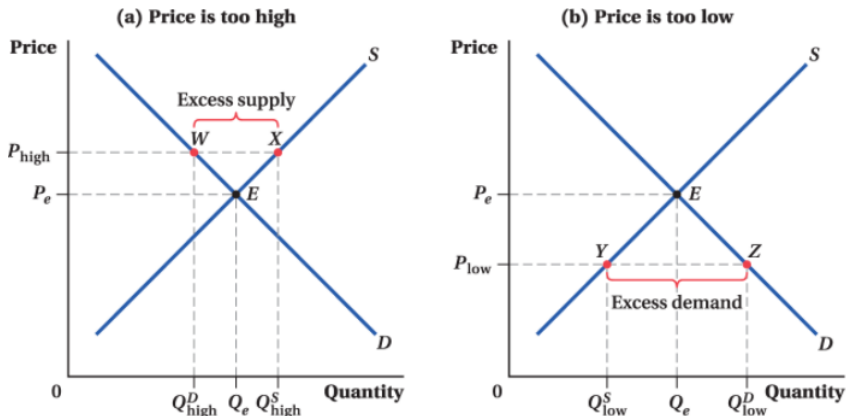
$$Q^D = 1,000 - 200 * P$$

$$Q^S = 200 * P - 200$$

You can also find the equilibrium price and quantity using the inverse demand and supply equations:

$$P = 5 - 0.005 * Q^D$$

$$P = 0.005 * Q^S + 1$$

Demand
oooooo

Supply
oooooo

The Market
ooooo●oooooo

Elasticity
ooooooooo

# Why Markets Move toward Equilibrium



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Equilibrium Price

Demand
oooooo

Supply
oooooo

The Market
ooooo●oooooo

Elasticity
ooooooooo

## Example of excess demand

Suppose that the demand and supply curves for a monthly cell phone plan can be represented by

$$Q^D = 50 - 0.5 * P$$

$$Q^S = -25 + P$$

The current price of these plans in the market is \$40 per month.

- Is this market in equilibrium?
- Would you expect the price to rise or fall?
- If so, by how much?

## Example of excess demand

First, calculate the quantity demanded and quantity supplied at
the current market price of \$40

$$Q^D = 50 - 0.5 * P = 50 - 0.5 * (40) = 30$$
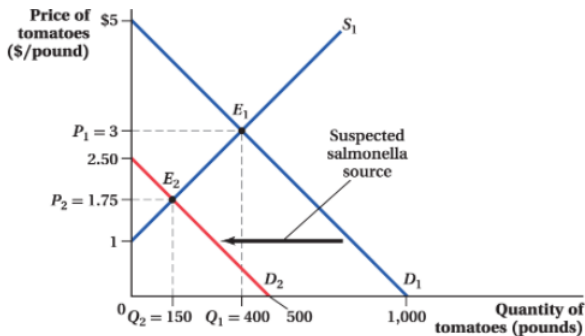
$$Q^S = -25 + P = -25 + 40 = 15$$

Because quantity demanded is greater than quantity supplied,
we can tell that there is excess demand in the market. In
equilibrium, we should have

$$Q^D = Q^S$$

$$50 - 0.5 * P = -25 + P$$

$$P = 50$$

## The Effects of Demand Shifts



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Fall in the Demand for Tomatoes

Demand
oooooo

Supply
oooooo

The Market
ooooooooo●oo

Elasticity
ooooooooo

## The Effects of Demand Shifts

The new demand equation is

$$Q^D = 500 - 200 * P$$

We know that at market equilibrium, quantity demanded equals quantity supplied:

$$Q^D = Q^S$$

$$500 - 200 * P = 200 * P - 200$$

$$700 = 400 * P$$

$$P = 1.75$$

## The Effects of Supply Shifts



Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Increase in the Supply of Tomatoes

Demand
○○○○○○

Supply
○○○○○○

The Market
○○○○○○○○○○○●

Elasticity
○○○○○○○○○

## The Effects of Supply Shifts

The new supply equation is

$$Q^S = 200 * P + 200$$

We know that at market equilibrium, quantity demanded equals quantity supplied:

$$Q^D = Q^S$$

$$1,000 - 200 * P = 200 * P + 200$$

$$800 = 400 * P$$

$$P = 2$$

# Contents

## Elasticity

The elasticity formula is

$$E = \frac{\%\Delta Q}{\%\Delta P} = \frac{\Delta Q/Q}{\Delta P/P}$$

where E is a demand or supply elasticity, depending on whether Q denotes quantity demanded or supplied.

Rearranging terms yields

$$E = \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

## Elasticity

We can also express the elasticity as
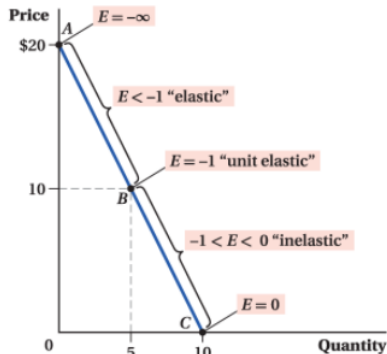
$$E = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{1}{slope} \cdot \frac{P}{Q}$$

where "slope" refers to $\frac{\Delta P}{\Delta Q}$, the slope of the demand or supply curve in the standard price-versus-quantity space

Types of Elasticity

- Perfectly inelastic: $|E| = 0$
- Inelastic: $|E| < 1$
- Unit elastic: $|E| = 1$
- Elastic: $|E| > 1$
- Perfectly elastic: $|E| \longrightarrow \infty$

Demand
oooooo

Supply
oooooo

The Market
ooooooooooo

Elasticity
oooo●oooo

## Elasticity of a Linear Demand Curve



Goolsbee et al., *Microeconomics*, 3e, © 2020
Worth Publishers

**Figure:** Elasticity of a Linear Demand Curve

## Example: Elasticity of Demand

The demand for gym memberships is

$$Q = 360 - 2 * P$$

Calculate the price elasticity of demand for gym memberships
when the price is \$50 per month

$$E = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{1}{slope} \cdot \frac{P}{Q}$$

First let us compute the slope of the inverse demand

$$P = 180 - 0.5 * Q$$

Then, the quantity demanded at $P = 50$

$$Q = 360 - 2 * (50) = 260$$

Demand
○○○○○○
Supply
○○○○○○
The Market
○○○○○○○○○○○
Elasticity
○○○○○○●○○

## Example: Elasticity of Demand

Finally, substitute in the elasticity formula

$$E = \frac{1}{slope} \cdot \frac{P}{Q} = \frac{1}{-0.5} \cdot \frac{50}{260}$$

$$E = -2 \cdot \frac{50}{260} = \frac{-100}{260} = \frac{-50}{130} = -0.385$$

Calculate the price elasticity of demand for gym memberships when the price is \$100 per month

$$E = -2 \cdot \frac{100}{160} = \frac{-200}{160} = \frac{-50}{40} = -1.25$$

Demand
oooooo

Supply
oooooo

The Market
ooooooooooo

Elasticity
ooooooooo●o

## Income Elasticity of Demand

$$E_I^D = \frac{\%\Delta Q^D}{\%\Delta I} = \frac{\Delta Q^D}{\Delta I} \cdot \frac{I}{Q^D}$$

- Inferior goods: $E_I^D < 0$
- Normal goods: $E_I^D > 0$
- Luxury goods: $E_I^D > 1$

Demand
oooooo

Supply
oooooo

The Market
ooooooooooo

Elasticity
oooooooo●

## Cross-Price Elasticity of Demand

$$E_{XY}^D = \frac{\%\Delta Q_X^D}{\%\Delta P_Y} = \frac{\Delta Q_X^D}{\Delta P_Y} \cdot \frac{P_Y}{Q_X^D}$$

- Complement goods: $E_{XY}^D < 0$
- Substitute goods: $E_{XY}^D > 0$