Equilibrium
Chapter 16
Today

- Info Re: Quizzes
- Marginal Revenue
- Competitive Equilibrium Intro
- Equilibrium: Comparative Statics
Quizzes Next Week

- Covers chapters 12, 14, 15
- 3-5 multiple choice, comparable to B&V
- 12 minutes, beginning of section
- Only pen needed (no scantron, calculator)
- Diagnostic
- Returned next section
Q: Why is the $MR$ curve always below $D$?

A: Lower price to sell additional unit; earn extra $p$ on additional unit, but lose revenue w/ lower price on all previous units.

$$R = pq \implies MR = \frac{\partial R}{\partial q} = p \cdot 1 + q \frac{\partial p}{\partial q}$$
How elastic is demand at the quantity at which $MR = 0$?

A) Elastic
B) Unit Elastic
C) Inelastic
D) Not enough info
Clicker Vote

How elastic is demand at the quantity at which $MR = 0$?

A) Elastic  
B) **Unit Elastic**  
C) Inelastic  
D) Not enough info
Marginal Revenue

Linear demand: \( p(q) = a - bq \) (inverse demand)

\[ MR = a - 2bq, \] so revenue maximizing \((p, q) = (a/2, a/(2b))\).
Firms are ‘price-takers’ in competitive markets, but how is the market price (and quantity) determined? **competitive equilibrium**

What happens to equilibrium price and quantity when either supply or demand changes? **comparative statics**

What are the effects of taxes and subsidies on prices and quantities?

What are the welfare effects of taxes and subsidies? **deadweight loss, tax incidence**
Competitive Equilibrium

Market Basics:

- How do we determine what to produce, how to do so, how to allocate produced goods, and to whom?
- One method: central planning
- Market system = decentralized alternative: each person/firm decides what/how to produce, individuals decide what to buy
- Market = meeting of buyers and sellers; many different formats/institutions
- How is price/quantity determined? Depends on institutional rules, individuals but . . .
- By understanding incentives, we arrive at the concept of equilibrium as a predictor of long-term
- In equilibrium, no one has any reason to change behavior; disequilibrium incentive push people back towards equilibrium
Market Forces

What is the equilibrium price?
What is the equilibrium price?

The graph shows the intersection of the supply and demand curves at point $p^*$, indicating the equilibrium price in the market for Kale.
Market Forces

What are the sellers’ disequilibrium incentives?

Price

Supply

$p > p^*$

$p^*$

Demand

Kale
What are the sellers’ disequilibrium incentives?

\[ p > p^* \]

Excess Supply

Competition will drive the price down
Market Forces

What are the sellers’ disequilibrium incentives?

\[ p < p^* \]
What are the sellers’ disequilibrium incentives?

Greed will drive the price up.
Q: What is a competitive equilibrium?

A: The price $p^*$ and quantity $q^*$ such that

$$D(p^*) = S(p^*) = q^*.$$ 

Alternatively, using inverse demand and supply we can write

$$P_D(q^*) = P_S(q^*) = p^*$$
Example

Market for kale

- Demand for kale: \( D(p) = 100 - 2p \)
- Supply of kale: \( S(p) = 10 + 7p \)
- Equilibrium condition:

\[
D(p^*) = S(p^*) \implies 100 - 2p^* = 10 + 7p^* \implies 9p^* = 90 \implies p^* = 10
\]

- So equilibrium \( q \) is

\[
q^* = D(10) = 100 - 2 \times 10 = 80 = S(10)
\]
A new study reveals health benefits of eating kale. How does this affect \((p^*, q^*)\)?
A new study reveals health benefits of eating kale.
An *E. coli* outbreak is traced to a kale farm.
Comparative Statics: Shifting Supply

Kale-weevils decimate crop

**Clicker Vote:** Which way does supply shift?
- Up
- Down
- Left
- Right

![Supply and Demand Diagram]

- **S** indicates Supply
- **D** indicates Demand
- **p^*** is the price at equilibrium
- **q^*** is the quantity at equilibrium
Comparative Statics: Shifting Supply

Kale-weevils decimate crop

**Clicker Vote:** Which way does supply shift?
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![Diagram showing supply and demand curves](https://via.placeholder.com/150)
Comparative Statics: Shifting Supply

Kale-weevils decimate crop

![Diagram showing the effect of kale-weevils decimating the crop on the supply curve and price. The original supply curve is SS, and the new supply curve after the decimation is SS'. The price increases from p* to p', and the quantity demanded decreases from q* to q'.]
Comparative Statics: Shifting Both Curves

The effect on \((p^*, q^*)\) of shifting both curves: ambiguous for one, unambiguous for the other.

![Diagram showing supply and demand curves with price and quantity axes labeled.]