

# 2.1 – Production and Firms

ECON 306 • Microeconomic Analysis • Spring 2023

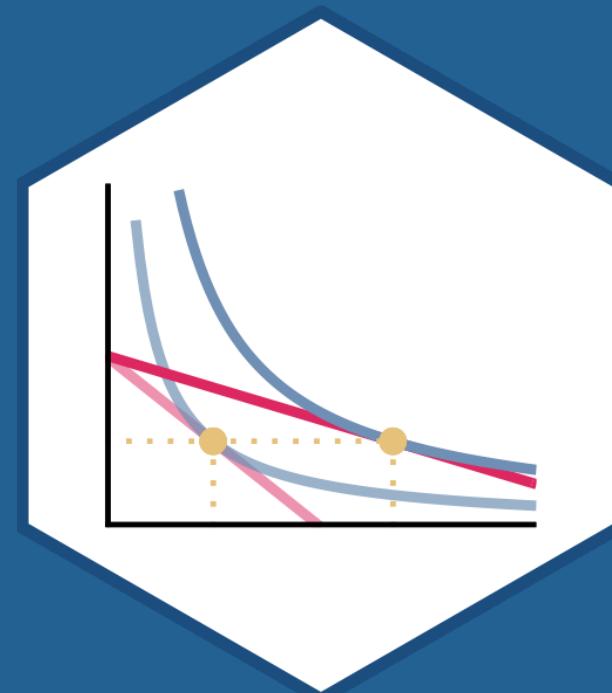
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 [ryansafner/microS23](https://github.com/ryansafner/microS23)

 [microS23.classes.ryansafner.com](https://microS23.classes.ryansafner.com)



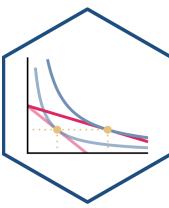
# Outline



## Production, Specialization, & Comparative Advantage

### What Do Firms Do?

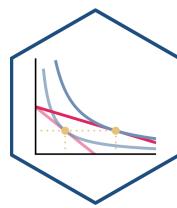
# Producer Behavior



- How do **producers** decide:
  - which products to produce
  - in what quantity
  - using which inputs
  - and sold at what price?
- Answers to these questions are building blocks for **supply curves**



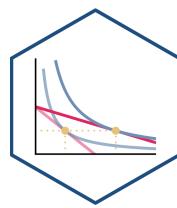
# The Basics of Production



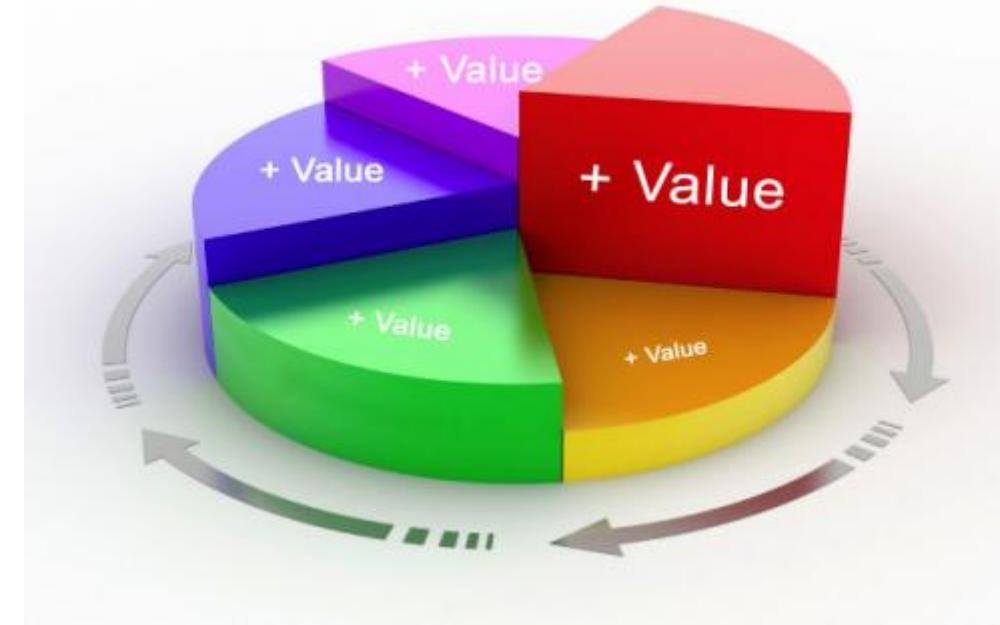
- Nearly all goods must be **produced** before we can exchange & consume them
- **Consumption** is the **using up** of value to gain utility
  - **Consumption is the ultimate goal of all economic activity**



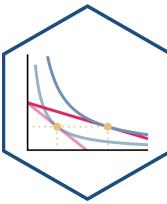
# The Basics of Production



- **Production** is the **creation** of value, by transforming *lower*-valued goods (resources, inputs, etc) into *higher*-valued goods (outputs, consumer products, etc)
- Iron Ore → Steel → Buildings, Bridges, Ovens, Water Bottles

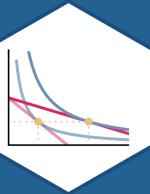


# It's Demand all the Way Down!



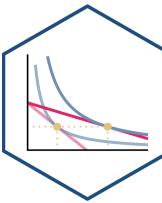
- **Supply** is actually **Demand** in disguise!
- An **(opportunity) cost** to buy (scarce) inputs for production because **other people demand** those same inputs to consume or produce **other valuable things!**
  - Price necessary to **pull them out of other valuable productive uses** in the economy!





# What Do Firms Do?

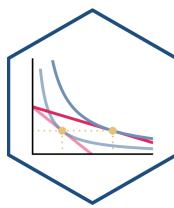
# The Firm



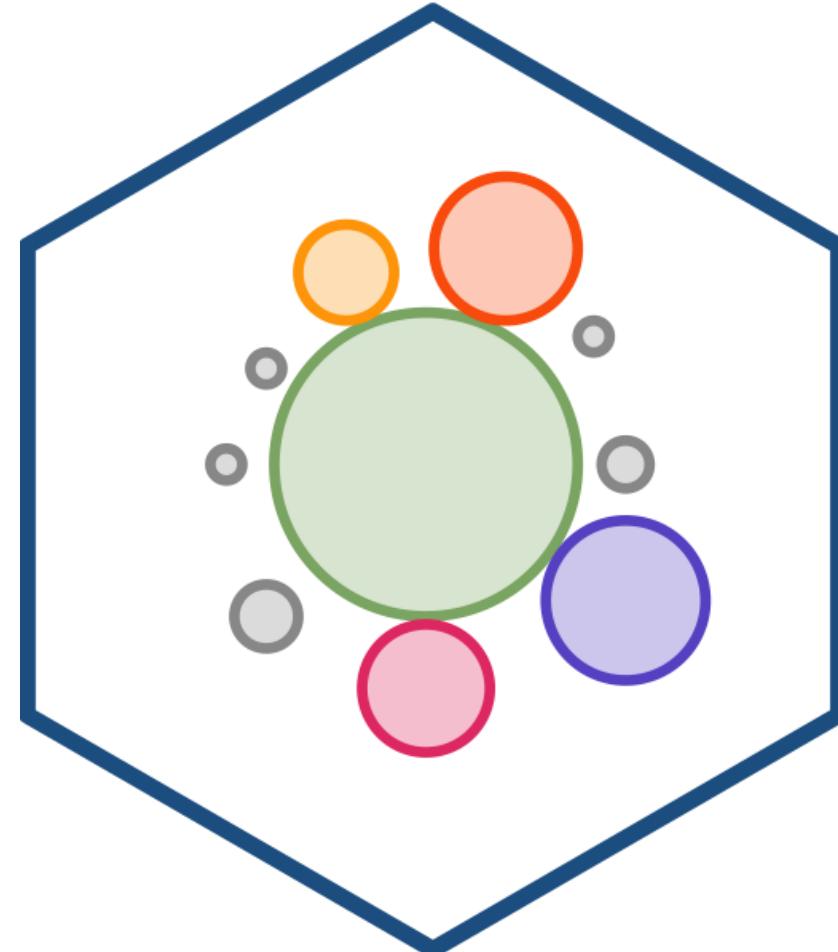
- In modern market economies, most production takes place in an organization known as a **firm**
  - A legal fiction for particular purposes
- It does not *have* to be this way, and for most of history it was not this way!
  - Craft guilds
  - Independent artisans
  - Independent contractors



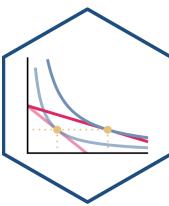
# If Markets Are So Great, Why Do Firms Exist?



- Firms exist in the forms they do because they are **an efficient response to particular problems of economic organization**
- Lots of interesting & Nobel-prize winning analysis
- For now, we'll sidestep these and just *assume* firms exist. Learn more in my **Industrial Organization** course:
  - [Why Are There Firms?](#)
  - [The Firm as Nexus of Contracts](#)
  - [Asset Specificity and Vertical Integration](#)
  - [Contractual Restraints & Property Rights](#)



# What Do Firms Do? I

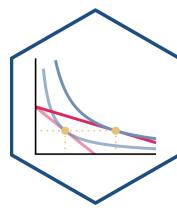


- We'll assume “the firm” is the agent to model:
- So what do firms do?
- How would we set up an optimization model:

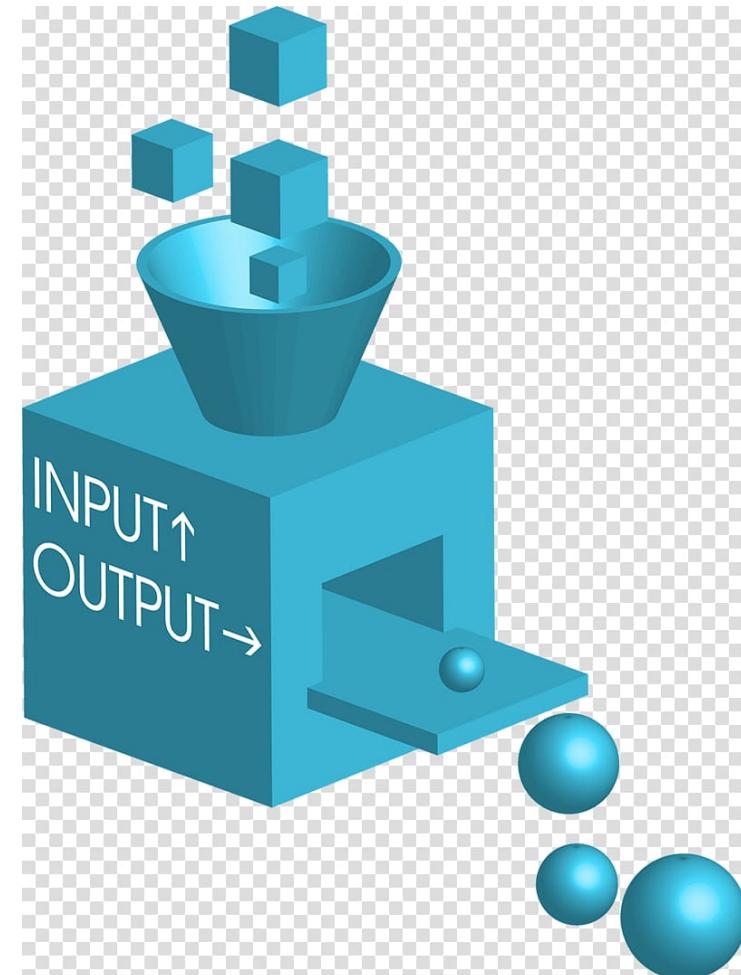
1. **Choose:** < some alternative >
2. **In order to maximize:** < some objective >
3. **Subject to:** < some constraints >



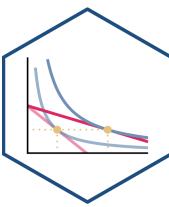
# What Do Firms Do? II



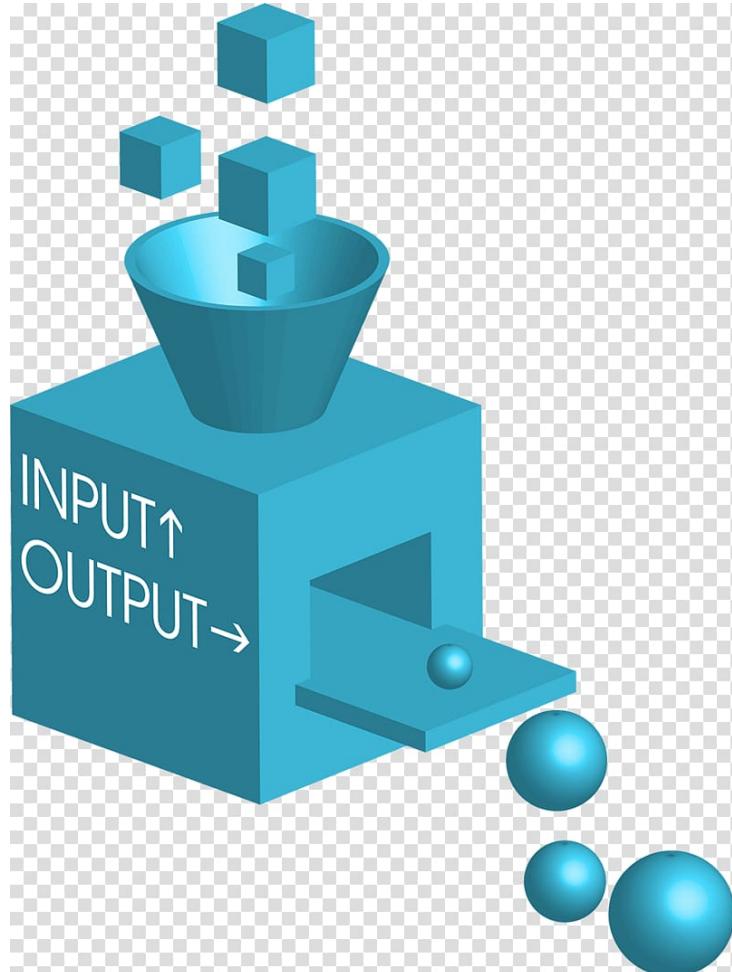
- Firms convert some goods to other goods:



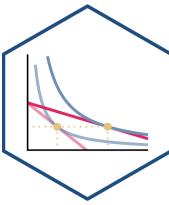
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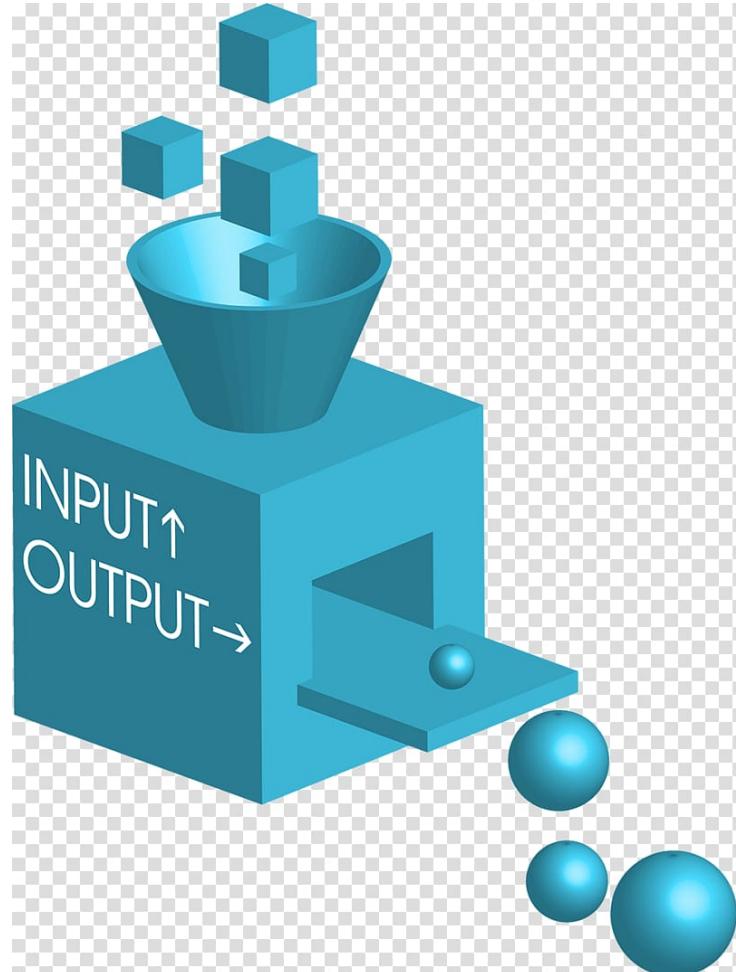
- Firms convert some goods to other goods:
- **Inputs:**  $x_1, x_2, \dots, x_n$ 
  - **Examples:** worker efforts, warehouse space, electricity, loans, oil, cardboard, fertilizer, computers, software programs, etc



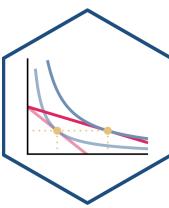
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- Firms convert some goods to other goods:
- **Inputs:**  $x_1, x_2, \dots, x_n$ 
  - **Examples:** worker efforts, warehouse space, electricity, loans, oil, cardboard, fertilizer, computers, software programs, etc
- **Output:**  $q$ 
  - **Examples:** gas, cars, legal services, mobile apps, vegetables, consulting advice, financial reports, etc

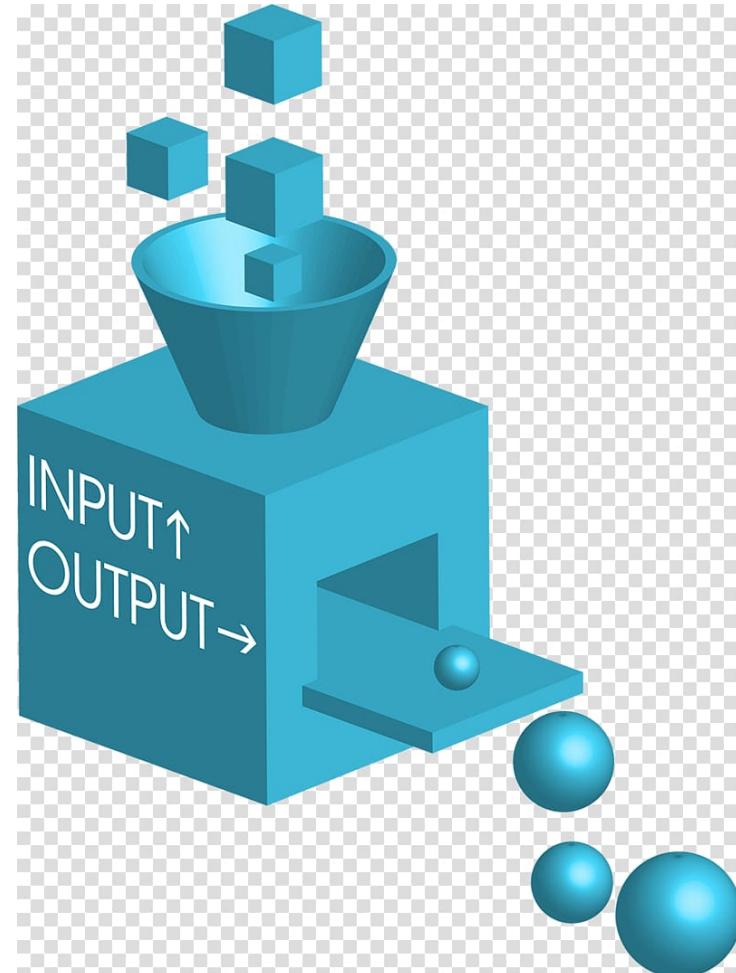


# What Do Firms Do? III

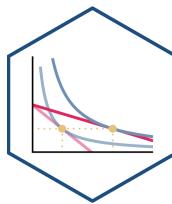


- **Technology** or a **production function**:  
rate at which firm can convert specified  
**inputs** ( $x_1, x_2, \dots, x_n$ ) into **output**  
( $q$ )

$$q = f(x_1, x_2, \dots, x_n)$$



# Production Function as Recipe



## The production function

READY IN: 1hr 20mins

YIELD: 2 loaves

UNITS: US

### INGREDIENTS

#### Nutrition

5 cups all-purpose  
white flour

2 tablespoons yeast (or  
2 x 7g pkts)

2 teaspoons sugar

1 teaspoon salt

2 cups warm-hot water

$\frac{1}{4}$  cup cooking oil

## The production algorithm

### DIRECTIONS

Put 4 cups of the flour, yeast, sugar and salt into large bowl.

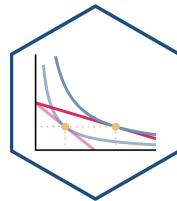
Pour in hot water and oil and mix until combined- it will be sticky.

Add the remaining flour in increments until dough is no longer sticky.

Knead for about 5 minutes until dough is elastic and smooth.

Place dough back into bowl and cover with a damp teatowel and let it rise until double its size- about 1/2 hour.

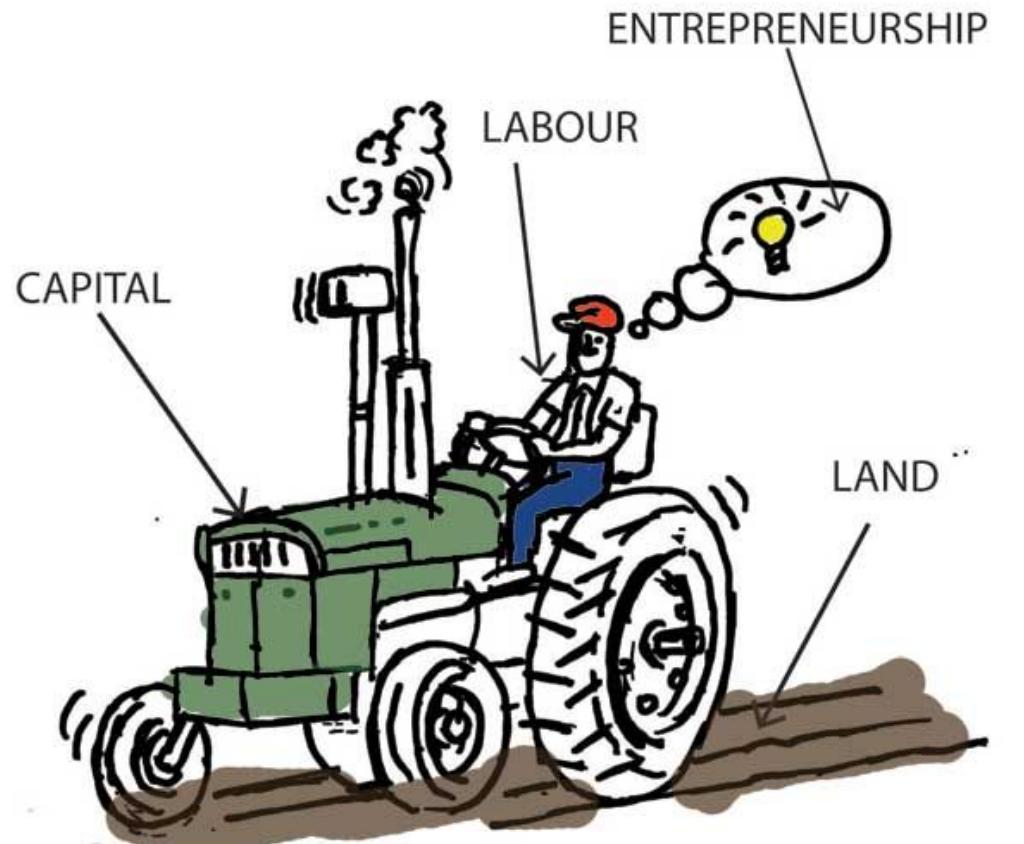
# Factors of Production I



$$q = A f(t, l, k)$$

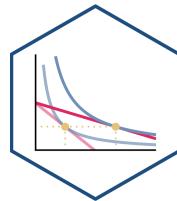
- Economists typically classify inputs, called the **“factors of production” (FOP)**:

Factor	Owned By	Earns
Land (t)	Landowners	Rent
Labor (l)	Laborers	Wages
Capital (k)	Capitalists	Interest



- $A$ : "total factor productivity"  
(ideas/knowledge/institutions)

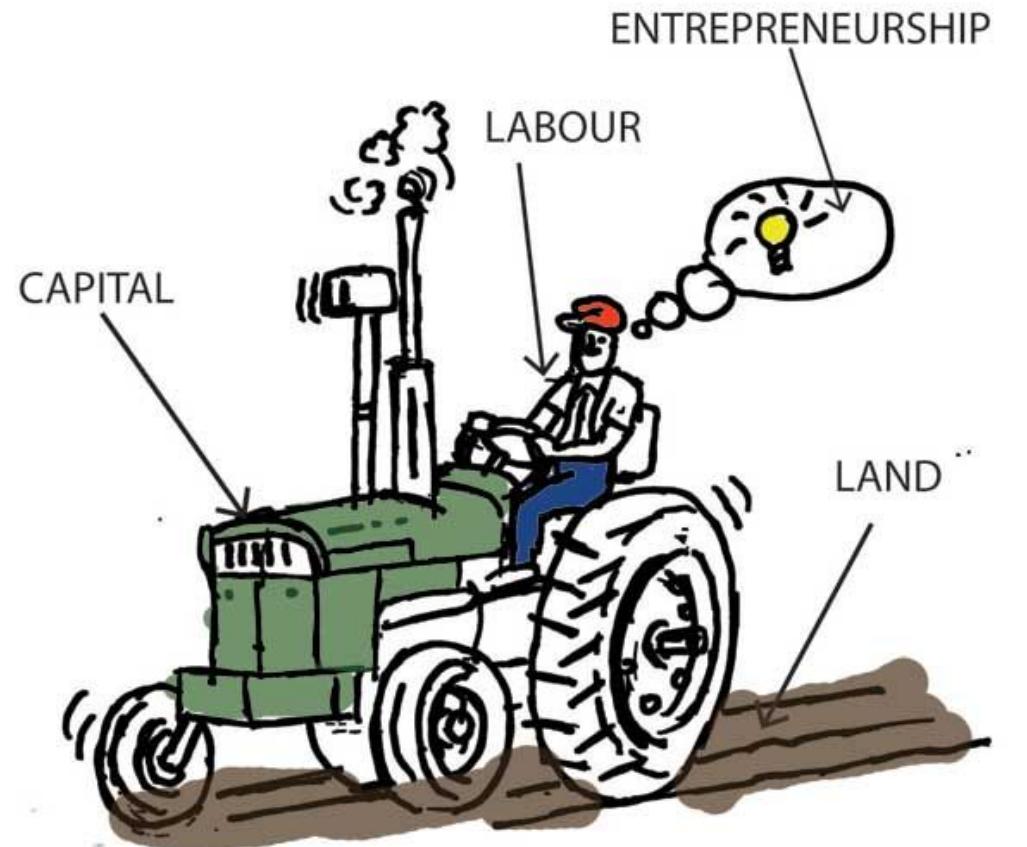
# Factors of Production II



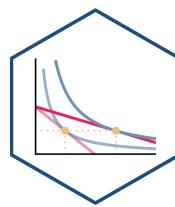
$$q = f(l, k)$$

- We will assume just two inputs: labor  $l$  and capital  $k$

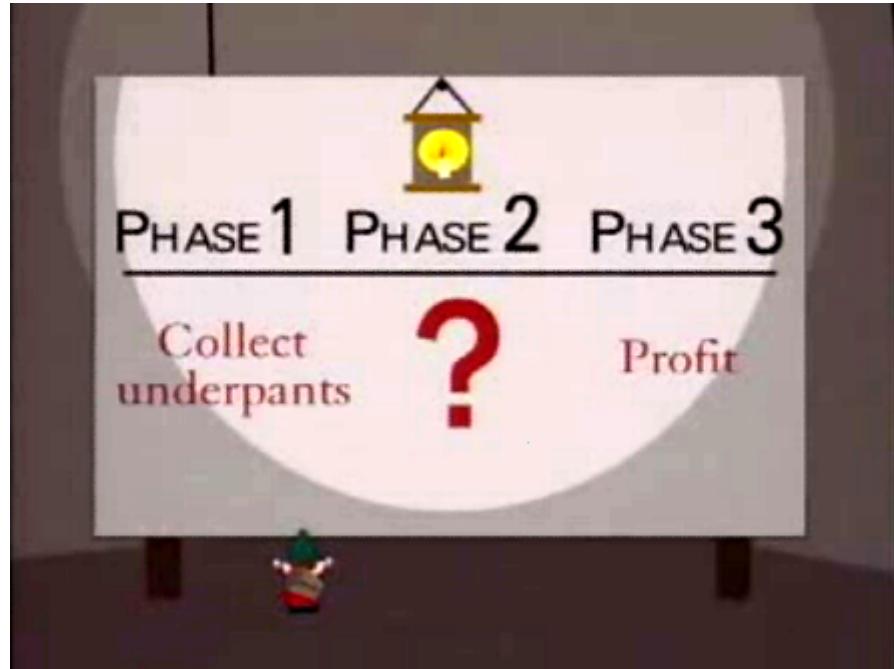
Factor	Owned By	Earns
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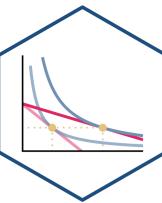
# What Does a Firm Maximize?



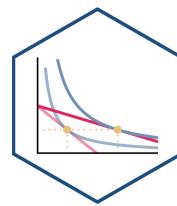
- We assume firms **maximize profit** ( $\pi$ )
- Not true for all firms
  - **Examples:** non-profits, charities, civic associations, government agencies, criminal organizations, etc
- Even profit-seeking firms may also want to maximize *additional* things
  - **Examples:** goodwill, sustainability, social responsibility, etc



# Profits Have a Bad Rap These Days



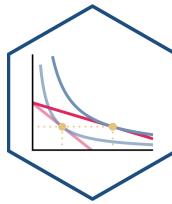
# What is Profit?



- In economics, **profit** is simply **benefits minus (opportunity) costs**



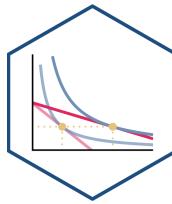
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- Suppose firm sells **output  $q$**  at price  $p$



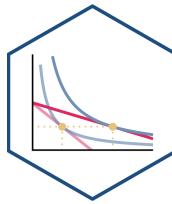
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- Suppose firm sells **output**  $q$  at price  $p$
- It can buy each **input**  $x_i$  at an associated price  $p_i$ , i.e.
  - labor  $l$  at wage rate  $w$
  - capital  $k$  at rental rate  $r$



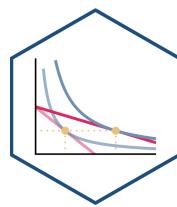
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  - labor  $l$  at wage rate  $w$
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- The profit of selling  $q$  units and using inputs  $l, k$  is:



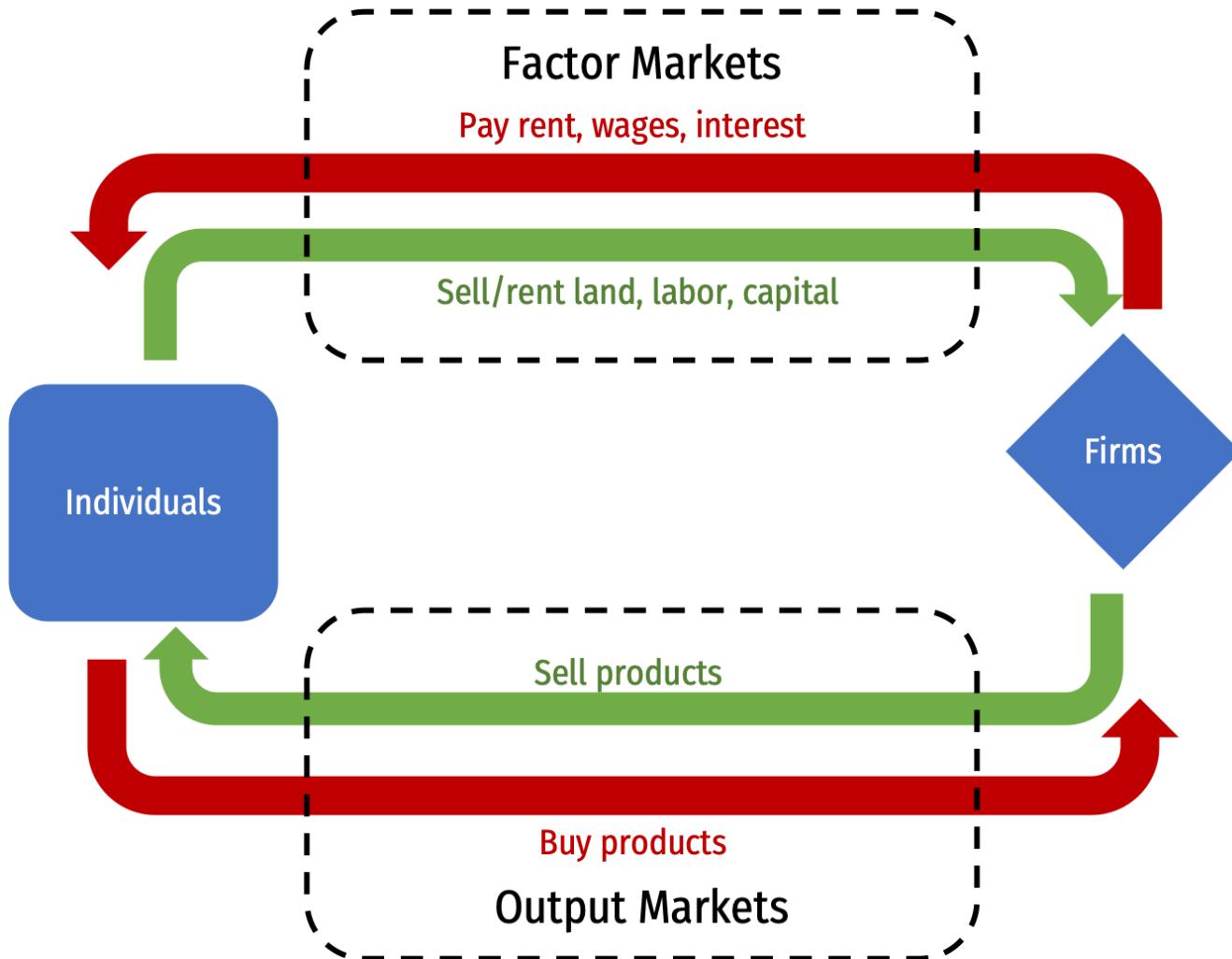
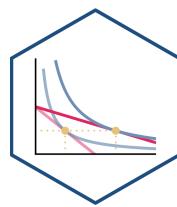
# Who Gets the Profits? I



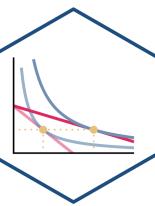
$$\pi = \underbrace{pq}_{revenues} - \underbrace{(wl + rk)}_{costs}$$



# Reminder from Macroeconomics: “The Circular Flow”



# Who Gets the Profits? I

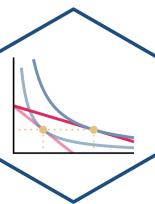


$$\pi = \underbrace{pq}_{revenues} - \underbrace{(wl + rk)}_{costs}$$

- The firm's costs are all of the factor-owner's incomes!
  - Landowners, laborers, creditors are all paid rent, wages, and interest, respectively



# Who Gets the Profits? I

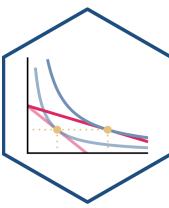


$$\pi = \underbrace{pq}_{\text{revenues}} - \underbrace{(wl + rk)}_{\text{costs}}$$

- Profits are the **residual value** leftover after paying all factors
- Profits are income for the **residual claimant(s)** of the production process (i.e. **owner(s)** of a firm):
  - Entrepreneurs
  - Shareholders



# Who Gets the Profits? II

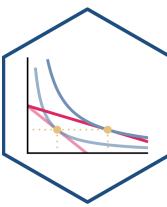


$$\pi = \underbrace{pq}_{\text{revenues}} - \underbrace{(wl + rk)}_{\text{costs}}$$

- Residual claimants have incentives to maximize firm's profits, as this *maximizes their own income*
- Entrepreneurs and shareholders are the only participants in production that are *not* guaranteed an income!
  - Starting and owning a firm is inherently **risky**!

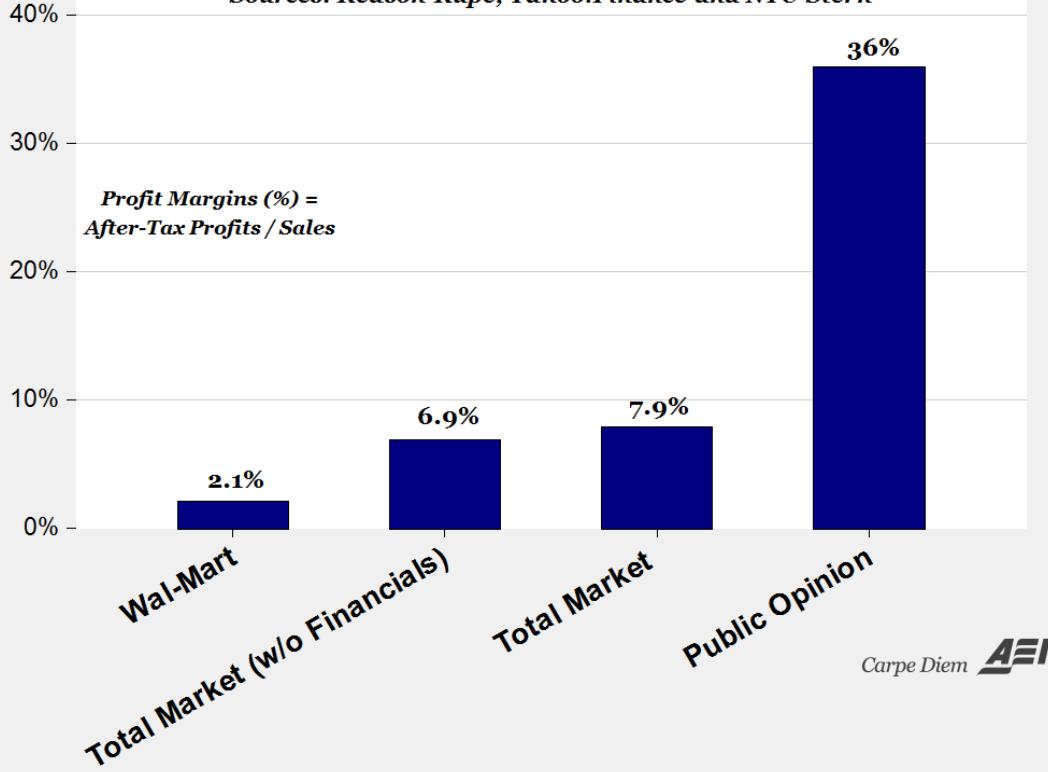


# People Overestimate Profits



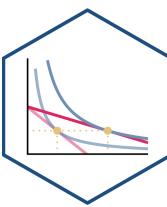
**Profit Margins: Public Opinion vs. Actual vs. Wal-Mart**

Sources: Reason-Rupe, Yahoo!Finance and NYU Stern



Source: [American Enterprise Institute](#)

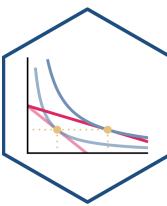
# Profits and Entrepreneurship: A Preview



- In markets, production must face the **profit test**:
  - Is consumer's willingness to pay > opportunity cost of inputs?
- Profits are an indication that **value is being created for society**
- Losses are an indication that **value is being destroyed for society**
- Survival in markets *requires* firms continually create value & earn profits



# The Firm's Optimization Problem I



- So what do firms do?

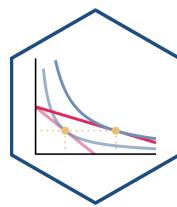
1. **Choose:** < some alternative >
2. **In order to maximize:** < profits >

3. **Subject to:** < technology >

- We've so far assumed they maximize profits and they are limited by their technology



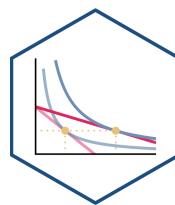
# The Firm's Optimization Problem II



- What do firms **choose**? (Not an easy answer)
- Prices?
  - Depends on the market the firm is operating in!
  - Study of **industrial organization**
- Essential question: **how competitive is a market?** This will influence what firms (can) do



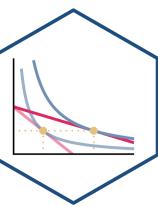
# Industrial Organization: A Roadmap I



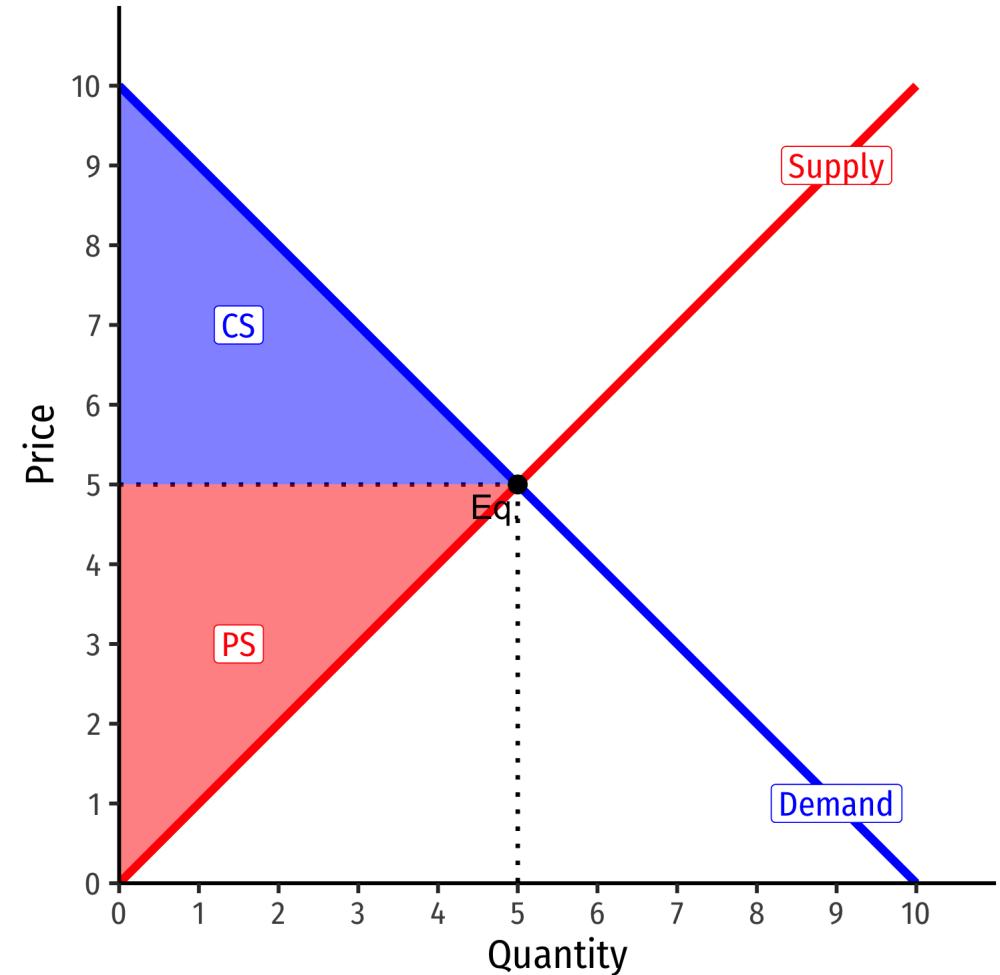
- Begin with one extreme case: “**perfect competition**”
  - Firms can choose to sell as much  $q^*$  as they want
  - Firms are constrained to sell at the (exogenous) market price  $\bar{p}$
- Appropriate for settings with *many* firms, each small relative to market



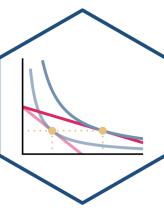
# Interlude



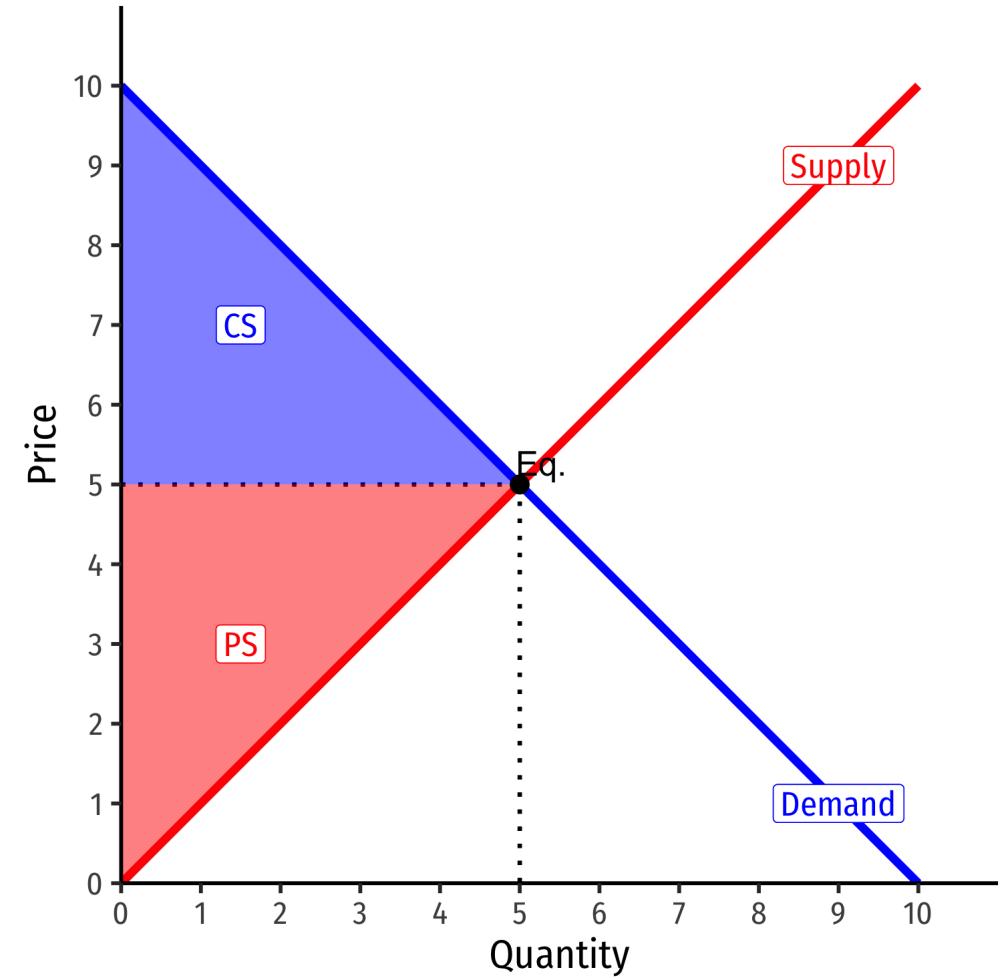
- After we find firm's **optimal decisions** in this market (and have Exam 2), we will then finally look at **Unit III: Market Equilibrium**
- Put **Supply** and **Demand** together



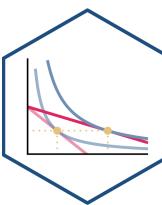
# Interlude



- We've seen how **consumers** cause and respond to market changes
  - e.g.  $(\Delta p_x, \Delta p_y, \Delta m)$
- We're about to explore how **producers** cause and respond to market changes
- Finally we can explain all of these market changes with Supply and Demand **equilibrium models**
- Discuss how markets work, why they are good & efficient, and when they fail



# Industrial Organization: A Roadmap II



- Examine another extreme case:  
**monopoly** of a single seller
  - Appropriate for some markets
- “**Imperfect competition**”: models of  
**monopolistic competition & oligopoly**
  - In latter case, firms act **strategically**,  
so we will need **game theory**
- Firms can choose *both*  $q^*$  &  $p^*$  to  
maximize  $\pi$

