LECTURES IN THE PRINCIPLES OF MICROECONOMICS

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The following notes are preliminary and incomplete! Often these notes require further explanation, there could be mistakes in them, and some things are missing (e.g. the graphs are not usually labeled.) Students are responsible for catching the corrections given during lecture.

What is economics?

Economics is a social science

Adam Smith was the father of economics, and his most famous book was published in 1776, titled *An Inquiry into the Nature and Causes of the Wealth of Nations*. Therefore, one way to describe economics is by this title.

A typical definition comes from paraphrasing Mankiw: "Economics is the study of how society manages its scarce resources, and the decisions and choices we make. Because there are limited resources, the economy always has less to offer than people wish to have. Therefore people have to make tradeoffs when deciding what to produce and consume."

Finally, (D. Friedman, 1990) offers the following: "Economics is that way of understanding behavior that starts from the assumption that people have objectives and tend to choose the correct way to achieve them…economics is not a particular set of questions to be answered but a particular way of answering questions."

Supply and Demand

Supply involves four factors of production:

1. Labor
2. Capital -- physical (factories)
   -- human (skills and knowledge)
3. Land (natural resources)
4. Entrepreneurial Ability (ideas in the mind of an entrepreneur)

Entrepreneurs receive *profit*

Land owners receive *rent*

Capital owners receive *interest*

Labor is paid *wages*

Demand comes from maximizing utility subject to constraints, but also from production.

Consumers consume goods and services (e.g. food and leisure time)

Firms consume factors (or at least buy things) like labor and land

Five Keys to "Thinking Like an Economist"

A famous expression goes "There's no such thing as a free lunch" It means that in order to get something you need to give something up. People face tradeoffs – there is no exception to this rule in economics. Thus our first key is:

I. People respond to **incentives**

II. The cost of an item or activity is what you give up in order to choose it (**opportunity cost**).

e.g. by eating a "free lunch" you may lose the opportunity to study for class

III. Economic analysis is often a **marginal analysis**

Most decisions are not all or nothing types. Rational people attempt to take actions up to and until the marginal benefit outweighs the marginal cost. (If MB ≥ MC; If the *extra* benefit exceeds the *extra* cost)

IV. Distinguish between **positive and normative analysis** (think: objective versus subjective analysis)

Positive – statements that make a claim about the way the world is.
Normative – statements of how the world ought to be, e.g. is "better."

V. Finally, **economists prefer models**.

The real world is too complex to model exactly. Models simplify the world by making assumptions that are necessarily meant not to be realistic. Models often allow one to think more clearly and systematically about issues, and to make **ceteris paribus** (all else equal) statements e.g. As personal benefits (costs) from choosing an option increase, *ceteris paribus*, a person will be more likely (less likely) to choose that option.

Microeconomics studies the individual parts of the economy

Macroeconomics studies the entire economy as a whole – the total output of the economy, price level, etc.

Economic decision makers:

1. Households
2. Firms
3. Government
4. Rest of the world (ROW)

1. Households

   Demand goods and services
   Supply resources

2-4. Firms, Government, and ROW

   Demand resources that households provide
   Supply goods and services

Decision makers interact in *markets* where buyers and sellers carry out exchanges. There, the decision makers bring together *supply* and *demand*. This determines prices and quantities and these in turn affect many features of human existence, not least of which is quality of life.

Broadly speaking, there are two kinds of markets:

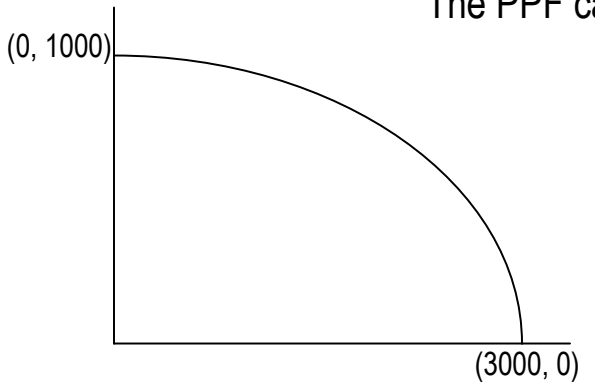
Product market – goods and services are bought and sold
(e.g. a grocery store)

Factor market – where resources (factors of production) are bought and sold
(e.g. the labor or land market)

Production Possibility Frontier (PPF):

a graph that shows the various combinations of output that the economy can produce, given the available factors of production and technology.

Consider an economy that can only produce two things: cars and computers



The PPF can illustrate the following:

- efficiency
- opportunity cost
- economic growth

Opportunity Cost When 1000 cars are produced, there are no resources left to produce computers. When 3000 computers are produced, there are no resources left to produce cars – the opportunity cost of 1000 cars is 3000 computers.

Efficiency: The economy is operating efficiently when it is getting the most it can from its resources. All points on the PPF are efficient (those points on the bowed line)

Economic Growth The PPF with shift outward if, for example, technological advances make producing cars and computers easier.

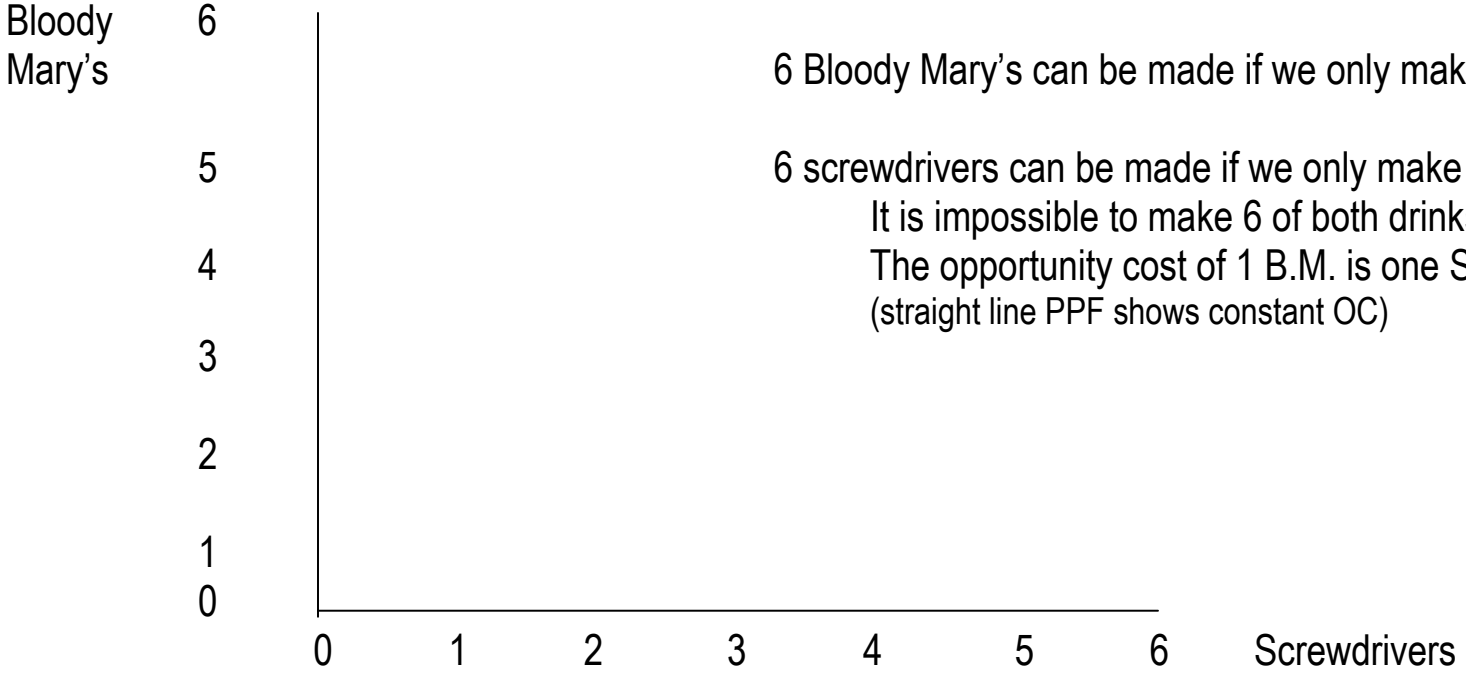
Why is the PPF bowed outward?

As more computers are produced, resources that are better suited for car production are drawn away from cars toward computers.

This is our 1st example of *diminishing returns*. The intuition is when an economy is only producing one thing, it is using resources that are valuable in other areas of production but may only contribute marginally to producing the one thing that is being produced.

Example: PPF of drinks

Imagine an economy with an unlimited and free supply of tomato juice and orange juice, but with only six shots of vodka.. What does the PPF of this economy look like, with Bloody Marys on the Y-axis and Screwdrivers on the X-axis?



Now who decides what to produce? (i.e. on which point of the PPF to operate?)

- Government (Benevolent Social Planner or Public Choice)
- Market Mechanism ("Invisible Hand")

"It's not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner but from their regard to their own interest."
-- Adam Smith

- Mixed economies

In every economy, both private individuals and government determine which goods and services are produced. Market failure is often used to justify government involvement in the economy.

Why do we need government?

Markets may fail to reach some desired outcome. This is termed *market failure* – a situation when markets fail to bring about efficiency. For example, a relatively unprofitable factory may displace a profitable laundromat if the factory does not bear the cost of pollution

Market failure may result from externality, non-private goods, asymmetric information, market power

Externality when the action of one person affects the well being of others.

examples: sound from a loud stereo, lights from Christmas decorations
(these can be both positive and negative externalities)

Non-private goods: public goods and common pool goods

Public Good A good for which one person's use does not diminish another's and people cannot be prevented from consuming it.

examples: national defense, knowledge, and radio waves

In the case of a public good, there may be under provision due to *free riding*.

Common Pool Good Like public goods people cannot be prevented from consuming it. However, one person's use does diminish another's;. one person's use of this good results in another externality, as other people are left with less of the good.

examples: common grazing land in medieval towns.

In the case of a common pool resource, there may be excessive consumption (the *tragedy of the commons*) without government action, or assignment of property rights.

Asymmetric information: insurance companies cannot perfectly distinguish between different risk-classes of consumers. Also, they cannot perfectly monitor insures to ensure they are taking good care of themselves. These facts lead to the potential problems of *adverse selection* and *moral hazard*.

Monopoly

Finally, sometimes there are situations of monopoly. Lack of competition can be very unpleasant.

In Depth: Why is the PPF bowed outward?

Imagine an economy with six workers: Bob, Jim, Mary, Jan, Susan and Tom. Each of them can produce either cars or computers. In particular, the chart below shows how many cars and computers each worker can produce if the worker spends a whole day producing either cars or computers. Workers cannot work part of the day on computers and the other part on cars, so for example, if Bob spends the day making cars he will make six cars but zero computers that day

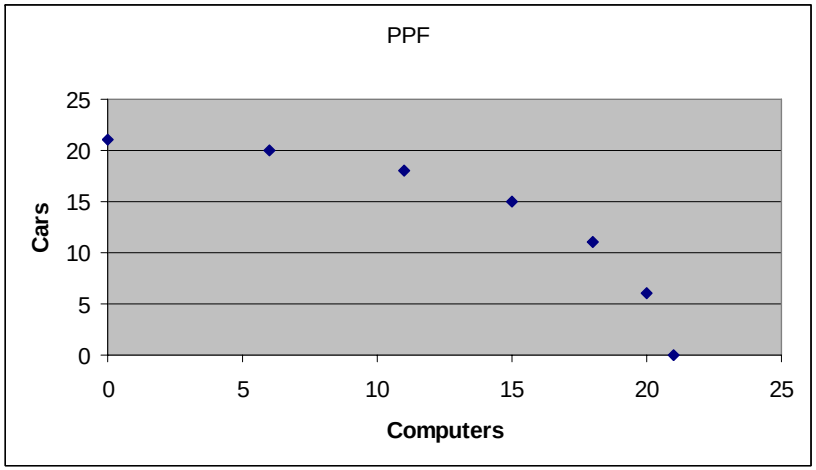
Table 1 Number of Cars and Computers Each Worker Can Produce in One Day

	cars	computers
Bob	6	1
Jim	5	2
Mary	4	3
Jan	3	4
Susan	2	5
Tom	1	6

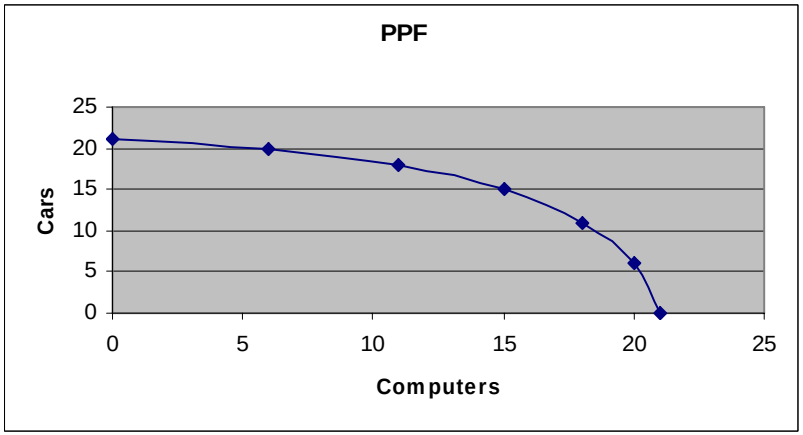
The most productive workers are always used in the production of any production bundle. For example, if 4 workers are used to produce cars and 2 workers are used to produce computers, Bob, Jim, Mary and Jan will produce cars and Tom and Susan will produce computers. In other words, workers will be chosen to produce cars from the order they appear in table 1 and workers will be chosen to produce computers from the reverse of the order that they appear in table 1.

If all workers produce cars, the total production of cars will be 21 – Bob produces 6, Jim 5, Mary 4, Jan 3, Susan 2 and Tom 1 – together they produce 21. If they are all producing computers, they can also make 21, because Tom produces 6, Susan 5, Jan 4, Mary 3, Jim 21 and Bob 1. As a final example, suppose three workers are used in the production of each good. Then Bob, Jim and Mary will produce cars (because they are the three most productive car producers) and Tom, Susan and Jan will produce computers.

The chart below shows every possible production bundle for different allocation of workers between cars and computers, assuming the most productive worker is used for each good.

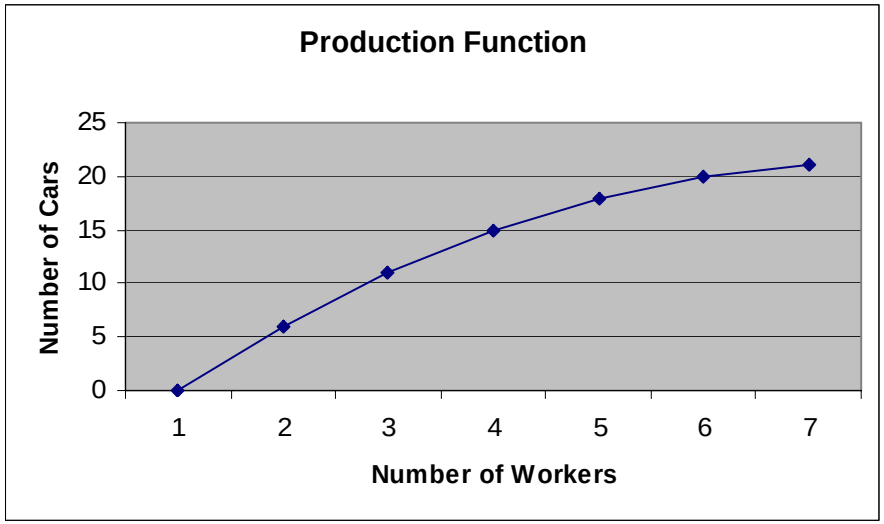


If we connect the dots, we find a PPF that looks like this

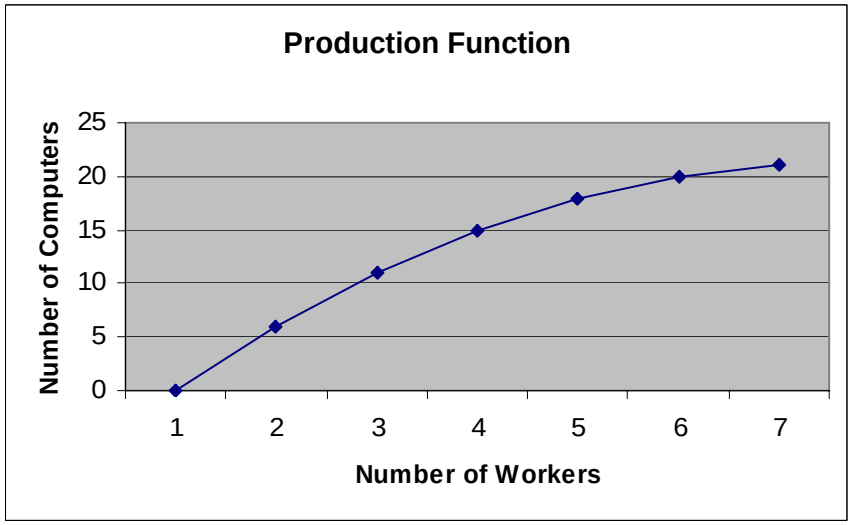


Why is the PPF bowed outward? Because when only cars are being produced, some workers are being used that are not very efficient at producing cars. So, when the economy moves from allocating all six workers producing cars to five workers producing cars and 1 worker producing computers, production of computers rises by six and only falls by one. This is because Tom was not very good at producing cars, but he is good at producing computers. This is the law of diminishing returns.

What would the production function look like if we put number of workers on the x-axis and number of computers (or number of cars) on the y-axis?



and for computers



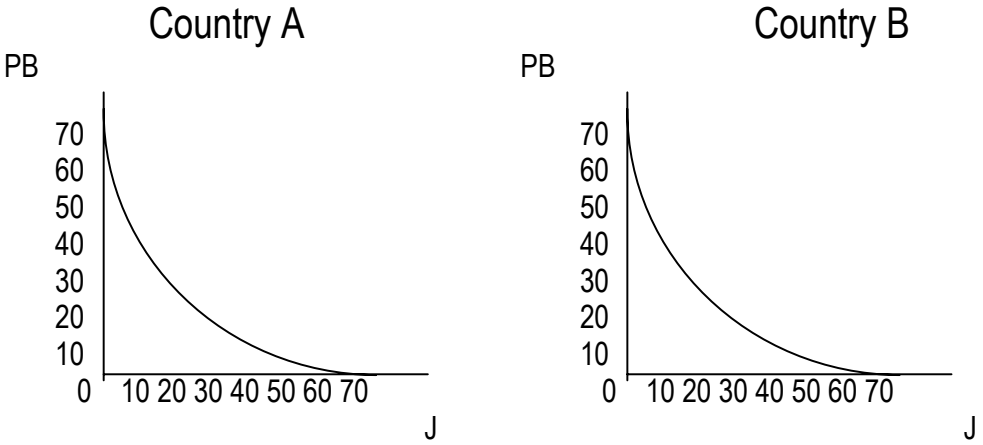
This is where you can really see the diminishing returns from adding additional labor.

Two reasons for gains from trade: increasing returns and comparative advantage

I. Increasing Returns

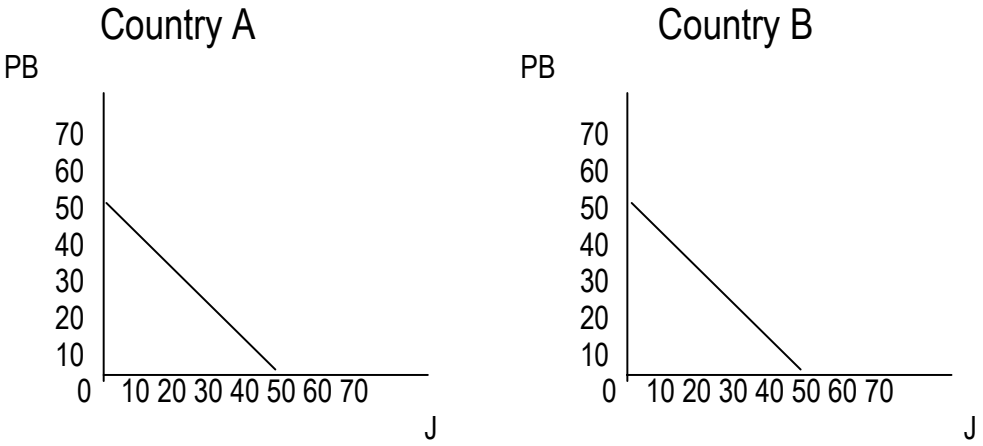
Sometimes the greater the extent that we specialize in producing something, the better we get at doing it. (Adam Smith noted several reasons this would be true for an individual: econlib.org

Consider the PPF of two identical countries:



If each country wants to consume equal parts of *PB* and *J*, then without trade, the most they can consume is about 25 *PB&J* sandwiches. However, if Country A specializes in *PB* and Country B specializes in *J*, then they will each produce 70. Then they can trade 35 units of *PB* and *J*, and both will have 35 of each, an increase of 10 each.

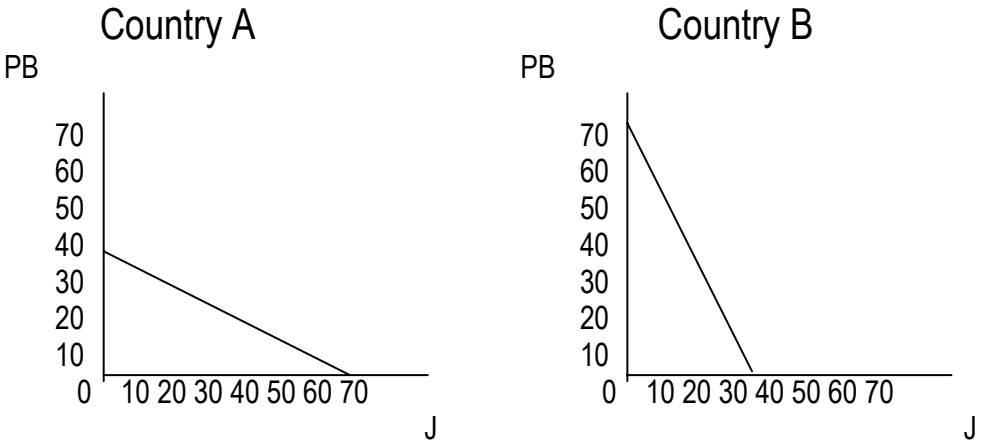
Without increasing returns (the reason for the bowed inward shape), gains from trade are not possible when countries are exactly the same:



In this case, each country will get 35 whether they trade or are self sufficient. (The point here is that there are no gains from trade)

II. Comparative Advantage

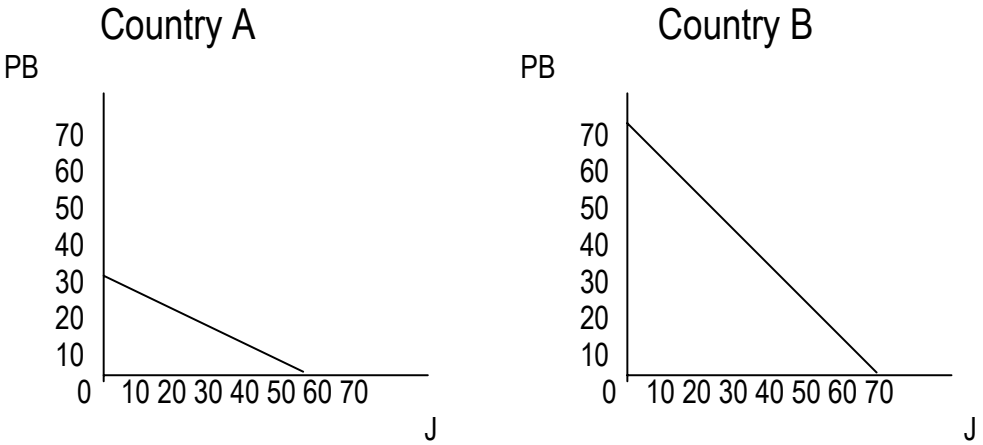
Now imagine there are constant returns to scale. We have already seen that if countries are identical, then there are no gains from trade. If countries are different, however, they can gain. Consider the following example:



Without trade, each country could consume about 27 PB&J sandwiches, but with specialization and trade, each can consume about 35 of each. In this case, Country A is better at producing jelly, and Country B is better at producing peanut butter…or, Country A has an *absolute advantage* in producing jelly, and Country B has an absolute advantage in producing peanut butter.

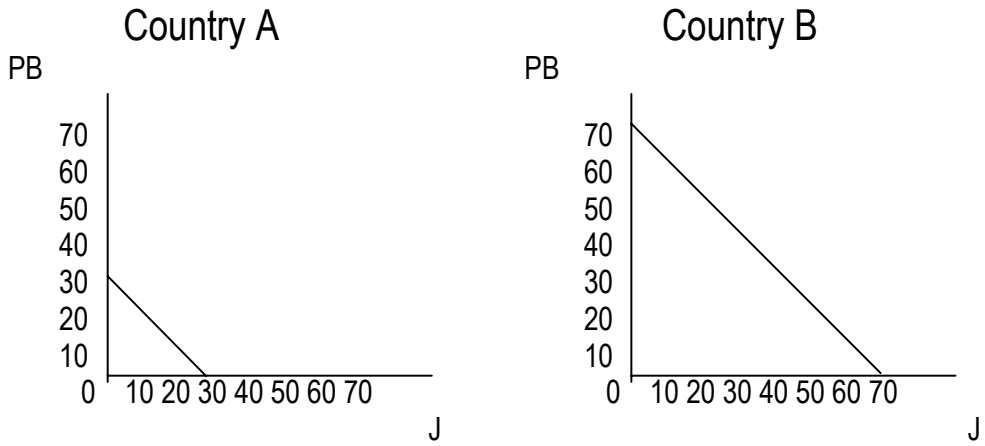
Absolute advantage – when one country can produce more of a good or service than another.

In the example above, we have seen that when two countries have absolute advantages in different goods, they can gain from trade. But the theory of comparative advantage is deeper. Even if one country has an absolute advantage in producing both goods, both countries may still be able to gain from trade. They can gain from trade if each specializes in the good in which it has a *comparative advantage*.



Comparative Advantage – A country has a comparative advantage in producing something if the *opportunity cost* of producing that good is lower in that country than in another country

Notice it is not just that there are differences between the countries; there must be differences between their opportunity costs of production. Consider the example below:



In the case above, country B has an absolute advantage in both PB and J, but there are no gains from trade, because both countries have the same opportunity costs.

Demonstration of Comparative Advantage

$$\text{Opportunity Cost of producing shoes} = \frac{\text{\# of hours needed to produce shoes}}{\text{\# of hours needed to produce camera}} = \text{x cameras}$$

CA holds true for individuals, organizations, etc. as well as countries.

In general, as long as two people (firms, countries) have different opportunity costs, each can benefit from trade. I have a comparative advantage in something if my opportunity cost is less than your opportunity cost.

Problem: It takes me 40 minutes to cook dinner and 30 minutes to clean up afterwards. It takes my wife 30 minutes to cook dinner and 10 minutes to clean up afterward. Based on the principal of comparative advantage, who should cook? Who should clean? (use the formula above, but substitute "# of minutes" for "# of hours")

My OC of cooking = $\frac{40}{30}$ = 4/3 clean-ups

My wife's OC of cooking = $\frac{30}{10}$ = 3 clean-ups

My OC of cleaning up = $\frac{30}{40}$ = ¾ meals cooked

My wife's OC of cleaning up = $\frac{10}{30}$ = 1/3 meals cooked

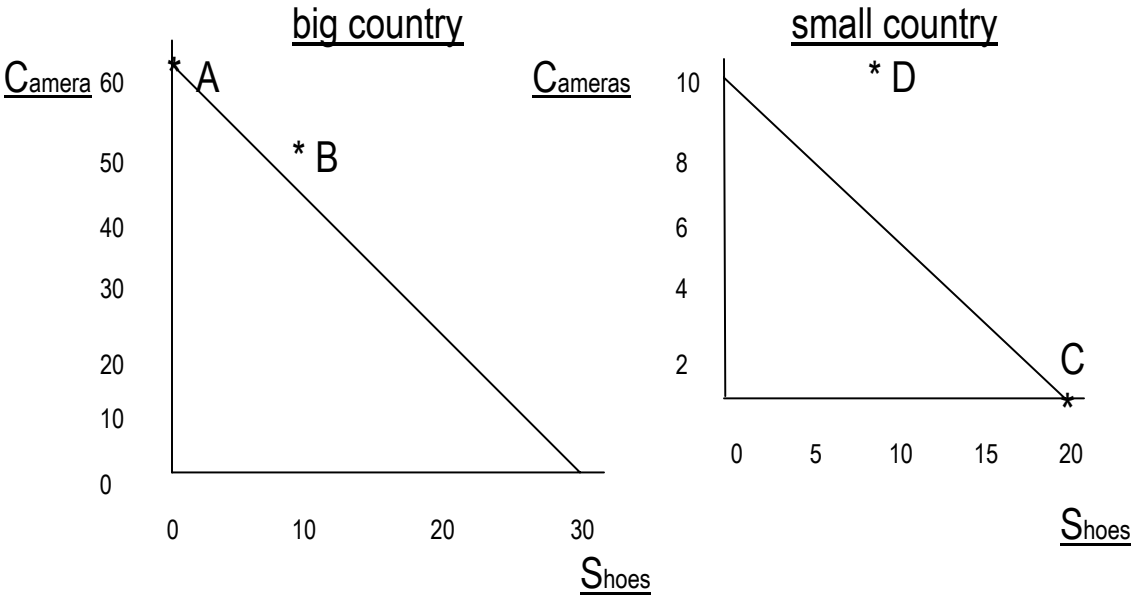
I have a lower OC of cooking than my wife, even though she has an absolute advantage in cooking. Therefore, if we use the principal of comparative advantage to determine who should specialize in what, then I should cook.

With trade between countries, we define price of one good in terms of another good. (Of course in the real world, we use money to buy things!) For example, one camera can be traded for one pair of shoes.

Suppose it takes a worker one day (eight hours) to produce a camera in both Big and Small but it takes one worker two days to produce a shoe in Big, and it only takes a worker half a day to produce a shoe in small. Finally, there are 60 workers in Big and 10 workers in small.

With this information we can draw PPFs and decide in what each country specializes.

The big country will produce at point A, but can consume at point B with trade, if one camera can be traded for one shoe **(this price must somehow be determined; for now, assume it is simply one for one)**
The little country can produce at point C, but can consume at point D with trade.



How did we determine which country specializes in what? A country specializes in what they have a lower OC.

Three methods to calculate OC:

I. Using the formula from these notes (page 17):

$$\text{Opportunity Cost of producing shoes in Big} = \frac{\text{\# of hours needed to produce shoes}}{\text{\# of hours needed to produce camera}} = \frac{16}{8} = 2 \text{ cameras}$$

II. The easy way (if the PPF is already given and it is a straight line PPF)

Define:
Y_{max} as the most cameras Big can produce if it uses all its resources to produce them
X_{max} as the most shoes Big can produce if it uses all its resources to produce them

Then the opportunity cost of shoes is

$$OC(\text{shoes}) = \frac{Y_{max}}{X_{max}}$$

And the opportunity cost of cameras is

$$OC(\text{cameras}) = \frac{X_{max}}{Y_{max}}$$

So for Big, OC(shoes)=2 cameras … and OC(cameras)=1/2 shoe

III. The intuitive way

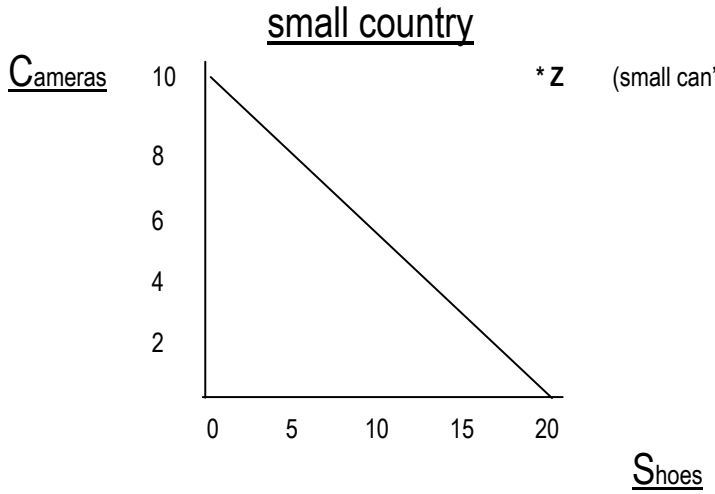
Say Big is producing at the point where it makes 60 cameras and zero shoes.
Then, Big decides to produce one shoe. How many less cameras is it making now?

To answer this question, you need to determine:

1. How many hours does it take Big to produce one shoe? 16
2. How many cameras could it have produced in that time? 2
3. Thus, how many cameras does it give up to produce one shoe? 2

Thus for Big, the opportunity cost of shoes (2 cameras) is greater than what it can sell a shoe for (the price of shoes is one camera) so it does not specialize in shoes…rather, it specializes in cameras.

Here is another way to think about calculating OC:



The OC of producing 10 cameras is 20 shoes
The OC of producing 1 camera is 2 shoes

The OC of producing 20 shoes is 10 cameras
The OC of producing 1 shoe is ½ camera

Another example of comparative advantage

Two countries: Britain and Portugal
Two goods: Wine and Cloth
Total labor: 12 in both countries

# of workers required to produce one unit

	Cloth	Wine
Britain	3	4
Portugal	2	1

1. Portugal has the absolute advantage in cloth and wine
2. O.C. for Britain:

1 cloth = ¾ wine
1 wine = 4/3 cloth

O.C. for Portugal

1 cloth = 2 wine
1 wine = ½ cloth

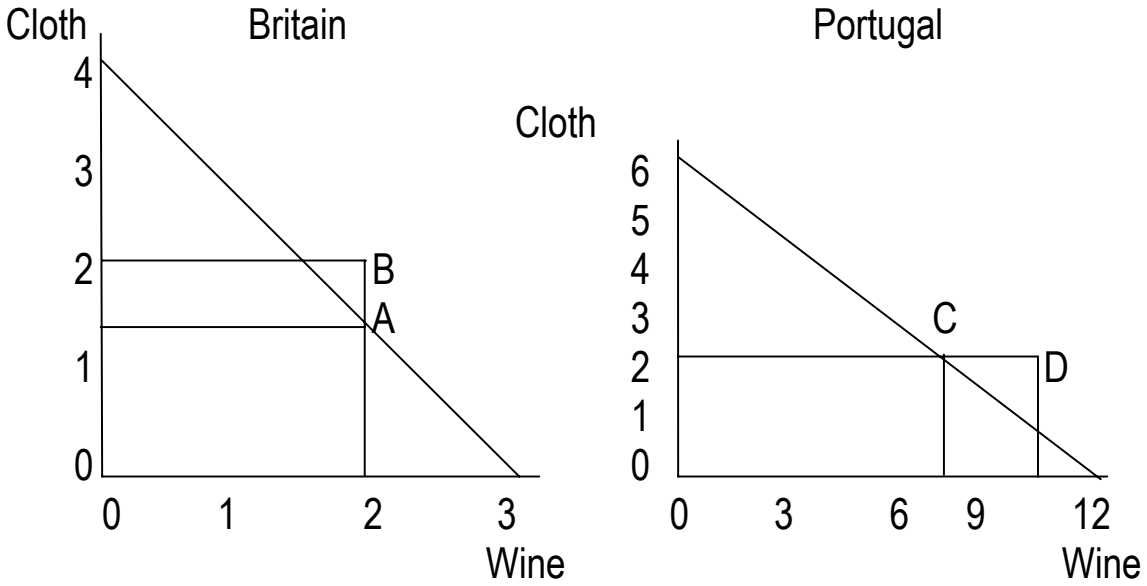
Table of Opportunity costs

	Cloth	Wine
Britain	¾ wine	4/3 wine
Portugal	12/6 wine	6/12 wine

3. Britain has a comparative advantage in cloth and Portugal has a comparative advantage in wine.

Imagine that without trade, Britain will consume 2 units of wine and 4/3 units of cloth, and Portugal will consume 6 units of wine and 3 units of cloth. Finally, assume that one unit of cloth can be traded for one unit of wine.

Can you show that there will be gains from trade?



If Britain decides to specialize in cloth, it will produce 4 units.
If Portugal decides to specialize in wine, it will produce 12 units.

If they decide to trade, Britain and Portugal could (for example) trade 2 units of cloth for 2 units of wine. Other combinations could be possible and depend on the relative price of the two goods.

Graphically, Britain moves from point A to point B with trade.

Portugal moves from point C to point D with trade.

Both points B and D are unattainable for Britain and Portugal, respectively, without trade

Arguments against free trade:

- the country as a whole may be better off but it has distributional effects

There are other arguments against free trade, but the possibility of gains from trade is widely acknowledged. We'll talk about trade in more depth in the second part of the course.

Other Arguments for Restricting Trade

- The Jobs Argument
- The National-Security Argument
- The Infant-Industry Argument
- The Unfair-Competition Argument
- The Protection-as-a-Bargaining-Chip Argument

Many of the concepts we'll discuss later in the course are relevant to this political discussion. For example, the free-rider problem suggests why some interest groups are better at lobbying for protection than others.

Market Forces of Supply and Demand

Market: a place (or service) that enables buyers and sellers to exchange goods and services

Competitiveness of markets: PC ~~MC~~ ~~O~~ ~~M~~

Perfectly Competitive (PC)

- many buyers and sellers
- sellers offer similar products and buyers know that they can go to any seller
- buyers have limited control over price because each buyer purchases only a small fraction of the total product
- the combined action of all buyers and sellers as they interact in the market place determines the prices of things and the quantities sold
- buyers and sellers are price takers

One of the best examples of a perfectly competitive market is the market for wheat, although it's not a perfect example

Monopoly (M)

- Greek for "one seller"
- the seller sets the price

an example of a monopoly is housing and food for Freshmen and Sophomores at OU

Oligopoly (O)

- a market with only a few sellers
- with little competition, they *may be able to* keep prices high

an example is a town with only two gas stations

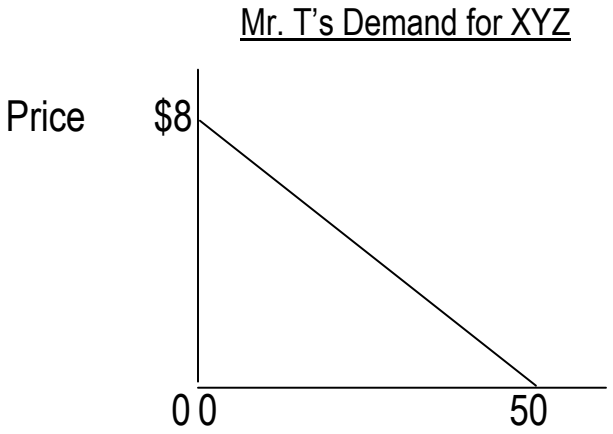
Monopolistic Competition (MC)

- many sellers offering slightly differentiated products
- since products are not identical, sellers can, to some degree, set prices

an example is pizza delivery (Pizza Hut, Dominos, Papa John's)

Competitive Markets and Demand

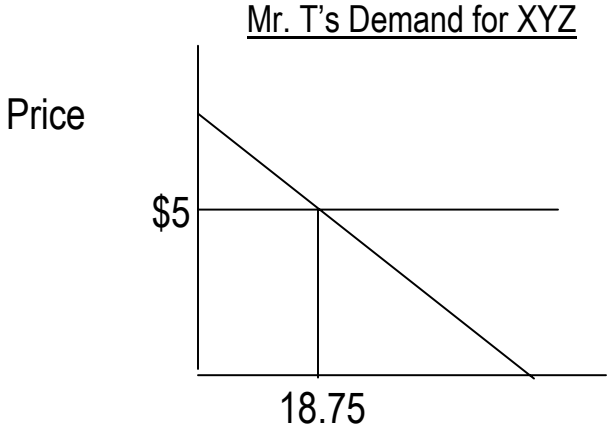
Quantity Demanded	the amount of a good that buyers are willing and able to purchase at a particular price
Demand	the amount buyers are willing and able to buy at each possible price
Law of Demand	*ceteris paribus*, as the price of a good rises, the quantity demanded of the good falls.
Demand Schedule	A chart of the relationship between the price of a good and quantity demanded
Demand Curve	A graph of the relationship between the price of a good and quantity demanded



The demand curve shows, at every price between 0 and $8 how much quantity will be demanded by Mr. T

****Note the difference between* ***demand*** *and* ***quantity demanded*** ***

e.g. **P=8-(8/50)Q**



At a price of $5, the quantity demanded by Mr. T is 18.75

e.g. **5=8-(8/50)Q** *and solve for Q*

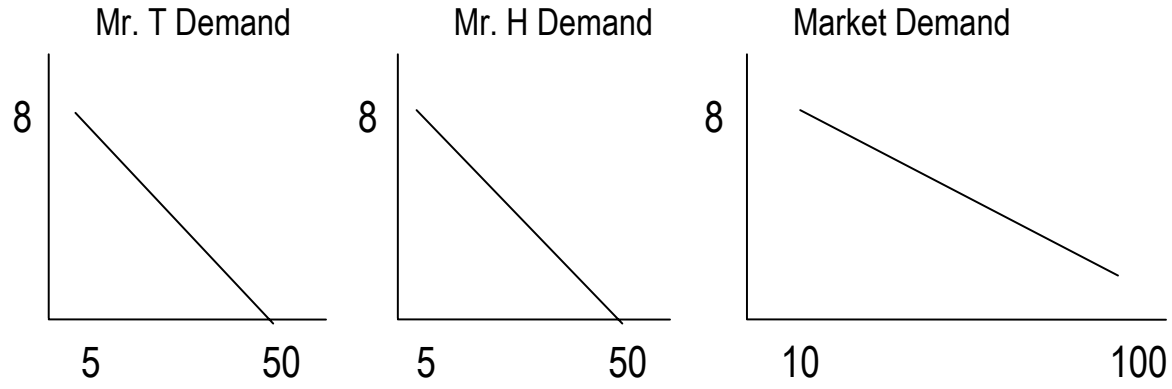
Moving beyond an individual's demand

Market Demand Schedule — sum of all individual demand schedules

Market Demand Curve — horizontal summation of individual demand curves

Demand of a good is the entire relationship between price and quantity demanded as reflected by the entire demand schedule, (or the demand curve.) Say there are two people with identical tastes and income (Mr. T and Mr. H)

Price	Q Demanded Mr. T	Q Demanded Mr H	Total Q Demanded
0	50	50	100
2	37.5	37.5	75
4	25	25	50
6	12.5	12.5	25
8	5	5	10



Movement vs. Shift

This is a very important component to ”thinking like an economist”

movement along demand curve - change in quantity demanded due to a *price* change

A *shift* in the demand curve is a change in the individual's (or market's) *willingness to pay* for a good. This type of change can be brought about by a number of "external" factors, including a change in the price of another good (see below)

In the case of a shift, the entire demand curve shifts to the right or left (or up and down if you prefer) whereas with a movement, the curve remains the same but we are focused onto a new point of it.

A shift to the right (up) is an increase in demand and a shift to the left (down) is a decrease in demand.

Five factors that shift the demand curve:

1. Changes in income
2. Changes in the price of related goods (substitutes and compliments)
3. Changes in tastes
4. Changes in expectations
5. Changes in the number of buyers (market demand only)

Factors that shift the demand curve

1. Income -- as income falls, demand for normal goods decreases, but demand for inferior goods rises

   e.g. most goods are normal goods; inferior goods are those like bus rides

2. Price of related goods

   Substitutes – if two goods are substitute, as the price of one good increases, the demand for the other rises e.g. grapefruit juice and orange juice

   Complements – if two goods are compliments, as the price of one good rises, the demand of the other falls e.g. computers and software, cars and gasoline

3. Tastes

   e.g. demand for bread falls as Atkins diets become fashionable

4. Expectations – expectations about future price and income

   e.g. demand for some stocks falls even before the Fed raises interest rates, because market participants *expect* the rate increases

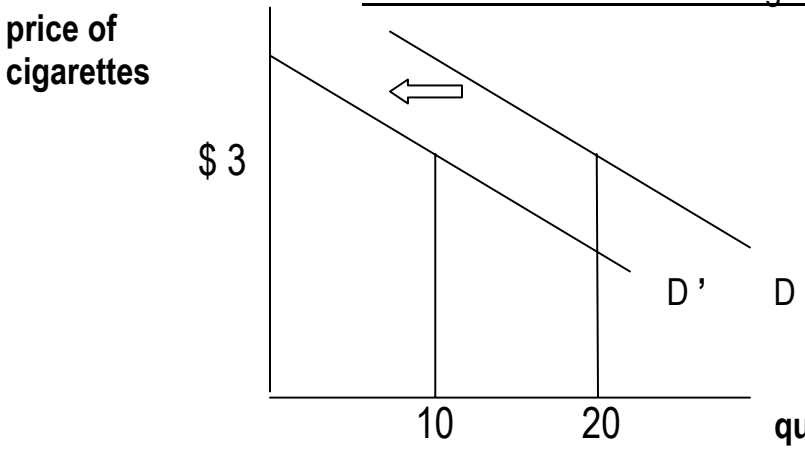
5. Number of buyers (market demand only) – if the number of buyers changes, then demand changes.

   e.g. if infant population rises, the demand for baby products will increase

Reducing the quantity of smoking demanded

1. Reducing demand for cigarettes (shifting the demand curve to the left) Health warnings may accomplish this

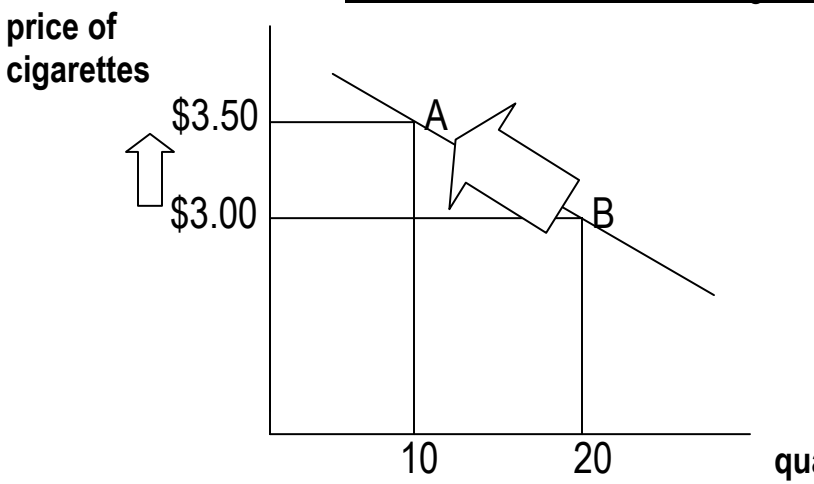
An Individual's Demand for Cigarettes



When the demand curve shifts to the left (from D to D ') quantity demanded falls from 20 to 10

2. Taxation

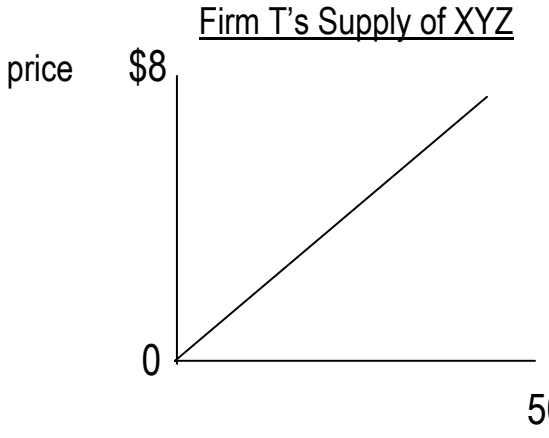
An Individual's Demand for Cigarettes



Due to the price increase (fifty cent tax) there was a fall in quantity demanded from 20 to 10. This is shown as a movement along the demand curve from point B to point A.

Competitive Markets and Supply

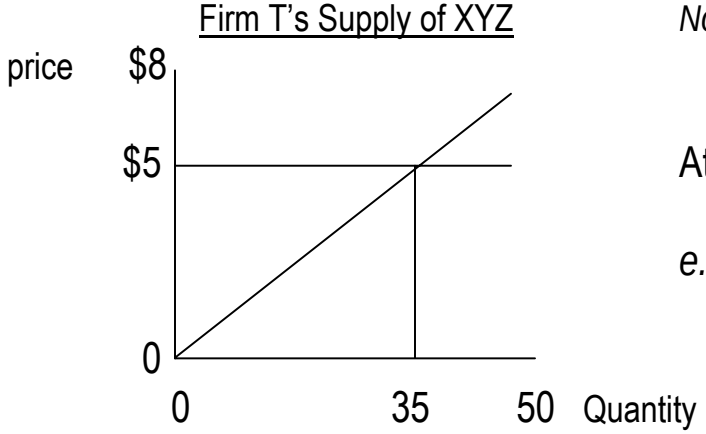
Quantity supplied of any good or service is the amount sellers are willing and able to sell at a particular price
Supply is the amount producers are willing and able to sell at each possible price
Law of supply *ceteris paribus*, as the price of a good rises, the quantity supplied of the good rises
Supply schedule a *chart* of the quantity supplied at different prices
Supply curve a *graph* of the quantity supplied at different prices



The supply curve shows, at every price between 0 and $8, how much Firm T will supply

e.g. **P=(8/50)Q**

Note the difference between supply and quantity supplied



At a price of $5, Firm T will supply 31.25 units of XYZ

e.g. **5=(8/50)Q** *solve for Q*

Moving beyond an individual firm's supply

Market Supply Schedule — sum of all individual supply schedules

Market Supply Curve — horizontal summation of individual firm's supply curves

supply is reflected by the entire schedule or supply curve

P	Q supplied Firm T	Q supplied Firm U	Q supplied in market
0	0	0	0
2	12.5	12.5	25
4	25	25	50
6	37.5	37.5	75
8	50	50	100

Movement vs. Shift of Supply

movement along the supply curve – the change in quantity supplied due to a change in price.

shift in the supply curve -- the entire supply curve shifts to the right or left. A shift to the right is an increase in supply and a shift to the left is a decrease in supply.

Factors that shift the supply curve:

- Changes in input prices and technology (cost of producing the good)
- Producer's expectations
- Change in the number of producers – shifts the market supply curve

Bringing together Supply and Demand

Equilibrium market demand = market supply

Equilibrium price price where the quantity of goods sellers are willing and able to sell is identical to what buyers are willing and able to buy.

Price	Q Demanded in Market	Q Supplied in Market
0	100	0
2	75	25
6	25	75
8	0	100

Here, Q demanded does not equal Q supplied at any price shown. This highlights the limitations of using charts. So, we'll solve the problem by using the market demand and market supply equations.

Demand: P=8-(8/100)Q (or Q=100-(100/8)P) , **Supply: P=(8/100)Q** (or Q=(100/8)P)
Demand=Supply → 8-(8/100)Q=(8/100)Q → 8=(16/100)Q **→ Q=50**
So the equilibrium quantity is 50…how can we find the equilibrium price?

Sometimes however we can tell equilibrium from info given in chart

Price of Ice Cream	Quantity Demanded		Quantity Supplied
0	19		0
.5	16		0
1	13		1
1.5	10	>	4
2	7	=	7
2.5	4	<	10
3	1		13

Equilibrium price is equal to $2 dollars, and equilibrium quantity is equal to 7

Equilibrium is where supply curve and demand curve intersect. Laboratory experiments have explored how quickly markets reach equilibrium; in theory, we assume they reach equilibrium instantaneously.

How does a market get to equilibrium?

If the price is above equilibrium, say at $2.50, then Qs = 10, and Qd = 4, (where Qs ≡ quantity supplied, and Qd ≡ quantity demanded,) an **excess supply** of ice cream.

Sellers will reduce their price in order to sell their excess supply. They will reduce their price until the market reaches equilibrium.

What if the price is below equilibrium? In this case, there is **excess demand**. Buyers will bid up the price until it reaches equilibrium.

Changes in Equilibrium

When something shifts the demand or supply curve, market equilibrium changes.

Comparative Statics comparing old and new equilibrium

Steps to analyze changes in equilibrium

1.) Decide which curve (supply or demand) will be affected

2.) Decide whether the respective curve shifts right or left

3.) Use supply and demand diagram to see how the shift affects price and quantity

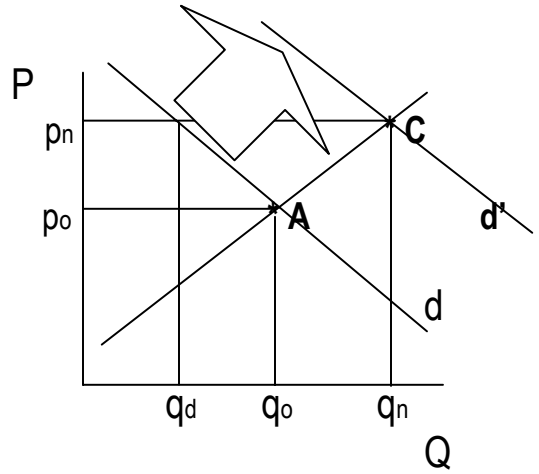
Example: Change in Demand for Ice Cream

Any of the following could cause a shift in the demand curve:

- increased income
- new research shows that ice cream reduces risk of cancer
- people expect ice cream to be banned next week
- # of tourists increase

Matt's hypothesis:

1. Demand curve shifts
2. It shifts to the right
3. quantity _ from _ to _ ; price from _ to _ .



The above is illustrated on the right

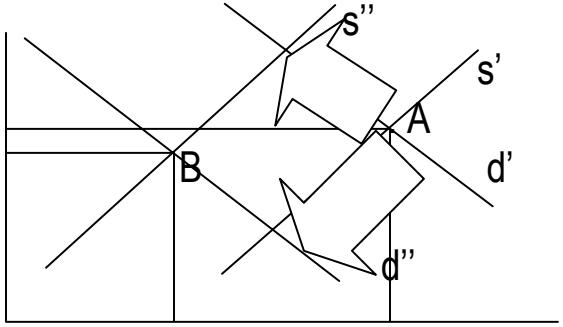
The old equilibrium point was A, and the new equilibrium point is C

If something in the world happens, one of three things will happen:

1. the demand curve will shift (as in the above example)
2. the supply curve will shift
3. both curves will shift

.

Case 1: here, both supply and demand fall (that is, shift left)

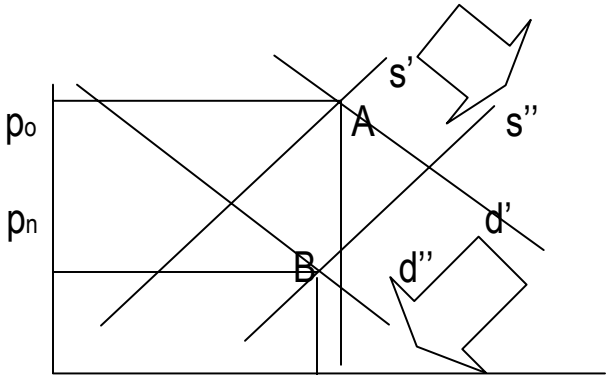


When demand decreases from d' to d'', and supply decreases from s' to s'';

- equilibrium quantity definitely (unambiguously) decreases
- equilibrium price, in this example, falls.

*In theory we cannot tell a **priori** what will happen to the price when both demand and supply curves fall. It may rise, fall, or stay the same. What happens to price depends on the relative magnitudes of the shifts.*

Case 2: here, supply shifts right and demand shifts left



In this case, we know a priori that the price will fall since both supply increased and demand fell.

Generally, when this happens we can't say what will happen to quantity, although in this specific example, equilibrium quantity fell slightly.

		Demand	
		Rises	Falls
Supply	Rises	Q ↗ ; P ambiguous	P ↘ ; Q ambiguous
	Falls	P ↗ ; Q ambiguous	Q ↘ ; P ambiguous

When both supply and demand fall, quantity sold falls unambiguously, but price may rise or fall (it rises if supply falls more than demand)

When both supply and demand rise, quantity sold rises unambiguously, but price may rise or fall (it rises if demand rises more than supply)

When supply rises and demand falls, price falls unambiguously, but quantity may rise or fall (it rises if supply rises more than demand falls)

When supply falls and demand rises, price falls unambiguously, but quantity may rise or fall (it rises if demand rises more than supply falls)

Deriving Demand: Where does the demand curve come from?

Economists are well aware that money is not the most important thing in life, happiness is.

Therefore, economists are interested in maximizing happiness, or utility

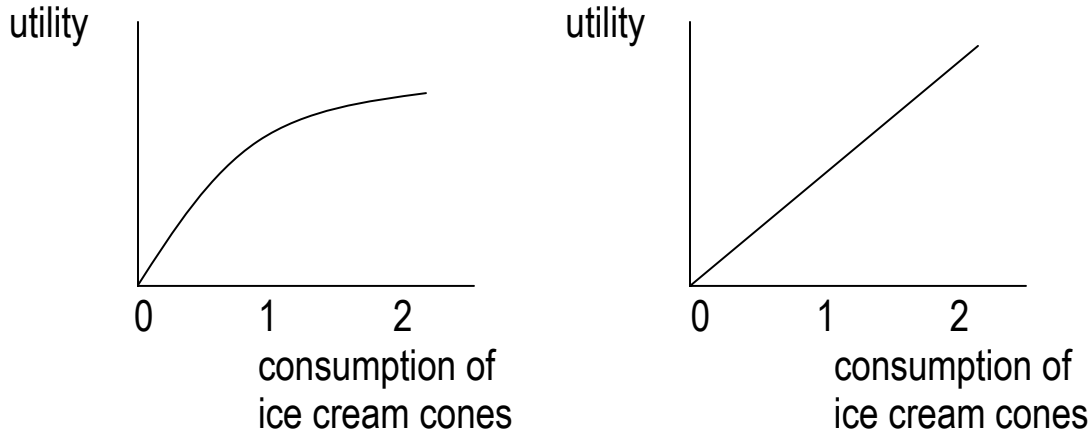
Utility -- A measure of happiness or satisfaction, measured in utils

The concept of utility plays an important role in the study of economics.

As we consume more of a *good*, our utility increases; as we consume more of a *bad*, our utility decreases.

e.g. A good is something like nice weather, where is bad is something like pollution

Consider the case of a good. Which of the diagrams below seems more plausible?



The first graph displays the property of *diminishing marginal utility*

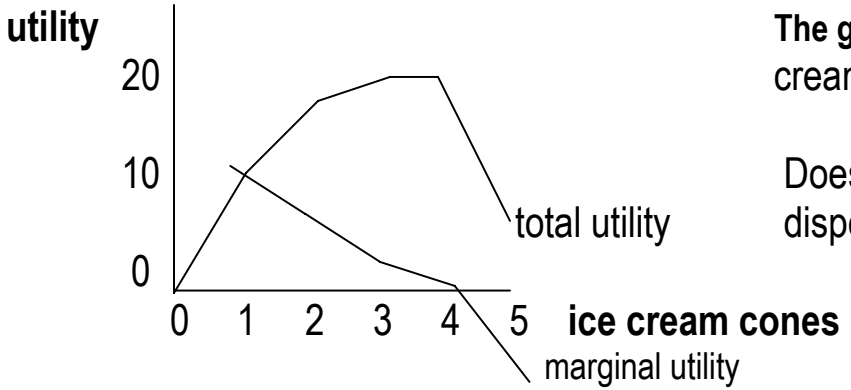
Diminishing marginal utility As consumption of a good increases, marginal utility decrease

The intuition is that after your second ice cream cone, a third ice cream cone might begin to make you sick. The fourth definitely will, for most people, w/o free disposal. Consider the following example, with utility measured in 'utils'

Consumption of Ice Cream cones	utility	marginal utility
0	0	n/a
1	10	10
2	15	5
3	17	2
4	17	0
5	5	-12

This example illustrates how, as the consumer increases consumption of ice cream, his utility may rise, but his marginal utility falls. It also illustrates at what point the consumer gets sick from eating ice cream. (if he can give it away, his utility may not fall, but if, say, he is forced to eat it his utility could actually fall)

Consumer A's Utility from Ice Cream Consumption



The graph on the right shows the utility at every level of ice cream **cone consumption from zero to five.**

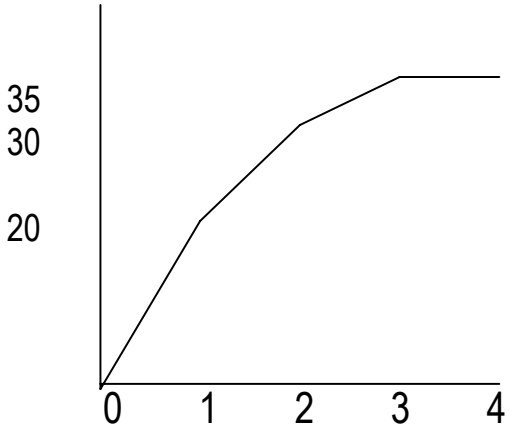
Does the graph above assume the person has free disposal?

We can tell the marginal utility from the graph of total utility by looking at the slope of the total utility curve.

Another example

Imagine someone who has is running a race. They are thirsty and begin to take water from people. Below is their utility schedule:

Glasses	Utility
0	0
1	20
2	30
3	35
4	35



Marginal Utility (MU) – Change in Utility over change in consumption

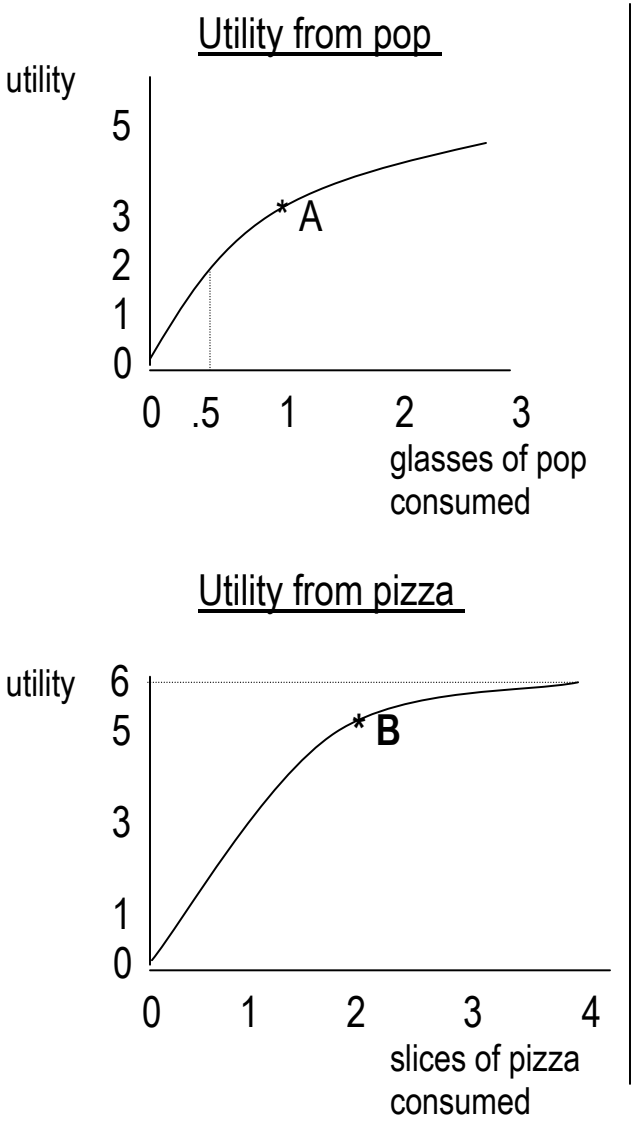
Glasses	Utility	MU
0	0	--
1	20	20
2	30	10
3	35	5
4	35	0

Even though utility is increasing, marginal utility may be decreasing.

When marginal utility decreases, it is known as diminishing marginal utility.

Note that the slope of the total utility curve is flat when the marginal utility is zero.

Consider now a person who has to decide between how much of two goods, pizza and pop, to consume.



Imagine that the consumer is presently consuming at the points A and B on the diagrams to the left.

(that is, one glass of pop and two slices of pizza.)

Hypothetically speaking, if the consumer were to trade one more glass of pop for one less slice of pizza, would she be better off, worse off, or the same as before**?**

(that is, when she went from consuming one glass of pop and two slices of pizza to two glasses of pop and one slice of pizza)

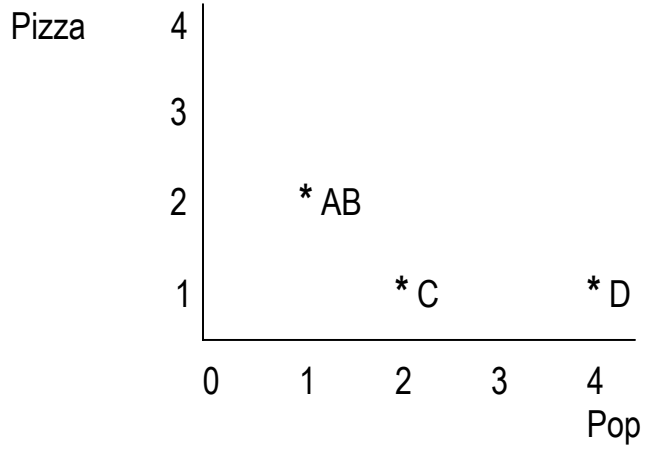
Answer: she would be worse off.

She would be worse off if she did the trade because she would need more than one additional glass of pop to compensate for he loss in utility received from decreasing pizza consumption. She might be equally well off if she had, say four glasses of pop and one slice of pizza as when she had two slices of pizza and one glass of pop.

If a consumer is equally happy with two different bundles of goods, we say that she is **indifferent** between the two bundles of goods.

Indifference Curves

Let us continue the example of a consumer deciding between how much of two goods, pizza and pop, two consume. Now, we will draw a diagram with consumption of pop on the X-axis and consumption of pizza on the Y-axis.

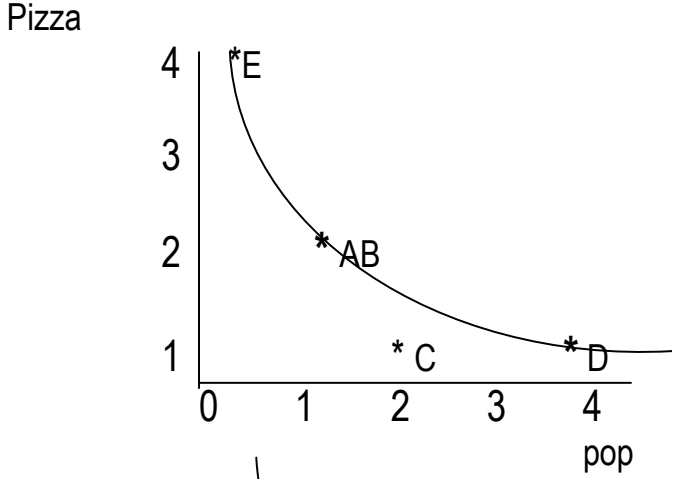


point AB refers to the initial consumption bundle in the argument above

It was determined that point C gave the consumer a lower level of utility than AB

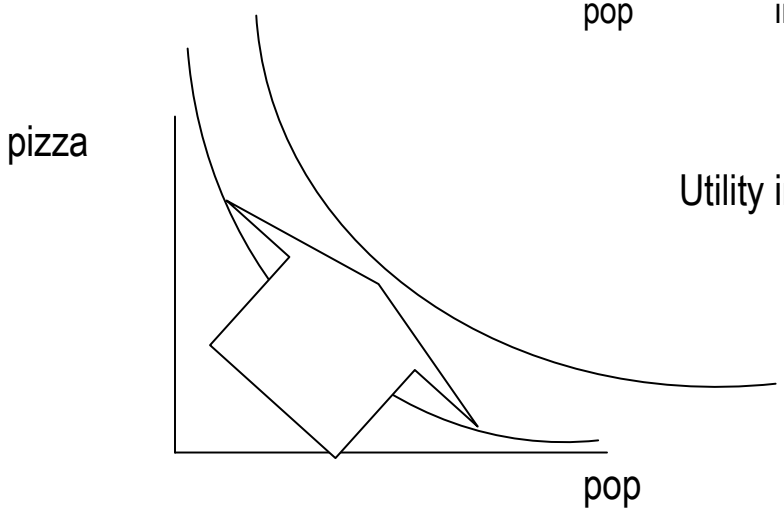
Point D, however, would make the consumer indifferent

Imagine a line running between points AB and D. We could find such a line so that the consumer equally prefers all of the points on it. This is an *indifference curve*. Can you verify that point E belongs on this indifference curve?



There is an indifference curve running through point C too, although it is not shown.

The indifference curve going through point C corresponds to a strictly lower level of utility than at the indifference curve running through points AB and D.



Utility increasing in this direction

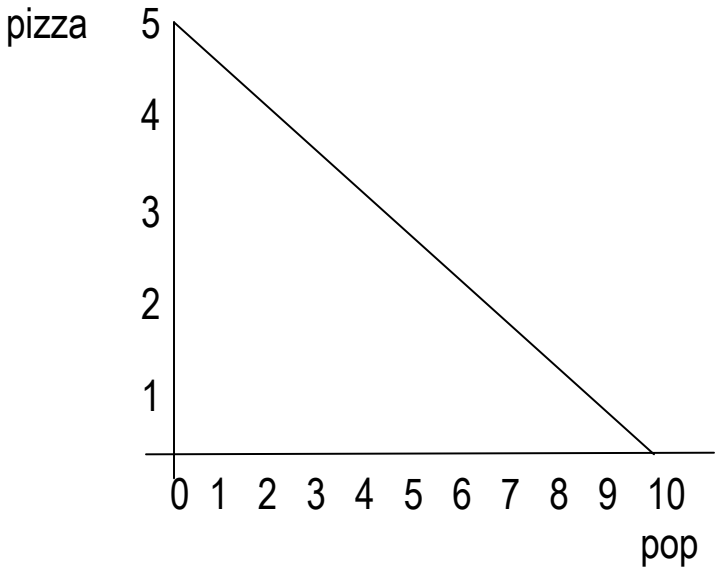
- Each of the higher indifference curves corresponds to a higher level of utility.
- Indifference curves can never cross.
- All points on a single indifference curve corresponds to a different bundles of goods that are equally preferred.

Forget about indifference curves for the next 5 minutes.

Unlike water, pizza and pop are not free, so we must take their price into account.

A **budget line** shows every combination of two goods that is *affordable*

Imagine that a consumer has $10. Further, imagine that pizza costs $2 a slice and pop costs $1 a glass.



If the consumer spends all of her money on pizza she could buy 5 slices

If she spent all her money on pop she could buy 10 glasses

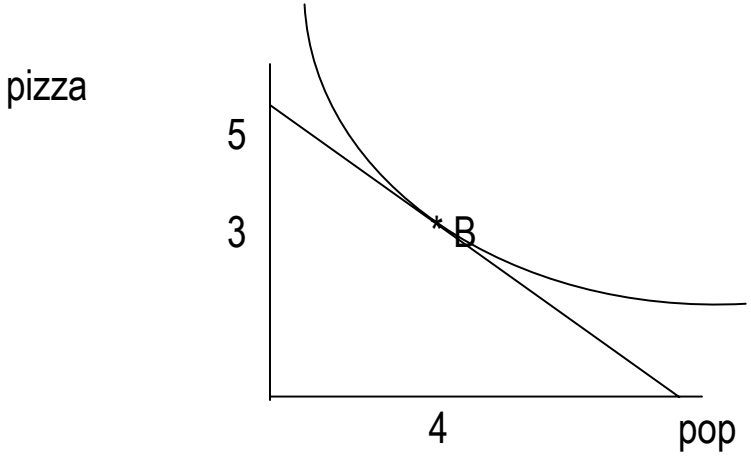
The budget line shows all combinations in between

(of course, prices and income must be given to draw this)

Putting indifference curves and budget lines together

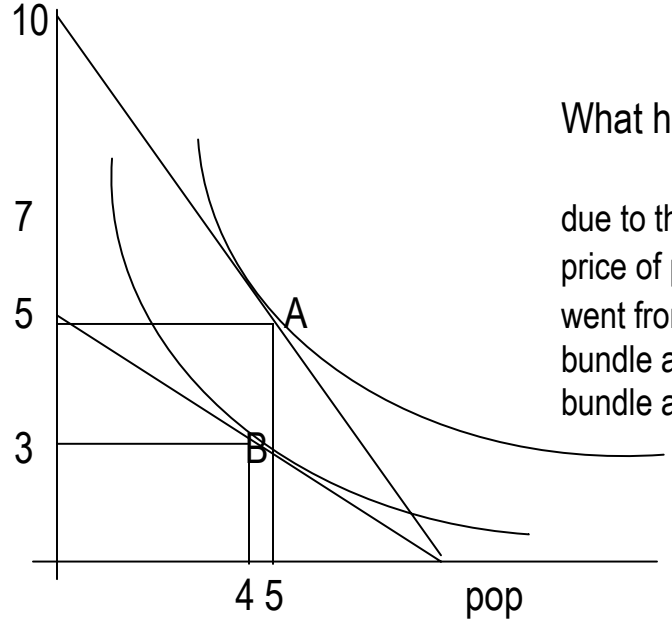
The consumer chooses the bundle of goods that maximizes her utility subject to the constraint that the bundle must be affordable. All bundles on or under the budget line are affordable, but any bundle under the budget line wouldn't maximize utility since a better bundle could be bought.

The best bundle is the one where the indifference curve and budget line is tangent.



Point B, where the indifference curve and budget line are tangent, maximizes utility.

Now imagine that the price of pizza falls, from its current price of $2 to $1.
(pop still costs $1 per glass)



What has happened?

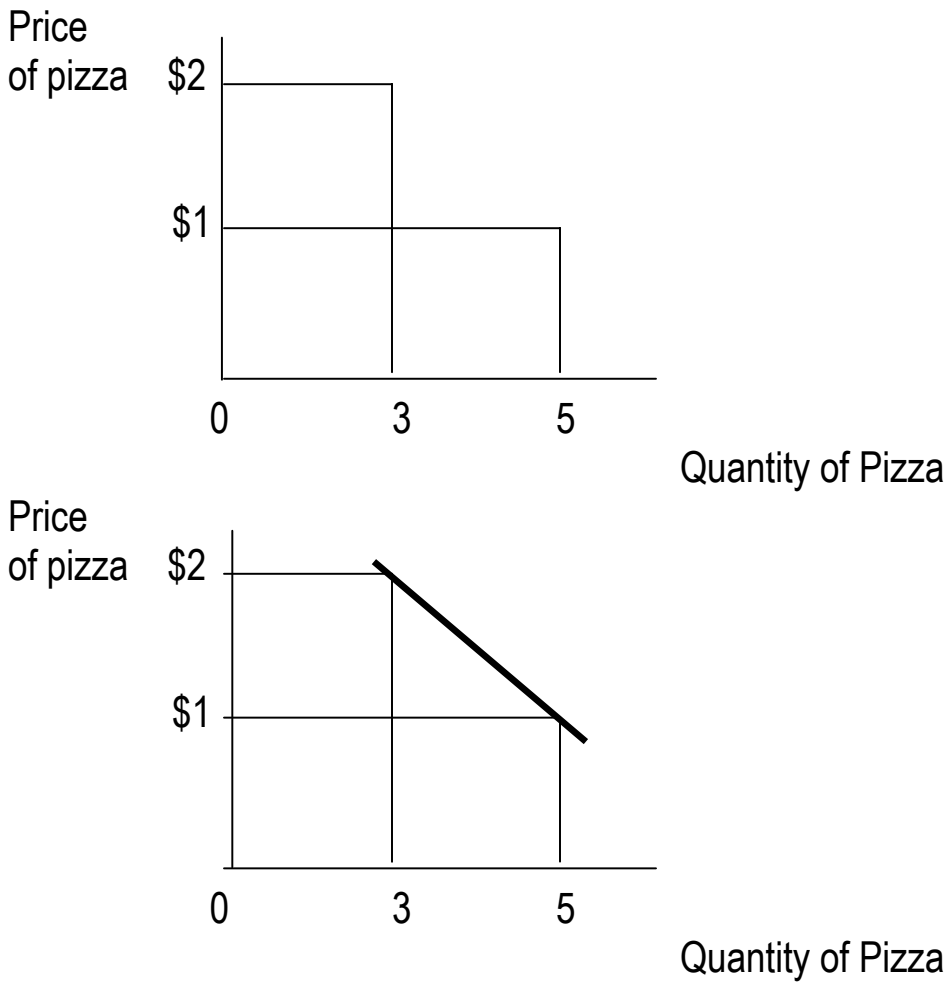
due to the decrease in the price of pizza, the consumer went from consuming the bundle at point B to the bundle at point A

Consumption of pop rose from 4 to 5, and consumption of pizza rose from 3 to 5.
Notice that the consumer's entire budget ($10) is exhausted at both points.
What was the point of all of this?

Recall, that when the price of pizza was $2, the consumer consumed 3 slices. When the price fell to $1, the consumer consumed 5 slices.

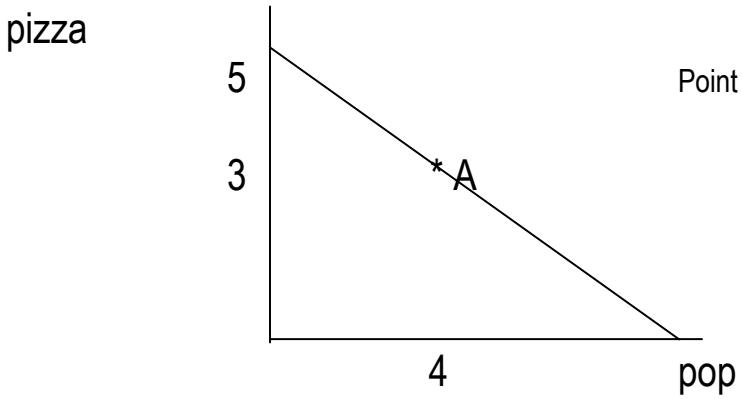
From here, we can draw a demand curve, which is what we wanted to do all along.

Consumer A's Demand for Pizza



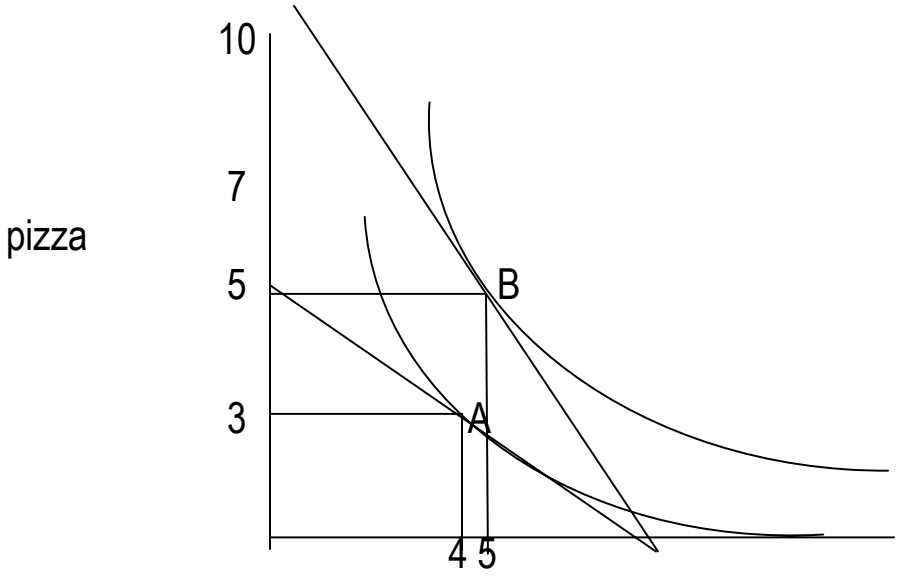
The following 5 pages use the theory of consumer choice to illustrate the law of demand, and to show shifts in demand. In each of the three cases, show either movements along the demand curve, or a shift in demand, for both pop and pizza.

Benchmark Case



Point A, where the indifference curve and budget line are tangent, maximizes utility

Case One: the price of pizza falls, from its current price of $2 to $1. (pop still costs $1 per glass)

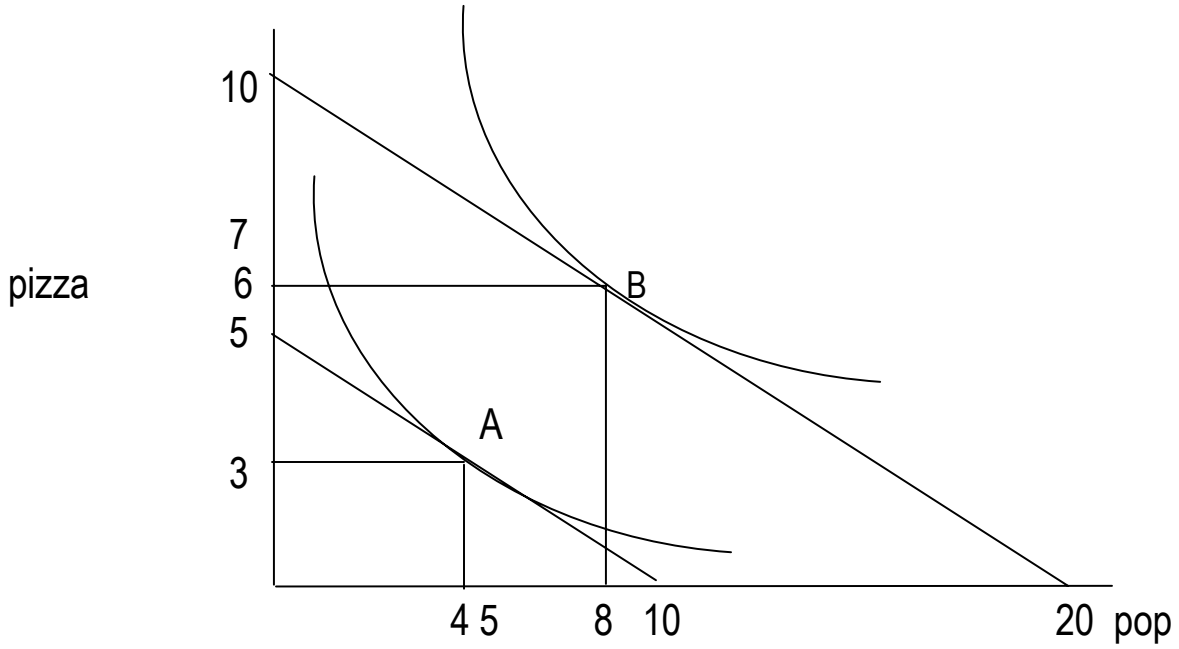


Consumption of pop rose from 4 to 5,
and consumption of pizza rose from 3 to 5.

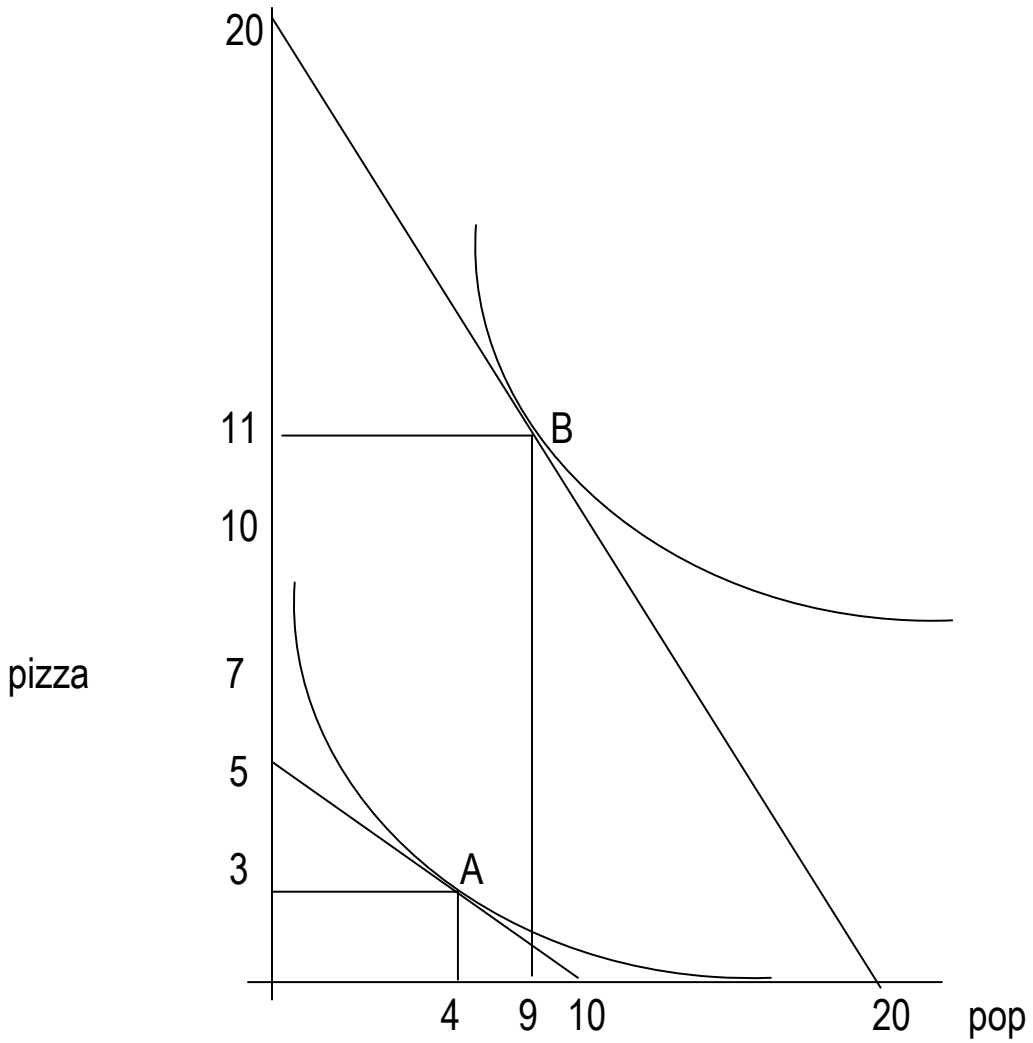
Notice that the consumer's entire budget ($10) is exhausted at both points.

How does the demand curve for pizza look? For pop?
See page 51 for a hint.

Case Two: Income rises from $10 to $20.

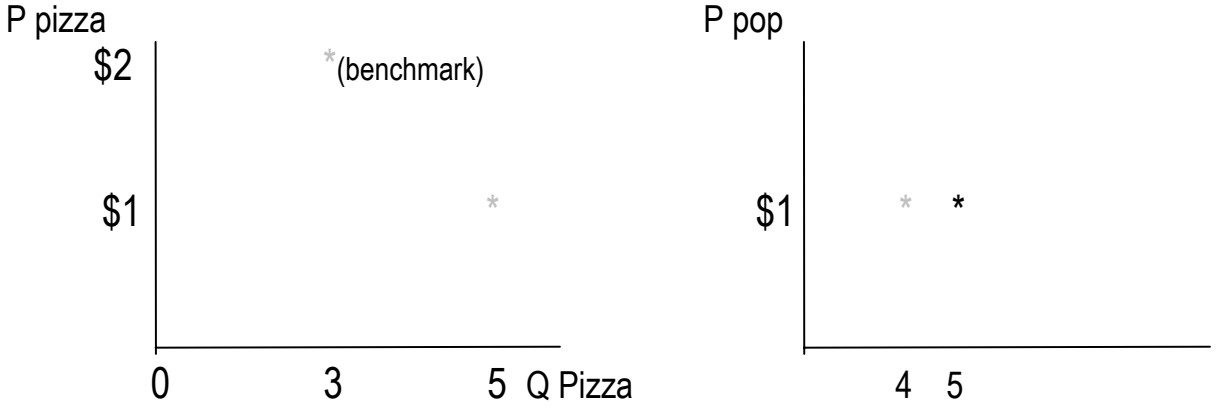


Case Three: the price of pizza falls from $2 to $1, *and* income rises from $10 to $20.

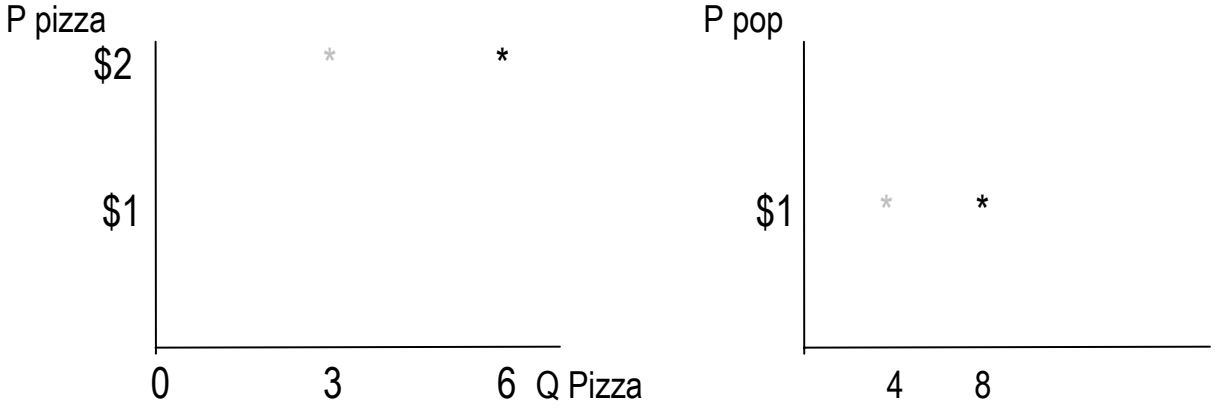


Notice the points in the graphs below. When should these points be connected (when do they lie along a single demand curve), and when are there separate demand curves running through the points?

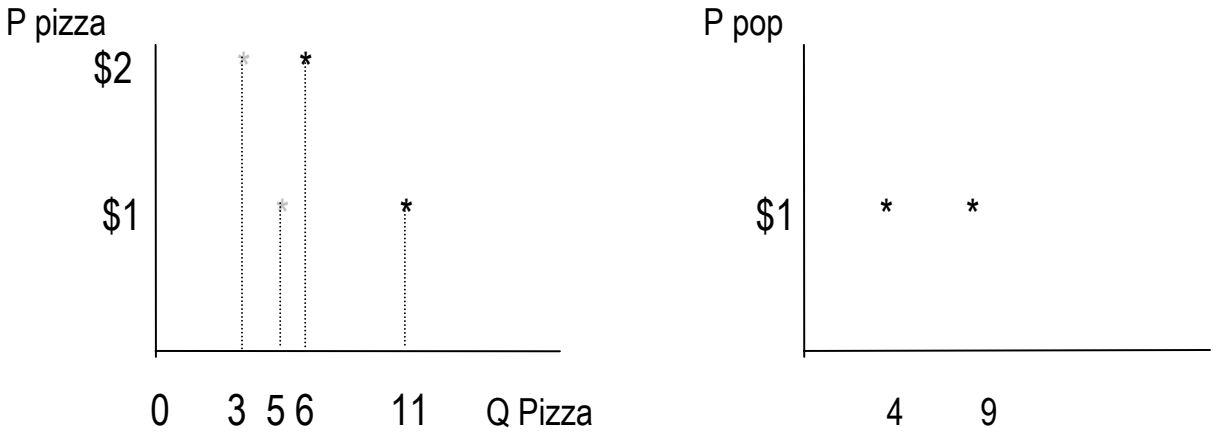
Case 1:



Case 2:



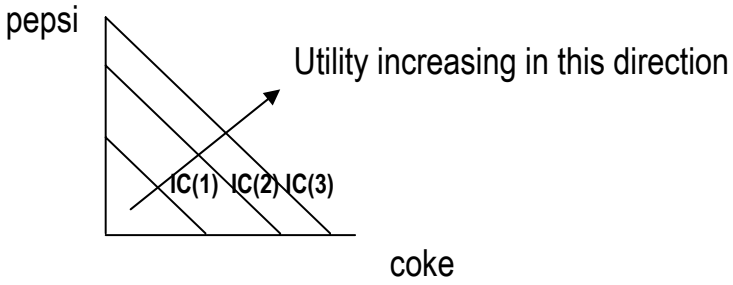
Case 3:



Now, we will use the theory of consumer choice to illustrate price competition between two rival producers of products that consumers regard as perfect substitutes.

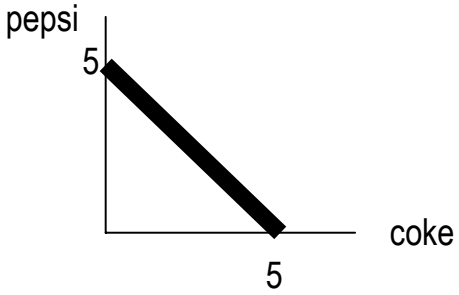
Indifference curves for goods that are perfect substitutes are not bowed towards the origin

The graph below illustrates indifference curves for perfect substitutes
(all the points along an indifference curve correspond with a given level of utility)

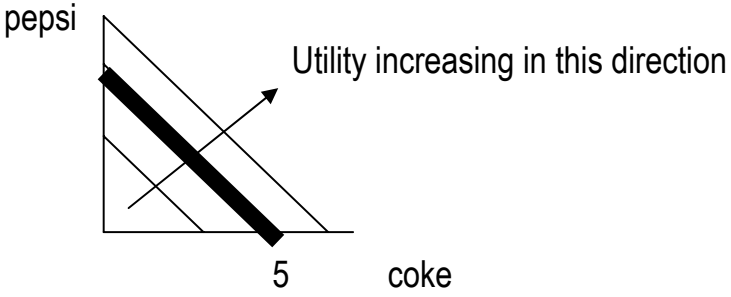


The lines above look like budget lines, but they are not. Their straight-line property reflects the fact that the consumer is willing to trade the two goods (say Coke and Pepsi) one-for-one.

Budget Line There is still one budget line for any given income and prices.



The consumer wants to get on the highest possible indifference curve, given his or her available income. The highest indifference curve the consumer can reach is IC(2)—you can't see IC(2) because it is exactly on top of the budget line.

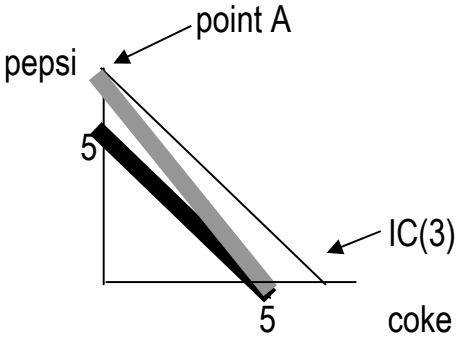


The consumer picks any bundle along IC(2), at random

In reality, there may be advantages to picking either only Coke or Pepsi, rather than a mix of the two, for example, if it is easier to carry cans that all come in one carton

Let's say the consumer picks Coke; then he buys 5 Cokes.

Effect of a change in price of Pepsi—Pepsi falls from $1.00 to 99 cents.



Before, if the consumer spent all his money on Pepsi, he could only afford 5 cans. Now that the price of a can has fallen to 99 cents, the Consumer can afford more than 5 cans (5.05 cans, to be more exact.)

So the consumer goes from picking coke or Pepsi at random, to buying Pepsi with certainty…all other consumers also buy only Pepsi.

As a result of the budget line shifting from the thick black line to the thin gray line, the consumer goes from picking any bundle along IC(2) to the bundle *A* on IC(3)

How would coke respond? Perhaps by cutting their price to 98 cents…this would allow *them* to now capture the whole market. Where will this process of price cutting end? The famous French economist Bertrand said it will go on until the firms are making zero profit. We'll talk about competition among suppliers in the next lecture.

Deriving Supply: Where does the Supply Curve Come From?

Imagine you are going to start a lemonade stand. What types of things will you need?

(Say all fixed inputs cost $50, variable inputs cost $.50/glass and in eight hours sell 100 glasses. What is total cost? If each glass sells for $1, what is total revenue, TR=PxQ? What is your total profit, profit=TR-TC? Finally, what if you could have made $10 an hour working at the gap, would you be happy with your profit?)

Production function: The relationship between quantity of inputs and quantity of output

$Y= f(L, K)$ Y = output, L = labor input, K = capital input

Two kinds of inputs

1. Fixed inputs – quantity cannot be changed during the time period considered. The size of a plant might be fixed

2. Variable inputs – inputs whose quantity can be changed. Labor can be a variable input.

Time horizon: Short run and Long run

Short run ≡ period of time so short that there is at least one fixed input

Can increase output by increasing variable input: fixed inputs can't be changed

Long run ≡ period of time so long that all inputs are variable

Firms can build new factories and machines in the long run

Total Product (TP) – maximum output that can be produced in the short run when variable inputs are added to the fixed input TP = Y = f(K, L)

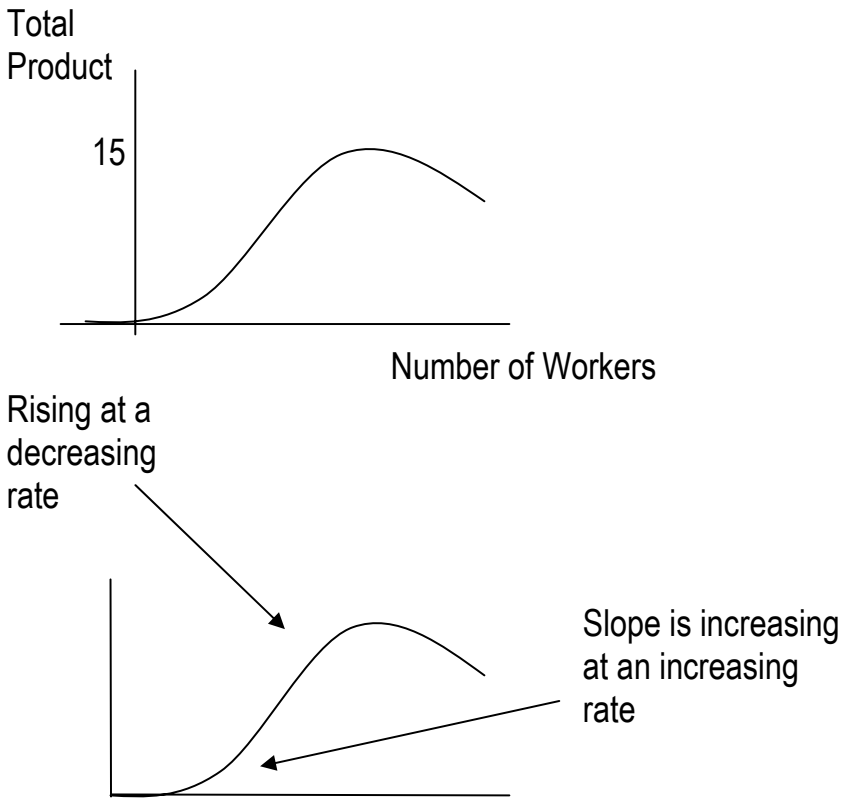
Marginal Product (MP) – additional unit of output that results from using one more unit of the variable input

Average Product (AP) – total output divided by the q of the variable output

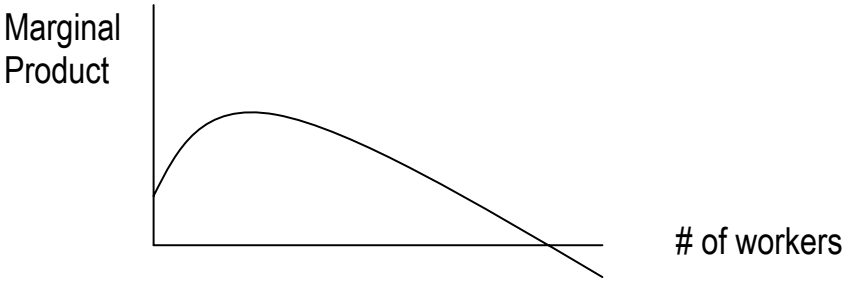
Tons of furniture moved

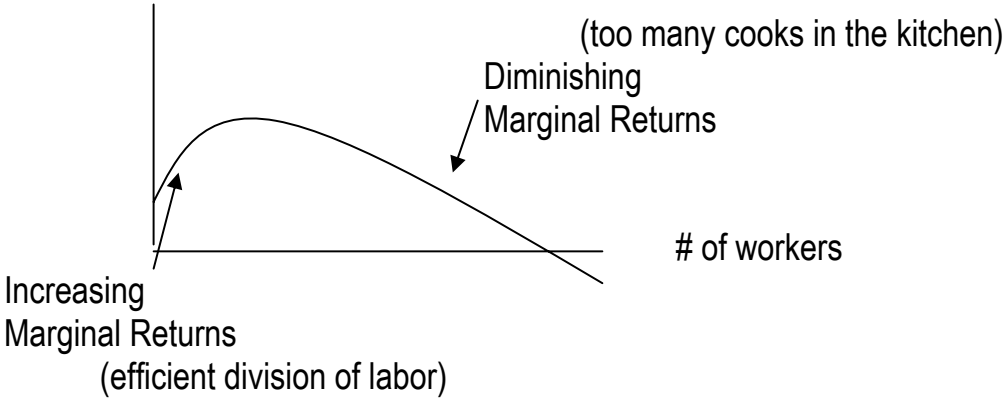
Workers per day	# trucks	TP	MP	AP	TFC	TVC	TC	ATC	MC
0	1	0	0	0	50	0	50	--	
1	1	2	2	2	50	10	60	30	
2	1	5	3	2.5	50	20	70	70/5	
3	1	9	4	3	50	30	80	80/9	
4	1	12	3	3	50	40	90	90/12	
5	1	14	2	2.8	50	50	100	100/14	
6	1	15	1	5/2	50	60	110	110/15	
7	1	15	0	15/7	50	70	120	120/15	
8	1	14	-1	7/4	50	80	130	130/14	

Law of diminishing returns – states that if more of the variable factor of production is employed with other fixed factors, eventually the MP of the variable factor falls

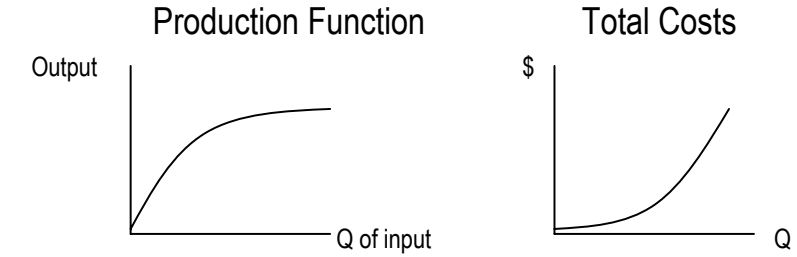


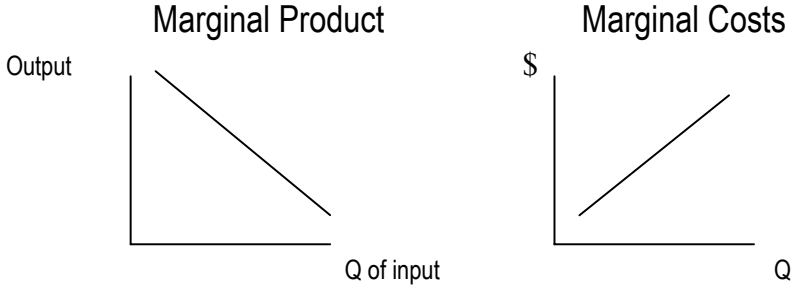
Why might marginal productivity be increasing? Perhaps due to division of labor.





But just like a consumer will not eat ice cream if it causes his utility to fall, a rational firm will not hire someone if doing so causes them to produce less. Also, while increasing returns to scale may occur over an intermediate level, the general property that characterizes production costs in the short run is diminishing marginal product. Therefore, the following shapes of production and cost curves are typical:





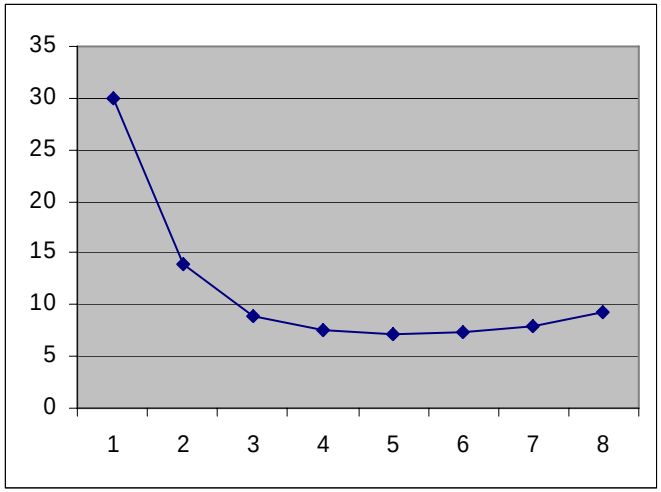
Costs in the short run

2 kinds of costs:

fixed (FC) – costs that do not change as output increases and are incurred even if no output is produced e.g. rent, insurance, tax

variable (VC) – costs that change as output increases e.g. electricity, raw materials, wages

TC (total cost) = FC + VC
ATC = total cost / output
(from chart above)
Marginal cost = MC
Increase in total cost that arises from an extra unit of output produced
MC = ΔTC/ ΔQ
AVC=VC/Q
AFC=FC/Q



Firms motive is to maximize profit. 2 kinds of profit:

Everyday "profit" means – accounting profit

1.) Accounting profit = total revenue – total explicit costs

Total explicit costs = direct costs of employing factors of production

2.) Economic profit = total revenue – total opportunity costs

Total opportunity costs = explicit costs and implicit costs

Implicit costs are resources used by firms that do not entail a direct money payment
e.g. the firm owns its factory (and it could have rented out the factory or used invested the capital somewhere else)

It is possible to have an accounting profit but not an economic profit. Zero economic profit is known as *normal profit*

The firm earns as much in this line of business as it could in any other business

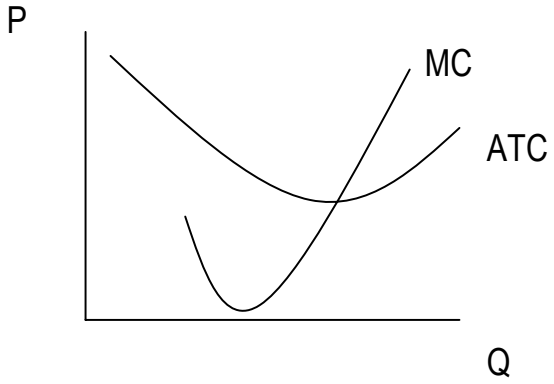
A negative economic profit but positive accounting profit means that a firm's implicit cost is very high so that they would earn more than another line of business. A positive economic profit comes when the firm has a greater return in this business than any other.

Thirsty Thelma's Lemonade Stand – Can you fill in the rest of the chart?

- TC here refers to TOC
- Here we don't know wages or # of workers, so can't find MP, AP
- Why is MC increasing? B/c MP is decreasing

Q	TC	FC	VC	AFC	AVC	ATC	MC
0	3						
1	3.3						
2	3.8						
3	4.5						
4	5.4						
5	6.5						
6	7.8						
7	9.3						
8	11						
9	12.9						
10	15						

An interesting fact about the relationship between MC and ATC

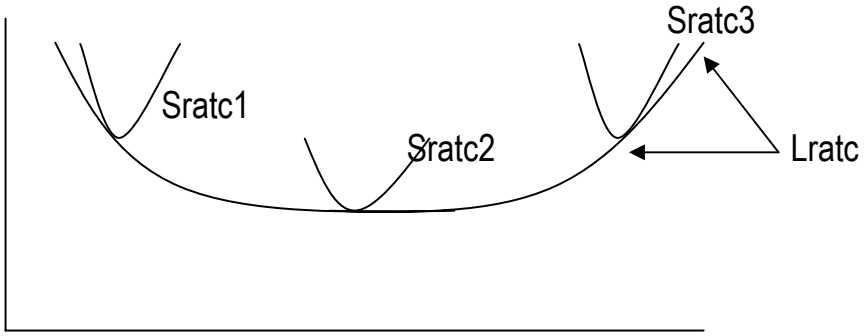


MC intersects ATC in the minimum point →
MC < ATC, ATC is decreasing
MC > ATC, ATC is increasing

Analogy: ATC = GPA, MC = grade in next course

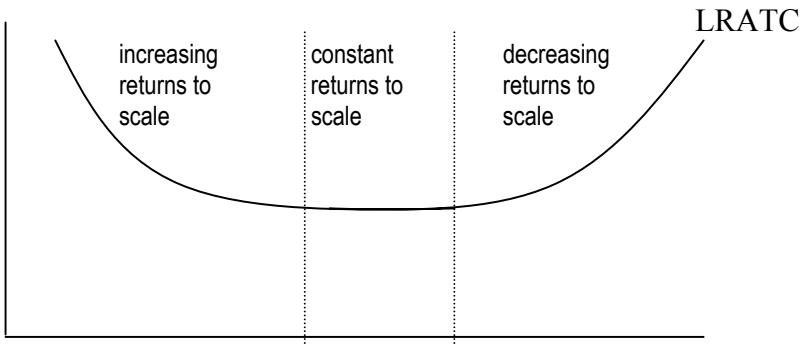
If grade in next course is lower than GPA, then GPA will fall

Costs in the long run



Sratc1 = small factory, Sratc2 = medium factory, Sratc3 = large factory

- As the factory moves along the Lratc, it adjusts the size of factory.
- The Lratc is flatter than all the SAC; It lies below the short run average cost curves, but touches at the minimum point
- The reason it lies below is that for each level of output, the LR level of cost is either < or = the SAC



When LAC decreases as output in increasing, it's called **economies of scale**
When LAC increases as output increases, it's called **diseconomies of scale**
Flat area is called **constant returns to scale** → Lratc is same as output increases

Universal clones inc.

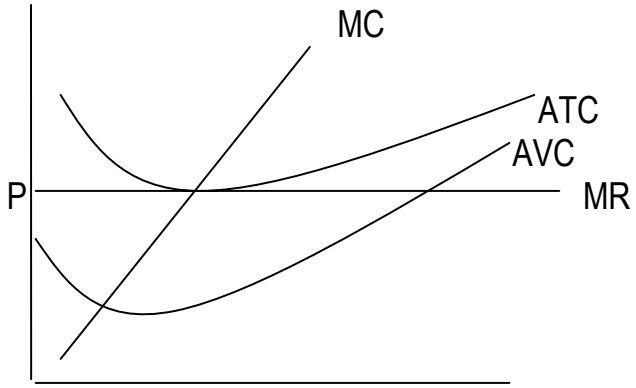
Current production is 500, Price=300, ATC=200
New customer wants to buy 1 unit. New customer agrees to pay $450
Then → Q = 501 and ATC = 201

a. What is the net change in profit? b. Should you accept this order?

(hint: the firm should only take action if MB ≥ MC)

Firms in Competitive Markets

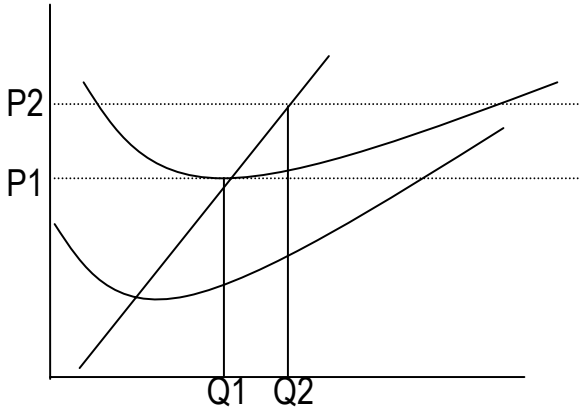
Competitive firms decides how much to produce, not what price to charge



P = MR = AR

Profit maximization → MC = MR (marginal costs equal marginal revenue)

For competitive firms → MR = P



Change in market price → at P1, the quantity supplied is Q1; at P2, it's Q2

MC curve = supply curve (not whole thing…only portion above AVC)

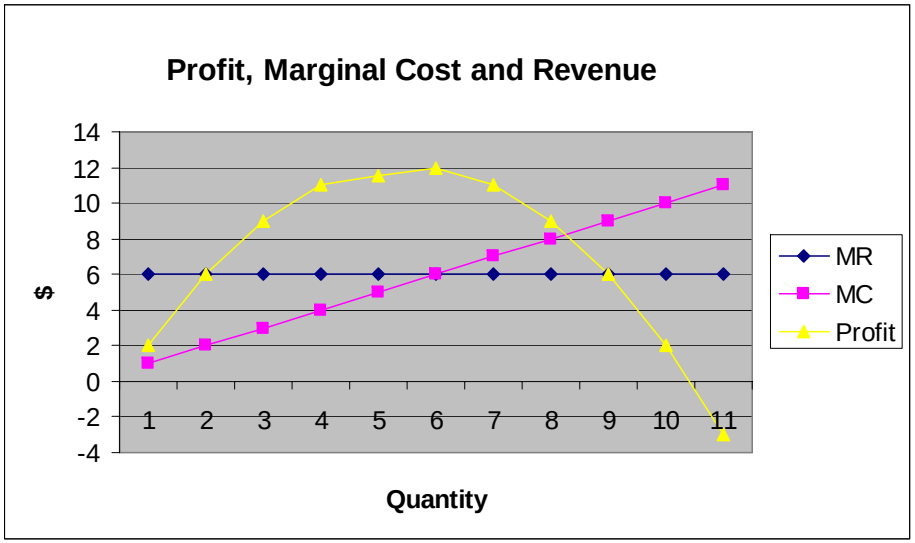
P2 = higher than original MC (original MC = P1)

MR > original MC when firm is producing Q1

Why does profit maximizing occurs where MR=MC? Consider the information in the chart below, which reflects the costs, revenues and profit of some firm.

quantity	price	TR	TC	MR	MC	Profit
0	6	0	3			
1	6	6	4	6	1	2
2	6	12	6	6	2	6
3	6	18	9	6	3	9
4	6	24	13	6	4	11
5	6	30	18.5	6	5.5	11.5
6	6	36	24	6	6	12
7	6	42	31	6	7	11
8	6	48	39	6	8	9
9	6	54	48	6	9	6
10	6	60	58	6	10	2
11	6	66	69	6	11	-3

From the chart above, it is clear that the profit-maximizing level of quantity is six (because the profit is highest there, at twelve). It is also clear that this is the point where MR=MC. To understand why this is, consider the graph of the information:



Note that whenever MR is above MC (this is true up to Q=6), profit is increasing, and whenever MR is below MC (for every unit after six), profit is decreasing. This is related to the analogy of GPA and grade in this class: whenever your grade in this class is above your GPA your GPA is rising, and whenever your grade in this class is below your GPA, your GPA is falling. Thus, the explanation for why profit-maximization occurs where MR=MC comes down to a matter of mathematics.

However, one question in class was (to paraphrase) "Wouldn't a rational firm only increase production if MR was *greater* than MC?" Thus we have something of a paradox.

The question is very good, because, as your book says, rational people (or rational firms) do only take action if the marginal benefit exceeds the marginal cost (or for a firm if the MR exceeds the MC). However, because marginal costs are increasing with quantity, as quantity increases, MR is greater than MC *up to the point* where they are equal.

The confusion perhaps would be resolved if I stated the profit maximization condition more correctly. A firm should increase production *up to the point* where MR=MC. But what about the final unit where MR=MC, what incentive does a firm have to produce that final unit? Let me illustrate the answer with an example.

Imagine that quantity on the above graph is measured in millions, so that profit maximization occurs at six million. Imagine that the firm is currently producing 5,999,998 units, and is considering increasing production by one. Say for the 5,999,999th unit MR is above MC. In other words, by producing the 5,999,999th unit, the firm will add more to its revenue than to its cost, and so will increase profit. In this case the firm should produce the 5,999,999th unit. Now say it is producing 5,999,999 units and is considering increasing production to 6,000,000. For the 6,000,000th unit, MR=MC, so that by producing this unit, the increase in the firm's revenue is just equal to the increase in the firm's cost, and so there will be no change to profits. In other words, there is no *net benefit* to producing that unit. But at the same time there is also no *net cost*. We can say that the firm is *indifferent* from producing 6,000,000 units or 5,999,999 units.

So in a sense, the answer I gave to the question was misleading. There is no real reason to produce the 6,000,000th unit or any unit, for that matter, where the increase in revenue is exactly offset by the increase in cost. For my answer (that a firm should produce where MR=MC) to be precisely correct, I should add the condition that the firm *will* produce a unit if it is indifferent from so doing. However by viewing quantity in millions, one can see how fine of a distinction it is between saying *produce up to where MR=MC* and *produce where MR=MC*. Whether the firm produces 5,999,999 units or 6,000,000 doesn't make a difference because the profit is the same in both cases. So, we just say that a firm produces at the point where MR=MC and typically avoid the detailed explanation. This is for simplicity and I now realize that this simplicity comes at a great cost, because it brings up a paradox. I hope that this clarification resolves any confusion students had on this point.

MC curve determines how much the firm is willing to supply at alternative prices

When does the firm decide not to produce anything?

1. Shutdown – short run decision not to produce anything during a specific period of time due to current market conditions
2. Exit – a long run decision to leave the market

Short Run

Shutdown – does this decision depend on fixed costs, variable costs, or both?

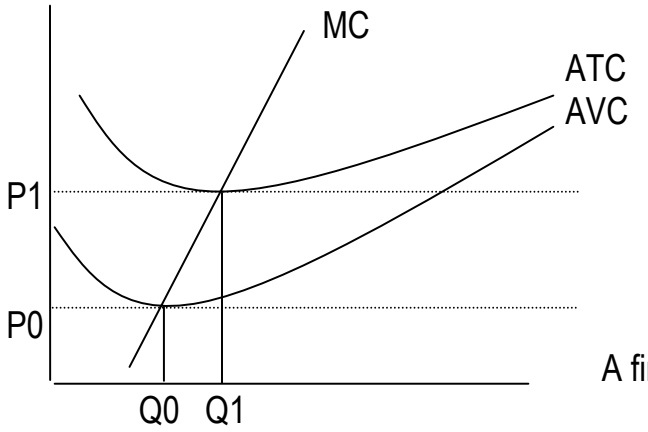
Fixed costs are **sunk costs**, so firm makes decision to shut down based on variable costs

Shutdown if TR < TVC

TR/Q < TVC/Q → P < AVC, then will shutdown

If Q > 0, firms profit maximizing output is where marginal revenue = marginal cost

But, in the S.R., Q>0 only if P > AVC



For any price less than P0, firm will shutdown.

A firm's short run supply curve is the portion of MC curve above AVC

Long run

Decision to exit

A firm makes a decision to exit if the revenue it gets from producing is less than the total cost

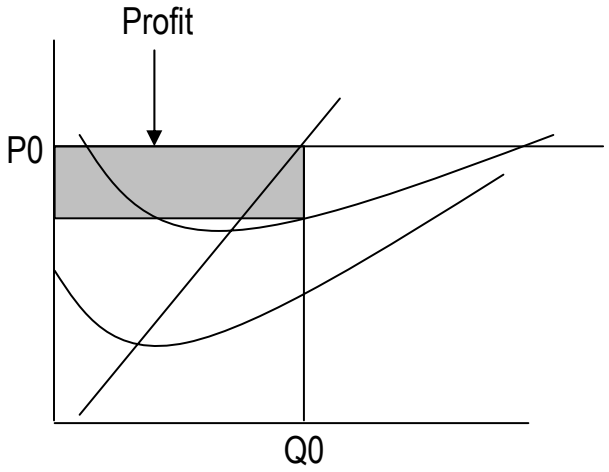
Exit if TR < TC

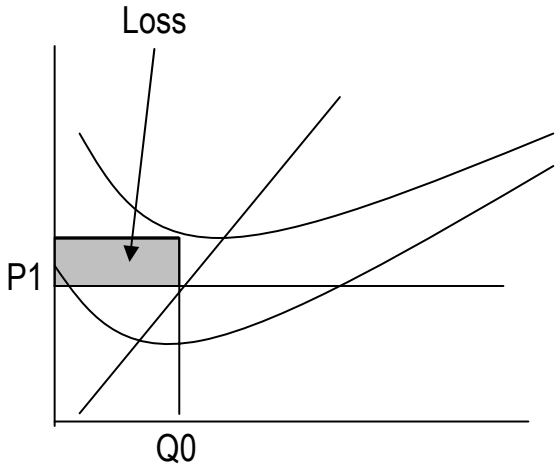
TR/Q < TC/Q → P<ATC

In the long run another possibility is for firms to enter the industry

Enter if TR > TC → TR/Q > TC/Q → P > ATC

Profit = TR – TC → (TR – TC)/Q]Q = (P – ATC)Q





Loss minimizing output where MR = MC
Profit = (P – ATC)Q

If a firm in the market is making a loss they will exit the market in the long run

Then supply decreases, then price increases, then more firms enter and eventually price = ATC

At the end of the entry and exit process, the remaining firms earn 0 economic profit.
P = ATC; Profit = (P – ATC)Q → Profit=(P-P)Q=0

Normal profit ≡ zero economic profit

But accounting profit may be > 0

Profit maximization: P = MC

Long run equilibrium where P = ATC = MC

MC intersects ATC at minimum

In a competitive market with free entry and exit, firms operate at their efficient scale

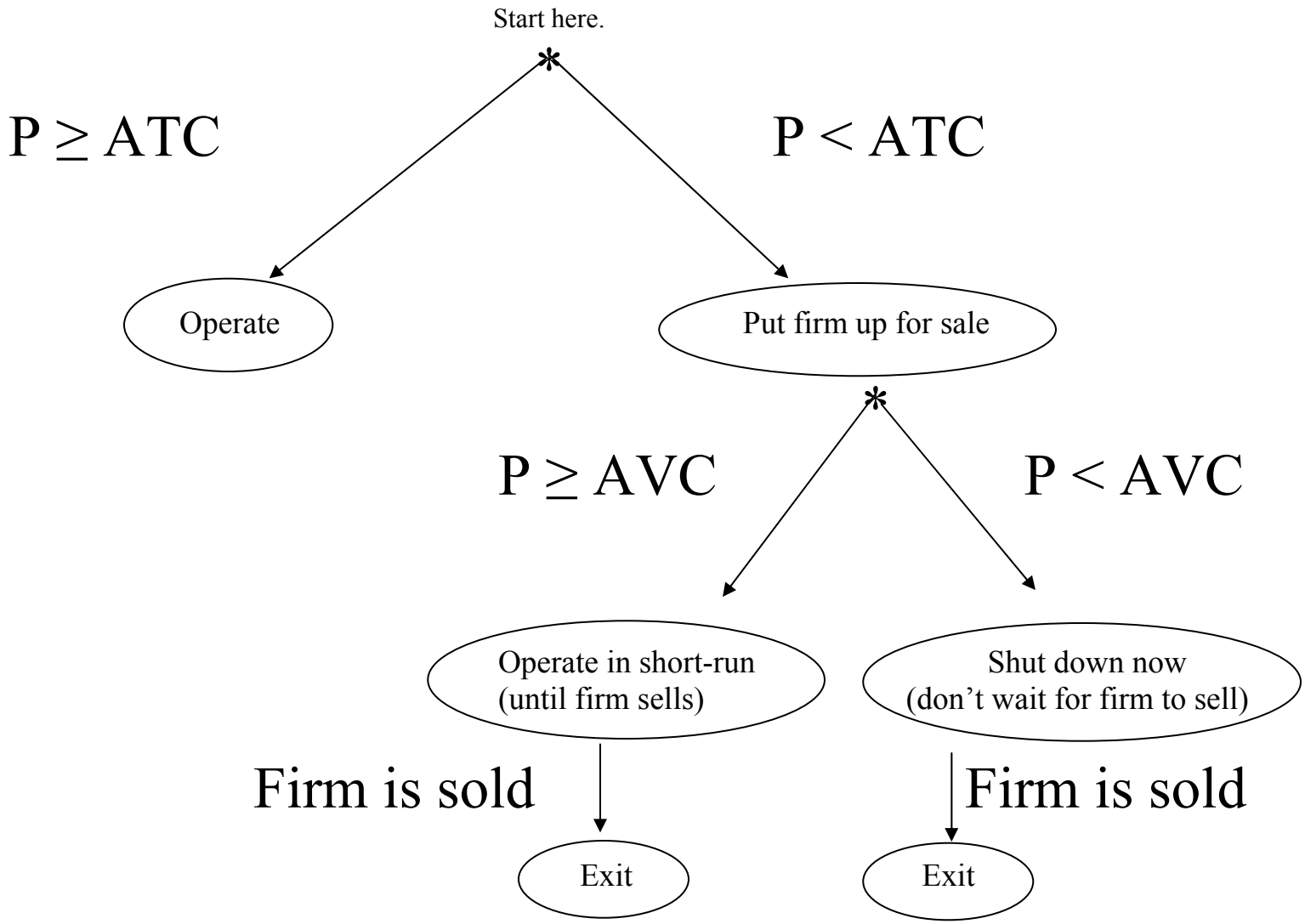
Portion of MC curve above AVC is supply curve

Shutdown if P<AVC. What if AVC<P<ATC? In the short run stay open and minimize losses…in the long run (when you can sell fixed inputs) exit.

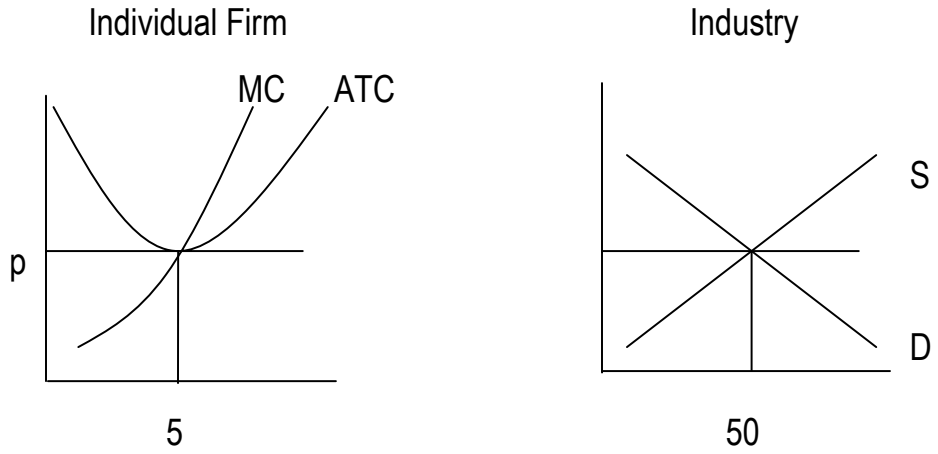
	Individual	Market
Short run	**Short run individual supply**– the portion of the firm's MC curve above AVC	**Short run market supply** – the horizontal summation of the portion of each firm's MC curve that is above AVC
Long run	**Long run individual supply** – the portion of the firms MC curve above ATC	**Long run market supply** – a straight line, equal to the minimum of the firms' ATC curve.*

*Each firm is identical, so this value (the min of ATC) is identical for each firm

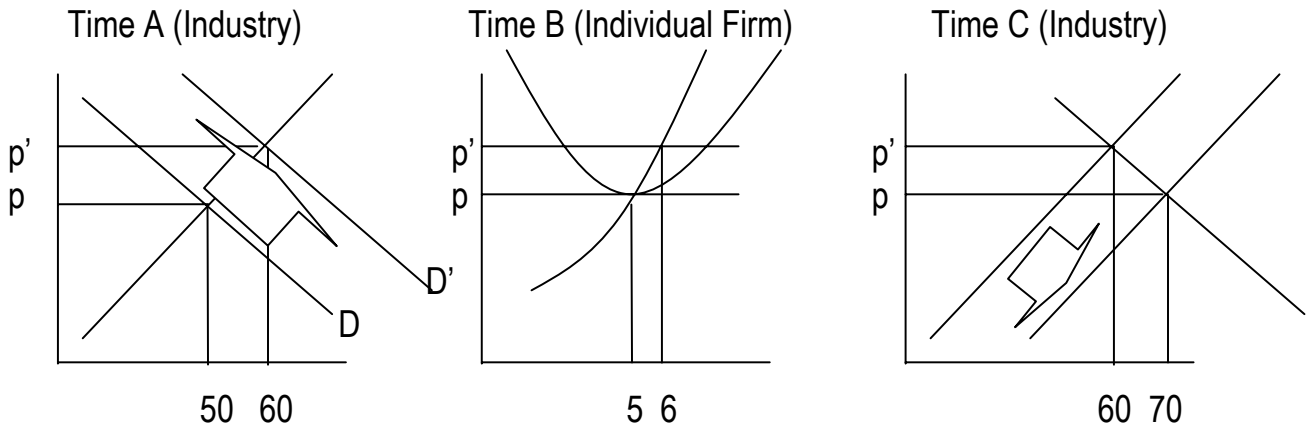
Operations Decision Tree for a Firm



Effect of Change of Demand



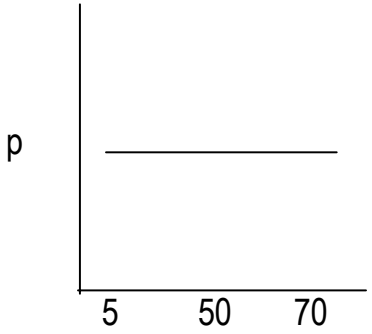
Perfect competition results in economic efficiencies



In the S.R, P rises, Q rises. In the L.R., P is as before, except Q is higher. In the short run price will rise. This will lead to more supplies in the market, which will bring the price down and further increase the quantity sold. The end result will be that the price will remain the same, but the quantity will change. Before there were 10 firms, now there are 14 (four entered the market)

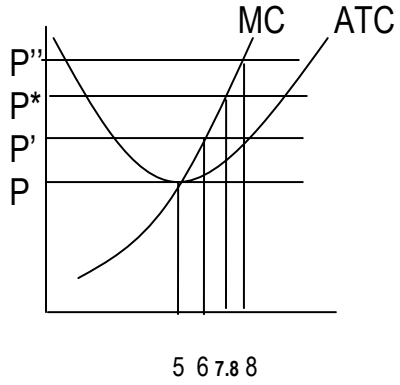
→ LRS curve is flat; market will supply any quantity at the minimum cost of production

Long Run Industry (Market) Supply Curve

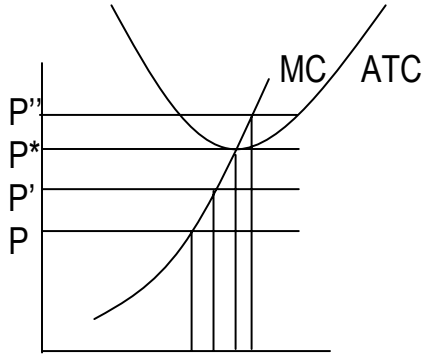


(all of these 14 firms are assumed identical; if not, LRS curve could slope upward)

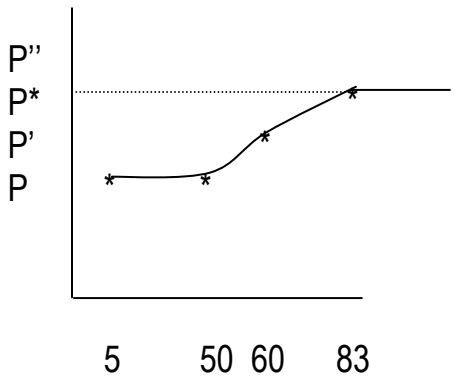
Individual Firm (type A)



Individual Firm (type B)



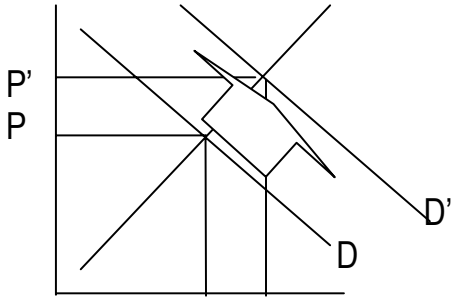
Long Run Market Supply



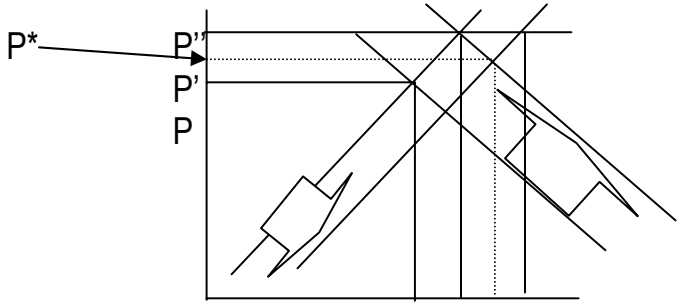
Here's what happened:

At time A, market demand increases, causing prices to rise to P'. This induces a movement along the market supply curve, and quantity supplied increases to 60. No firms enter the market, b/c no potential entrants could operate profitably at a price of P'. At time C, market demand increases even further, and prices rises to P''. This causes the incumbent firms to raise their output to 8 each, but it also causes a new firm (with type B technology) to enter the market, and produce 6 units. However this new firm entering the market causes the market supply curve to shift to the right, and prices reach a new equilibrium (as a result of the rightward shift in supply) and settle at P*. At this price, the 10 incumbent firms are producing 7.8 units each, the new entrant is producing 5 units, and the total quantity supplied to the market is 83.

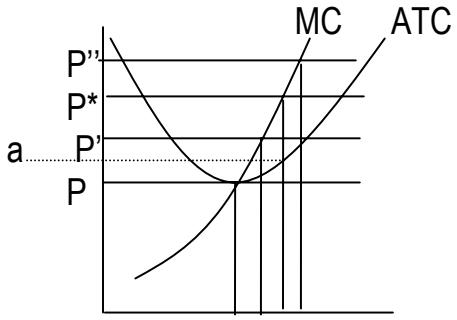
Time A (Industry)



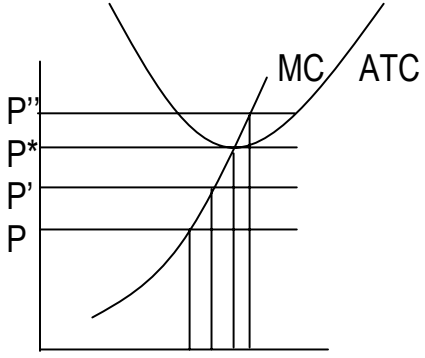
Time C (Industry)



Individual Firm (type A)



Individual Firm (type B)



Profits for type A firms persist

$\Pi = (P^* - a)x7.8$

Type B firms make normal Π

Four Factors that Could Shift the PPF Outward (Gwartney et al. 2006, pp. 43-44)

1. Increase in resource base

    - increasing the amount of investment goods produced (or capital formation) leads to greater future production possibilities

2. advancement in technology

    - invention – the creation of a new product or process, often facilitated by the knowledge of engineering and science

    - innovation – the economic application of inventions

→ *in what ways were Silicon Valley entrepreneurs innovative versus inventive?*

3. improvement in rules (institutions). Poor institutions:

    - reduce the level of resources, and the efficiency with which available resources are used
    - good institutions facilitate trade (e.g. legal institutions)
    - bad institutions discourage economic activity (e.g. discrimination, weak property rights)

4. working harder and giving up leisure

    - "Avis: we try harder!"

The Role of Profits and Losses (Gwartney et al. 2006, pp. 66-67)

- "Entrepreneurs organize the production of new products."
- If consumers are willing to pay a price greater than a good's opportunity cost, then they must value the good more than other goods that could have been manufactured with the same resources.
- Profit is earned by entrepreneurs who use resources to produce goods that consumers value more highly than other goods those resources could have been used to produce.
- Loss is earned by entrepreneurs who do not use resources to create value
- There is thus a positive side to business failure: "…losses and business failures free up resources being used unwisely so they can be put to a use producing other things that people value more highly."

Entrepreneurship: The Fourth Factor of Production (Gwartney et al. 2006, pp. 495-500)

- The reason we don't talk about entrepreneurs very much in economics is that it is difficult to incorporate uncertainty, discovery and business judgment into simple economic models.

    1. Uncertainty: the entrepreneur must be willing to take a risk that he cannot insure against
    2. "Entrepreneurs don't spot markets. They spot needs and assemble the skills to fill them…"
    3. Entrepreneurs need to make good judgments, and recognize when bad judgments have been made.

Entrepreneurship and Economic Progress

- Economic Development versus Economic Progress

→ Economists typically evaluate economic progress in terms of growth in income, but it is the more qualitative changes (in the types of goods and services the economy offers, and its methods of production) that represent progress, and this is what is behind income growth.

Entrepreneurial Decision Making and the Structure, Size, and Scope of Firms

A structure, size or form of business organization that results in high average costs will be driven from a competitive market by lower cost rivals.

1. structure: the way responsibility is delegated in an organization through its management hierarchy

2. size: is the organization big or small?

3. scope: in how many different types of businesses does the firm compete?

Uncertainty, Entrepreneurship, Profit, and Capital Markets (Gwartney et al. 2006, pp. 576-581)

Two other sources of profit:

- uncertainty

people are risk averse (would you rather have a 50/50 chance of getting $2, or have a dollar for sure?)

the riskier the investment, the higher the return will have to be to induce people make the investment, and so greater uncertainty leads to greater profits (and losses.)

- Entrepreneurship

The economist Joseph Schumpeter (1883-1950) is best known for his views on entrepreneurship, and his famous phrase, "creative destruction"

> "The…process of industrial mutation…incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism…" (1950, p. 83)

For example, as a result of invention and innovation, the typewriter and the buggy gave way to the computer and the car. In the short run, however, typewriter and buggy producers are harmed.

How does Wal-Mart illustrate creative destruction?

Capital Markets

A well functioning capital market ensures that entrepreneurs from all backgrounds are able to try out their ideas at relatively low cost

However, we don't want capital to be so cheap that it will be wasted on unproductive projects

A competitive capital market tends to encourage those projects that result in profits (indicating that people value the output more than the resources utilized.)

"…profitable investments tend to increase not only the wealth of the investor, but also the wealth of the nation."

Questions for Review:

1. Which of the following did Bill Gates' inventions contribute towards?

    - increasing the resource base by forgoing consumption for investment goods
    - advancement in technology (aspects of both invention and innovation)
    - improvement in rules (institutions)
    - working harder and giving up leisure

2. In what ways were Sergey Brin and Larry Page's plan to sell their stocks to the public innovative (versus inventive?)

3. How is capital allocated in a market economy versus how it was capital allocated in the Soviet Union? What types of institutional problems existed immediately after the Soviet Union collapsed?

4. What is the difference between economic growth and economic progress?

5. How do profits motivate entrepreneurs to put resources to their best use? In what way is there a positive side to losses?

6. What is meant by the phrase "Creative Destruction"?

7. Describe three ways a firm can earn profit.

8. "…profitable investments tend to increase not only the wealth of the investor, but also the wealth of the nation." Explain what this quotation means.

Midterm 1 Review – Rough Overview of the Topics We've Covered

We looked at diminishing returns in a number of contexts:

1.) PPF can be bowed outward, because different people in an economy have different skills, and so when we try to increase production of some good so much, we will end up putting in people that are not very good at producing that good.
2.) Indifference curves can be bowed inward because as we consume more and more of a good it makes us more and more happy, but less and less so. The bowed inward shape of indifference curves thus arises due to the property of diminishing marginal utility.
3.) Marginal cost curves are upward sloping because of diminishing returns; as we add more and more workers to a factory, eventually they start to run into each other. This is related to the notion that there are "too many cooks in the kitchen." We can enlarge the size of the kitchen, but even then we will eventually run into the problem of diseconomies of scale. (Note here, there need not be any difference between the skills of people, as in #1, for diminishing returns.)

Exception to #3: Marginal cost can be decreasing over an initial production interval due to *increasing returns*, which can arise due to the division of labor. The idea here is that sometimes there are synergies in teamwork. This captures the notion that, "the whole is greater than the sum of its parts"...in this case, two workers working together can make more than they could if each is working independently. e.g. assembly line. Exception to #1: PPF can be bowed inward if specialization is associated with increasing returns.

We also looked at specialization, comparative advantage and the gains from trade

If two economies differ in their relative propensity to produce two items, then they can gain from trade by specializing in what they do relatively better (that is, in what they have a comparative advantage) and exchanging. This holds even when one country is worse at producing both things. The important thing is that the countries differ in their relative propensity to produce goods; that is, they must have different opportunity costs.[1] Here, there is no notion of increasing returns.

[1] Some of you have mentioned that the homework problems on this question were difficult. Let the following quote, from Manuel Ayau, published in the journal *Economic Affairs*, Vol 26, issue 1 (March 2006), give you solace:

We talked briefly about public goods and common pool goods (also known as common pool resources) as justifications for government. We will talk more about these issues later in the quarter, but for now the important thing is to know the difference between them, the problems associated with both types of goods, and that the concepts are relevant in a variety of types of organizations, from societies to firms.

We talked about supply and demand and the factors that can shift these curves. We analyzed what happens to equilibrium price and quantity when curves shift. We also discussed how markets get to equilibrium. When there are more buyers than sellers (when the quantity demanded is greater than the quantity supplied) buyers bid up the price of the good…think of many E-bay bidders bidding on the last OSU-Michigan ticket. When there are more sellers than buyers (when the quantity supplied is greater than the quantity demanded) sellers undercut each other and drive down the price…think of many sellers at the end of the day in a food court that are competing for the business of the last customer. In competitive markets, these actions go on until *quantity demanded = quantity supplied*.

We also talked about the difference between a movement and a shift.

The theory of consumer choice leads us to the demand curve. The key elements in this theory are the budget line and indifference curves. To draw indifference curves, we need to know the consumer's preferences; that is, how much utility a consumer gets from consuming various amounts of a good. The objective of a consumer is to maximize their utility subject to their budget constraint. Using this theory, when we see how much quantity of some good consumers choose at various prices, we generate the information necessary to draw a demand curve.

Production and costs lead us to the supply curve. A firm's short-run supply curve is the entire portion of its MC curve that is above its AVC curve. This is because profit maximization occurs where MR=MC (recall P=MR for a competitive firm). A firm

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Nobel Laureate Paul Samuelson (1969, pp. 1–11) was once challenged by the mathematician Stanislaw Ulam to 'name me one proposition in all of the social sciences which is both true and non-trivial'. It was several years later that Samuelson thought that the correct response was comparative advantage:

'That it is logically true need not be argued before a mathematician; that it is not trivial is attested by the thousands of important and intelligent men who have never been able to grasp the doctrine for themselves or to believe it after it was explained to them.'

Here, Ayau quotes Samuelson 'The Way of an Economist', in P. A. Samuelson (ed.) *International Economic Relations: Proceedings of the Third Congress of the International Economic Association*, London: Macmillan.

is either making a profit or minimizing a loss at any point along this portion of the MC curve. All firms are identical in this model, so to get the market supply curve we just add up all the individual firms' supply curves or equivalently multiply one firms supply curve by the number of firms in the industry. This refers to the short run; in the short run both individual and market supply curves are upward sloping.

In the long run, an individual firm's supply curve is still upward sloping, but it is the portion of the MC curve that is above ATC. Whereas before some costs were sunk (and so sometimes the firm would engage in loss minimization), in the long run all costs are variable, and so a loss making firm will exit the market.

The long-run *market* supply curve is a straight line (or elastic, as your book says) *as long as all firms have identical cost structures*. This is due to the competitive process of entry and exit of firms. The competitive process leads firms to make zero (economic) profit, because if a firm is making positive profit, firms will enter and cause the price to fall, and if firms are making losses, some firms will exit and cause the price to rise. The long-run supply will equal price that will equal the minimum of the firms' ATC.

Finally, we explored various elements of entrepreneurship, distinguishing between innovation and invention, economic growth and economic progress, and we saw how profit and loss provide both information and incentives for creativity and efficiency.

Putting the concepts of Demand and Supply to Work

Elasticity (think responsiveness)

The following is some dialog from the HBO crime and police series *The Wire*:

instructor:

When a small change in price creates a large change in demand, then demand is said to be elastic. But, some products are inelastic, meaning a change in price does not affect demand. Some key factors that affect elasticity of demand are, what, Mr. Bell?

Stringer Bell:

Desire, consumer need...

instructor:

right, specifically the ability of a consumer to delay acquisition.

What else affects elasticity of demand?

We know, from the law of demand, that if the price of X falls, the quantity demand for X will increase.

This is obvious enough but sometimes we want to be more specific.

Imagine you are the manager of a restaurant and are considering increasing your prices. What kinds of things will happen to the restaurant's revenue?

Revenue ≡ Price x Quantity

If you increase your price and the quantity you sell remains the same, revenue will increase. But we know that the quantity you sell will not remain the same.

Why? Has anything happened to demand?

No, demand has remained the same. But we have *moved* to a new point on the demand curve.

So the question is, how much will quantity demanded fall if the price is increased?

We need to know the price elasticity of demand.

Price Elasticity of Demand -- A measure of the responsiveness of quantity demanded to changes in the commodities own price, ceteris paribus.

If the quantity demanded responds substantially to changes in price, the demand for the good is *elastic*. If it does not respond substantially, the good is *inelastic*.

What does "substantial" mean? We would like to be able to provide some mathematical concreteness

Computing price elasticity of demand:

$$Pe_d = \frac{\text{percentage change in } Q_d}{\text{percentage change in price}}$$

(where Q_d is quantity demanded)

example:

Say the price of the soup de jour was $1. At this price, Nancy's Restaurant sold 100. Then, she increased the price 20%. This hurt her sales (by the law of demand) and she then sold 80 soups.

Questions:

#1 What is the new price?
#2 By what percent did sales fall?
#3 What is the price elasticity of demand for soup at Nancy's Restaurant?

We can use the following formulas:

$$\text{percentage change in price} = \left(\frac{\text{new price} - \text{old price}}{\text{old price}} \right) \times 100$$

$$\text{percentage change in quantity demanded} = \left(\frac{\text{new } q_d - \text{old } q_d}{\text{old } q_d} \right) \times 100$$

To answer #1

$$.20 = \frac{x - 1}{1} \quad \rightarrow .20 = x - 1 \quad \rightarrow x = 1.20$$

To answer #2

$$x = \frac{80 - 100}{100} \quad \rightarrow 100x = -20 \quad \rightarrow x = \frac{-20}{100}$$ (x100 to see it as a twenty percent fall)

To answer #3

$$\frac{\frac{-20}{100}}{\frac{20}{100}} = \frac{-20\%}{20\%} = \mathbf{-1}$$

All price elasticities are negative, so we just take the **absolute value**, and say the Pe_d is 1.

Rewriting the formula for Pe_d:

$$Pe_d = \frac{\frac{\Delta \text{ in } Q}{\text{Old } Q}}{\frac{\Delta \text{ in } P}{\text{Old } P}}$$

How do we use elasticity?

example Say the Pe_d of something is .27. Then a 1% increase in the price would lead to .27% fall in q demanded.

Now we can formally define elastic and inelastic goods:

Elastic A good is elastic if a one percent increase in its price leads to a reduction in quantity demanded larger than one percent

or

A good is elastic if $Pe_d > 1$

If something has infinite elasticity, it is said to be **perfectly elastic**.

Inelastic A good is inelastic if a one percent increase in its price leads to a reduction in quantity demanded smaller than one percent

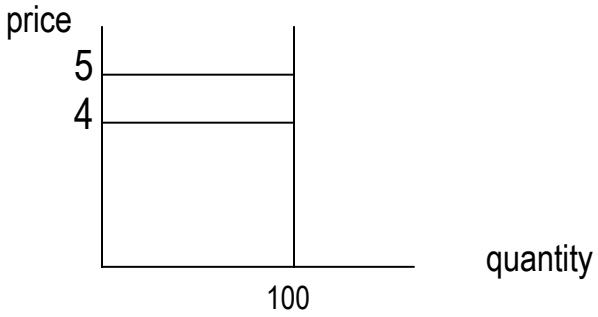
or

A good is inelastic if $0 < Pe_d < 1$

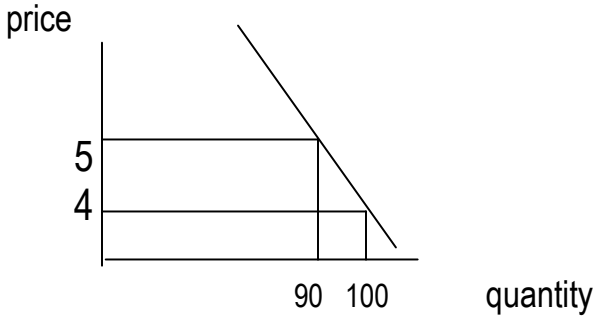
If something has 0 elasticity, it is said to be **perfectly inelastic**.

If $Pe_d = 1$, the good is said to be **unitary elastic**, and a one percent increase in price leads to a one percent reduction in quantity demanded.

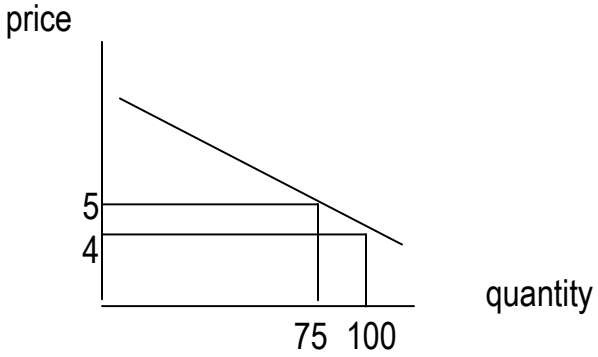
The Variety of Demand Curves



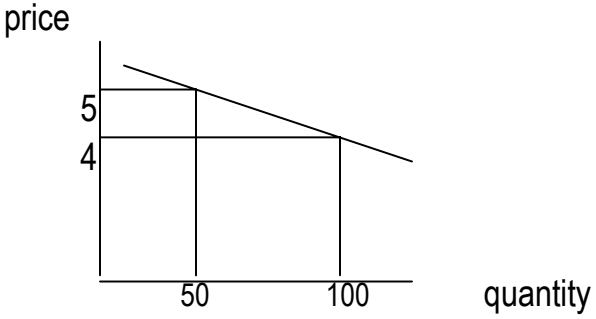
A graph showing perfectly inelastic demand
25% increase → 0% decrease



A graph showing inelastic demand
25% increase → 10% decrease



A graph showing unitary elastic demand
25% increase → 25% decrease



A graph showing elastic demand
25% increase → 50% decrease

A graph showing perfectly elastic demand
25% increase → ∞% decrease
****This is the demand curve facing A perfectly competitive firm****

Determinants of Elasticity

What determines whether the demand for a good is elastic or inelastic?

Necessities versus Luxuries

- necessities tend to have inelastic demand
- luxuries tend to have elastic demand

Availability of Close Substitutes

- If a good has a close substitute, it will have an elastic demand, since it is easy to switch to another good

e.g. If Coke becomes expensive, buy Pepsi instead

- Perfectly competitive firms have perfect substitutes

Definition of the Market

- Food is a necessity whereas caviar (a type of food) is a luxury

Time Horizon

- Gasoline may be inelastic in the short run, but elastic in the long run since people may buy hybrid cars

Another method of calculating elasticity: The Midpoint Method

One problem with the method of calculating elasticity we used above is that one must know the direction of the change in price, for example, whether it was an increase in price or a decrease in price. Sometimes we want to know the elasticity over a certain interval and do not specify a direction of change. In this case, it matters which price we use as the "old price." Should we use the higher price or the lower price? It turns out which one we use makes a difference.

e.g. calculating the percentage change in price

An increase in price from \$4 to \$5.

$$\frac{\text{new price} - \text{old price}}{\text{old price}} = \frac{5-4}{4} = 25\%$$

A decrease in price from \$5 to \$4.

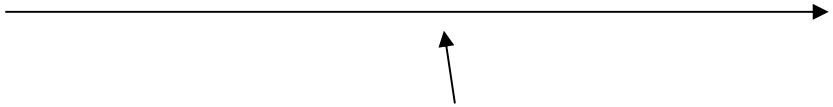
$$\frac{\text{new price} - \text{old price}}{\text{old price}} = \frac{4-5}{5} = -20\%$$

Even after taking absolute values, we still have different numbers. The midpoint method avoids this problem.

$$\frac{\text{new price} - \text{old price}}{\text{average price}} = \frac{5-4}{4.5} = .222\%$$

where average price is calculated as $\frac{4+5}{2}$

Which number is in between four and five? That is, in the **mid**dle?



0 1 2 3 4 5 6 7 …

Two other types of elasticity: income and supply

Income elasticity of demand a measure of how much the quantity demanded of a good responds to a change in consumers' income

$$Ie_d = \frac{\text{percentage change in } Q_d}{\text{percentage change in income}}$$

Here we don't use the convention of taking the absolute value, as we did with price elasticity.

- The income elasticity of demand of a good depends on whether it is a **normal good** or **inferior good**.
- A normal good has a positive income elasticity, whereas an inferior good has a negative income elasticity.
- Inferior goods are something like bus rides or ramen noodles, where, when a consumer's income increases, he buys less of them.
- Most goods are normal goods, where, when a consumer's income increases, he buys more of them.
- Among normal goods, there are **luxuries** and **necessities**.
- Luxuries are goods that have large positive income elasticity and necessities have small but still positive income elasticity.

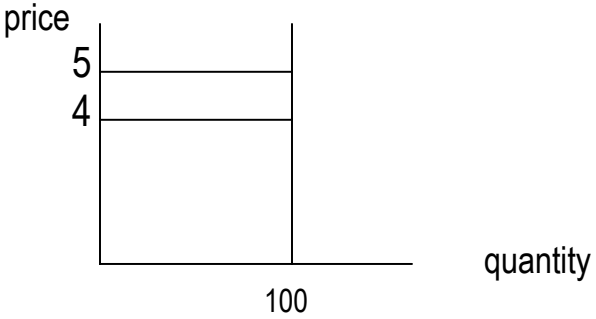
price elasticity of supply — a measure of how much the quantity supplied of a good responds to a change in the price of that good

$$Pe_S = \frac{\text{percentage change in } Q_S}{\text{percentage change in price}}$$

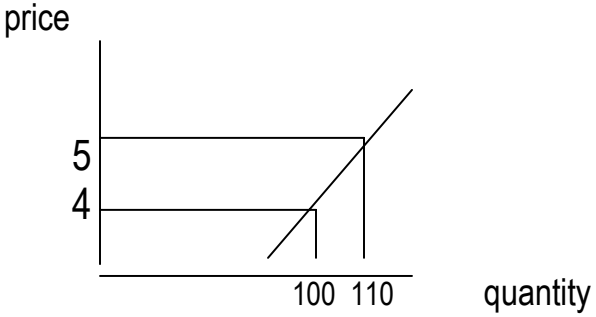
Here, we take the absolute value

Much like Pe_d, Pe_s measures the responsiveness of quantity supplied to changes in P.

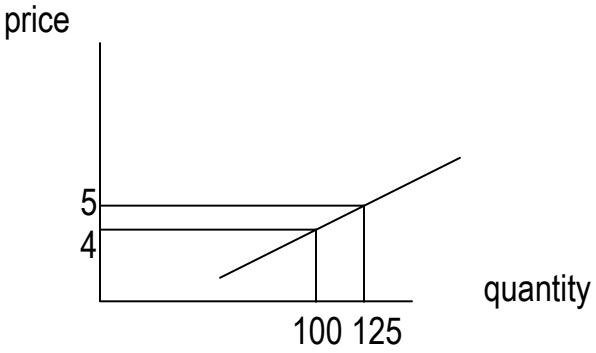
The Variety of Supply Curves



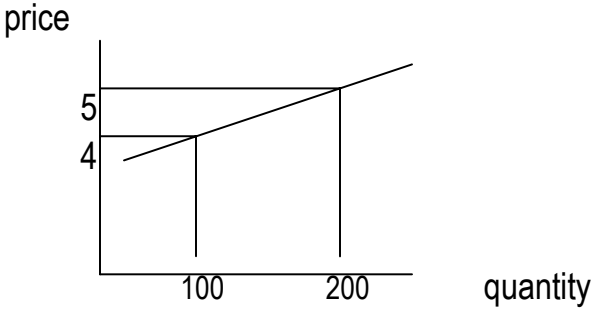
A graph showing perfectly inelastic supply ($Pe_s = 0$) (the supply of Babe Ruth baseball cards is like this)



A graph showing inelastic supply ($0 < Pe_s < 1$)



A graph showing unitary elastic supply ($Pe_s = 1$)



A graph showing elastic supply ($Pe_s > 1$)

A graph showing perfectly elastic supply ($Pe_s = \infty$)

Policy Analysis

At this point in the course, we have done most of the very technical material, and developed some powerful tools that we will use in the following section of the course to analyze public policies, including:

- Price controls (rent control, minimum wage)
- Taxes
- Tariffs

We will need to develop one more tool to evaluate outcomes; these are the tools of welfare economics. We will use them first to show in what sense the market is efficient. One more main thing we'll look at:

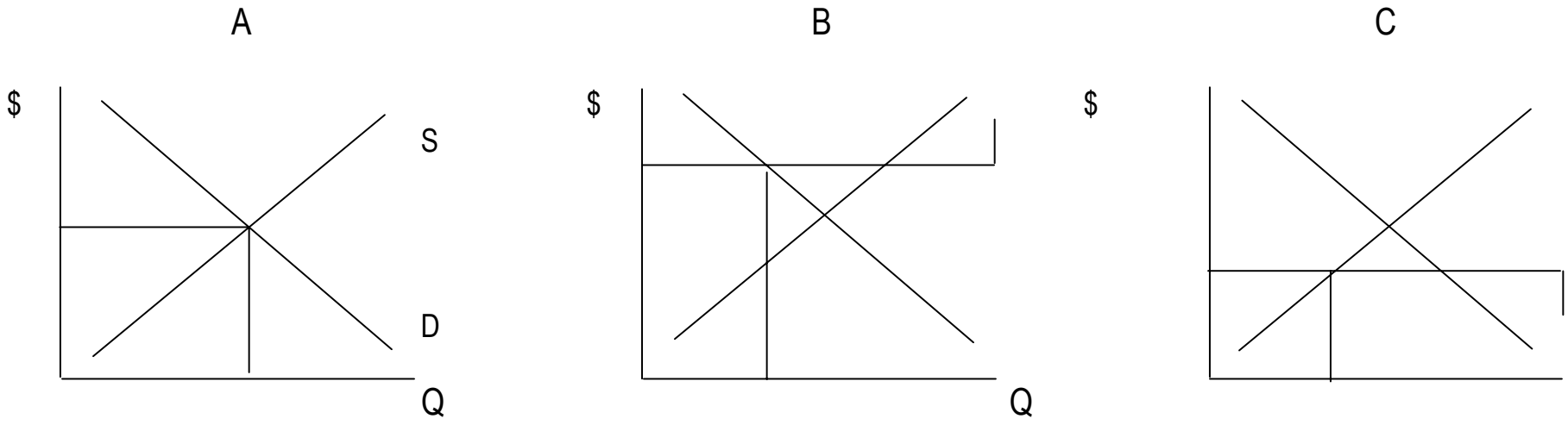
- The invisible hand theorem

We will also use the tools of welfare economics to evaluate the public policies discussed above.

After discussing public policies and the invisible hand theorem, we'll look at externalities and public goods, and then later in the course we'll look at oligopoly and monopoly. The remainder of the course covers public policy and political economy, industrial organization, and international trade. We'll also be looking at some frontier topics.

The following four slides show pictures that illustrate the four main topics we'll be looking at before we get to public goods: price controls, invisible hand theorem, taxes and international trade. These correspond to Mankiw's chapter 6-9.

Price Controls



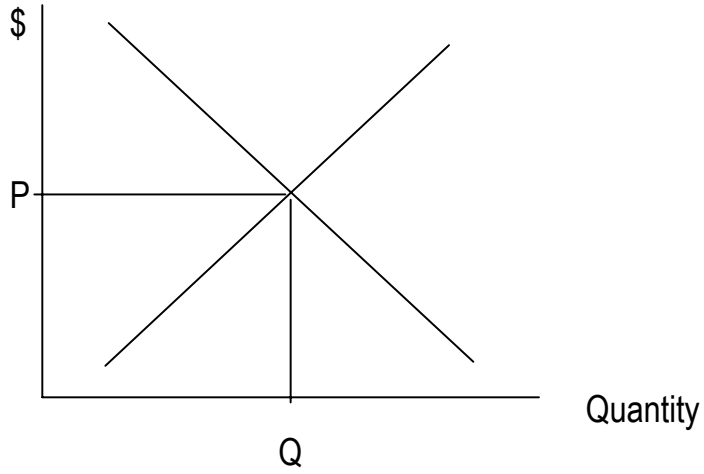
A A market without government control; equilibrium price and quantity obtain

B A market with a binding price floor; the price is equal to the price floor, and the quantity traded is equal to the quantity demanded

C A market with a binding price ceiling; the price is equal to the price ceiling, and the quantity traded is equal to the quantity supplied

The invisible hand theorem

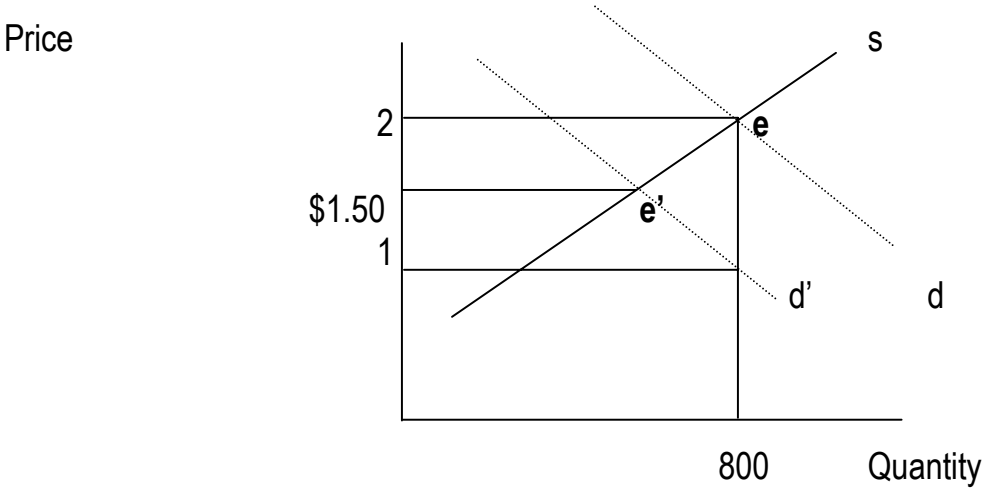
Equilibrium outcome brought about by the market results in efficient allocation of resources. Why is this? Consider the market equilibrium in the graph below



If the economy produced any quantity greater than Q, it would be inefficient because for any quantity above Q, it costs more to produce that quantity than consumers are willing to pay.

If the economy produced any quantity below Q, it would mean there were consumers willing to pay more than what it costs someone to produce the good. This is also inefficient…there are unexploited gains from trade.

Taxes

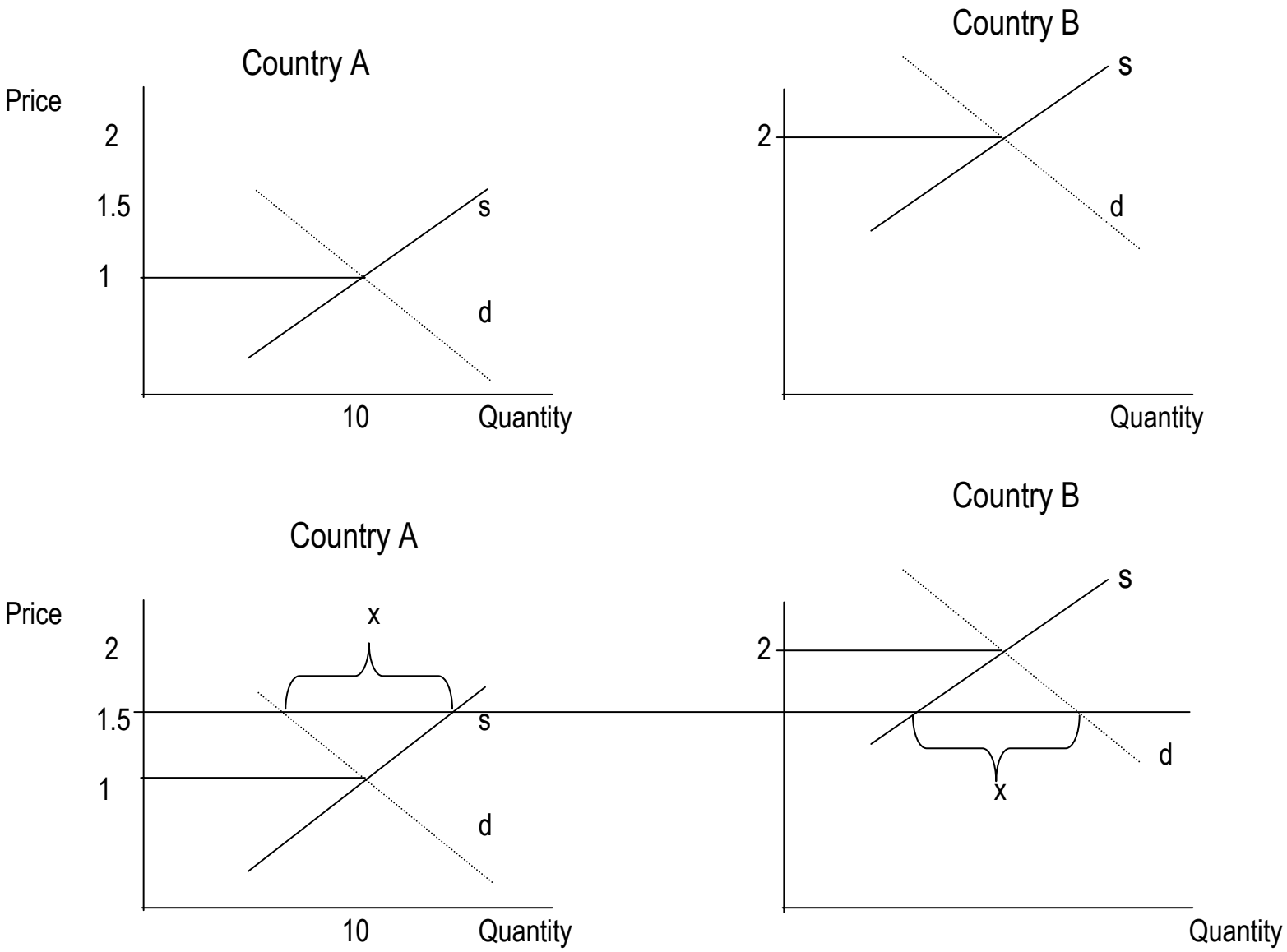


Deadweight loss arises because there are buyers who are willing to pay sellers more than their cost to get the good, but they don't buy it in order to avoid the tax. This is inefficient, by definition. Some "money is left on the table."

With a tax, buyers buy less, producers produce less, the market falls below its optimal size

Governments raise revenue, but this comes at a cost.

International Trade



Supply, Demand, and Government Policies

Not everybody is satisfied with equilibrium price. The distribution of goods in a shortage is determined by non-price mechanism (rationing, first come first serve, discrimination based on sellers bias). Some buyers get to pay the lower price, however others don't get the good at all.

In this lecture, we will look at how two government interactions in the market affect supply and demand: *rent controls* and *minimum wage* laws.

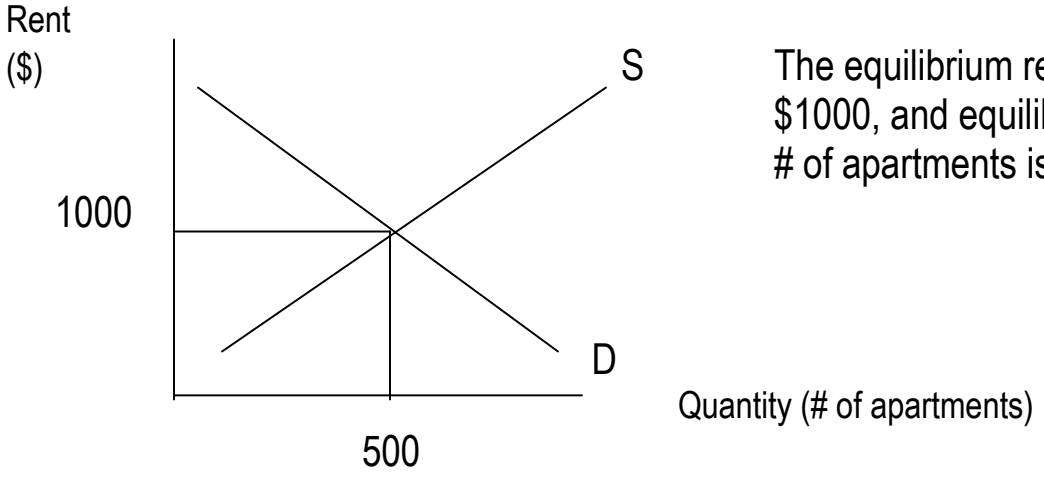
Rent controls are in place in many cities around the world. Their advocates argue that they are needed to allow low income people to live in a certain part of town. This often is done to help lower income people, and also to foster more diverse neighborhoods.

A rent control is a maximum rent that a landlord is willing to pay. Recall that rent is the type of payment that owners of land receive. Rent is nothing buy a type of price, so rent control is nothing but a type of price control.

A rent control is an example of a price ceiling. Later, we will look at minimum wage laws, which are a type of price floor.

Price Ceiling	A legal maximum on the price at which a good can be sold
Price Floor	A legal minimum on the price at which a good can be sold

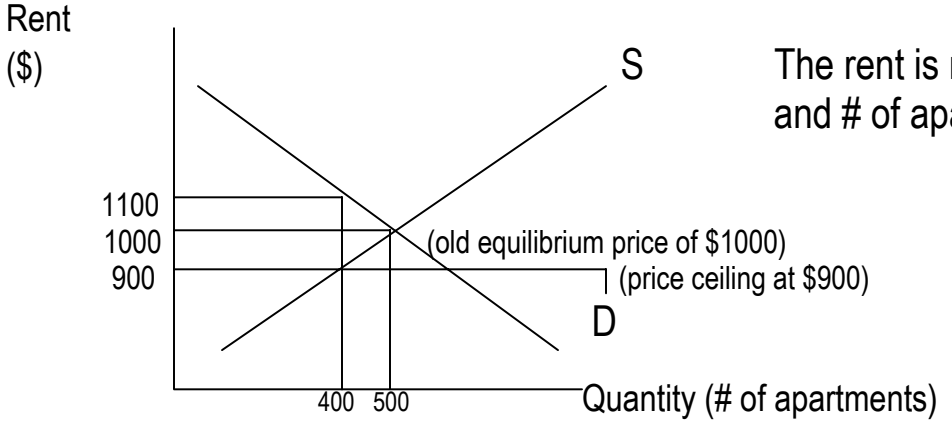
Supply and Demand for Rental Housing in New York City



The equilibrium rent is $1000, and equilibrium # of apartments is 500.

Question: Imagine that the government is not happy with this market outcome, because the rent is too high. What could they do?
One Answer: Apply a rent ceiling

A Rent Ceiling on the Market for Rental Housing in New York City



The rent is now $900 and # of apartments is 400.

How much rent would the market be willing to pay for those 400 apartments if the rent control was not in place?

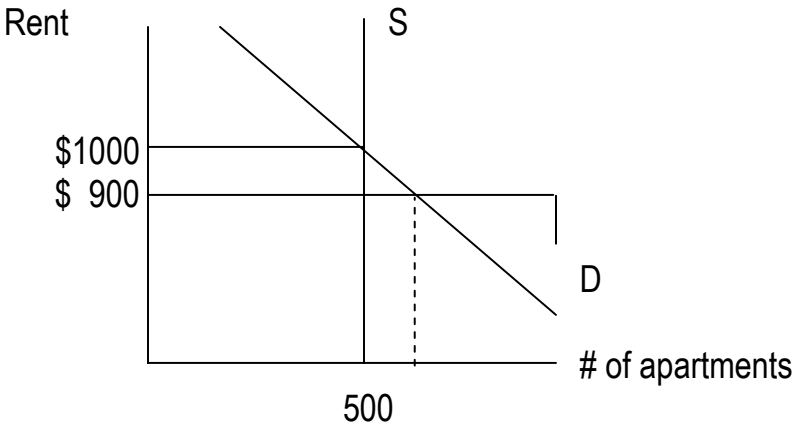
Approximately how many apartments does the market demand at the new rent of $900?

When the quantity demanded for some product is greater than the quantity supplied, we say that there is a shortage.

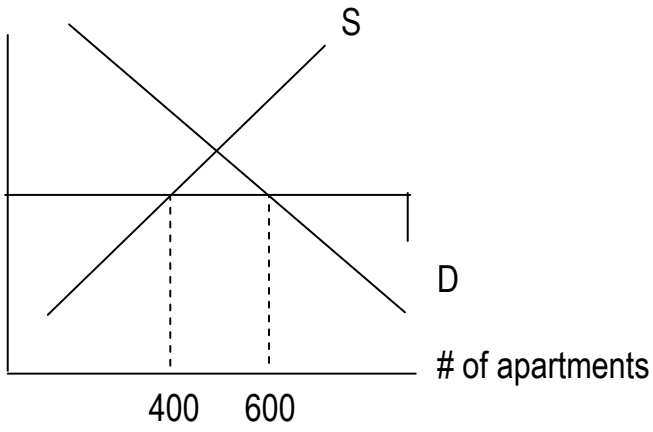
Why might the supply curve be upward sloping, isn't the supply of apartments fixed?

The supply curve might be upward sloping because the supply of housing is variable over an extended period of time. For example, a plot of land that currently has an apartment building built on it could be used more profitably if it is torn down and used as a parking lot. This may be plausible if rent controls are exceedingly high and the apartment building was already in a state of semi-disrepair.

Short-run

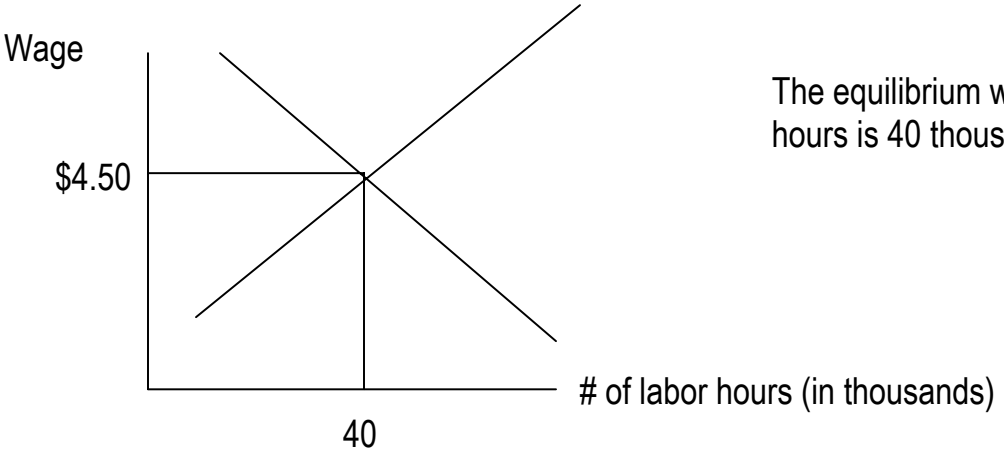


Long-run



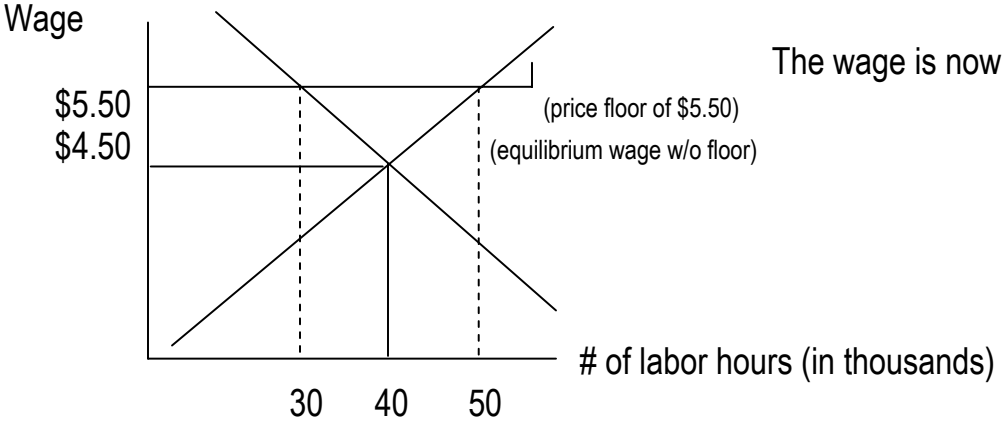
Minimum wage laws are also in use in many places around the world, including the United States. They are used to guarantee a minimum standard of living to workers. A **minimum wage** is the minimum that an employer can pay a worker. Recall that a wage is nothing but the price of labor, so a minimum wage law is nothing but another type of price control. A minimum wage is a type of price floor.

Supply and Demand for Unskilled Labor in Athens



The equilibrium wage is $4.50 and the # of labor hours is 40 thousand.

Question: If the government is not happy with the equilibrium wage of $4.50, they could impose a minimum wage to raise it.



The wage is now $5.50 and the # of labor hours is 30 thousand.

What has happened to the equilibrium wage and # of labor hours?

Approximately how many labor hours do suppliers (workers) wish to sell at the new wage?

The moral of the story:

The number of labor hours decreases and the wage increases. This translates into higher wages for employed workers, but less employment overall.

From a definitional point of view, unemployment increases even more since at a wage of $5.50, workers want to supply 50 units of labor but firms only demand 30; unemployment is defined to be 20 units of labor.

Even the definitional point aside, employment in our model has decreased from 40 to 30 due to the minimum wage law.

Another point often made by opponents of minimum wage laws is that the poorest workers are the ones who are most hurt. Consider a worker with very low level of marketable skills. Some business may have employed him at a wage of $4.50, but he would not contribute $5.50 worth of benefit to the firm for his one hour of labor. Thus the firm does not find it profitable to employ him and he is laid off. Had the government not set a price floor, he would be employed and earning $4.50 but now he is not employed and is earning $0.

Economics is full of public policy debates. The minimum wage law debate comes up every so often.

Other timely debates are:

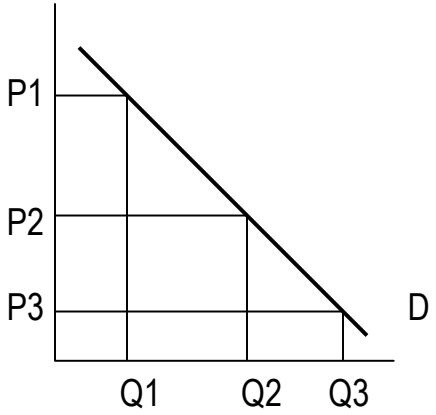
- public school privatization
- social security reform
- prescription drugs and patent laws

Efficiency of Markets

Market adjusts to equilibrium. But, are the *equilibrium price* and *equilibrium quantity* too large, too small or perfect? This is the domain of normative economics. The tools of welfare economics provide a positive framework which we can use to evaluate outcomes

Welfare economics – the study of how the allocation of resources affects economic well-being.

One measure of welfare is consumer surplus



The demand curve depicts the various quantities buyers are willing and able to purchase at different prices

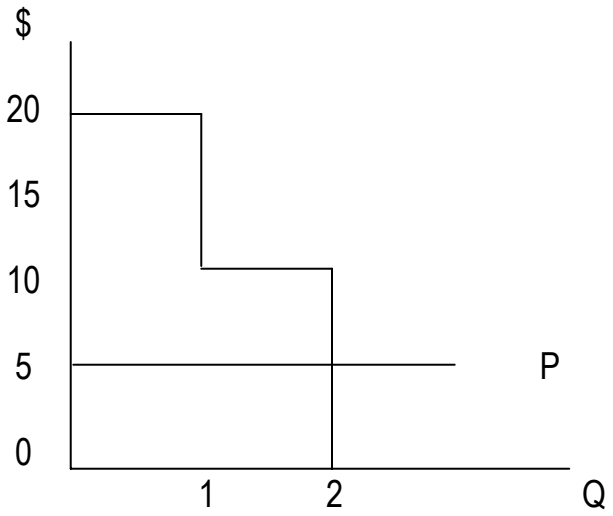
Consumer surplus is the difference between what the consumer is able and willing to pay and what the consumer actually pays

Say some consumer has a cold and is willing to pay $20 for some cold medicine. When he gets to the store, he finds that cough medicine costs $5

If he buys the medicine his consumer surplus will be $15 b/c(20 – 5 = 15)

There may be another consumer who values the good at $10 (or, is willing to pay $10). If this consumer buys the good, his consumer surplus will be $5 b/c (10 – 5 = 5)

If these are the only consumers in the market place, total consumer surplus (or market consumer surplus) is 20 (15 + 5 = 20)

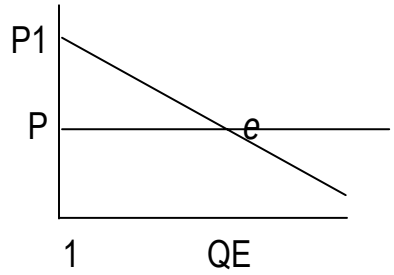


CS = Value (perceived by consumers) – Price (determined by supply and demand)

C.S. shows the benefit buyers receive form participating in market exchange as perceived by the buyers themselves. In a competitive market, there are many consumers, and they all value the product differently. However, they all pay the same price. The consumer who most values the good is willing to pay P1.

His surplus is P1-P

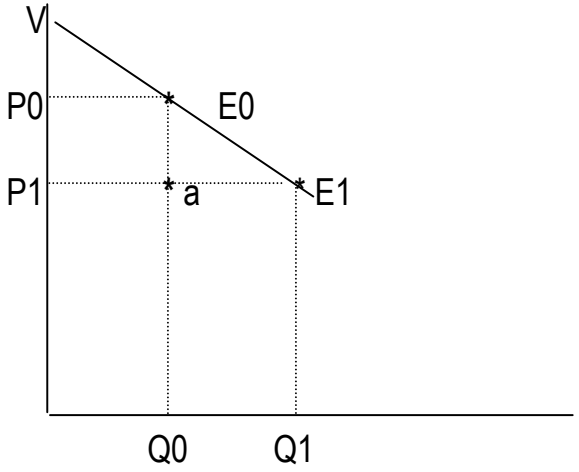
However a consumer who is willing to pay P gets zero surplus (P-P=0)



Thus some consumers get more surplus than others, even though they all pay the same price. In the graph of the market, the total consumer surplus (received by all consumers) is the triangle given by P(P1)**e**

C.S. is total area below demand curve and above the prevailing market price

Effect on C.S. due to a fall in the market price



* Old consumer surplus is P0(V)E0

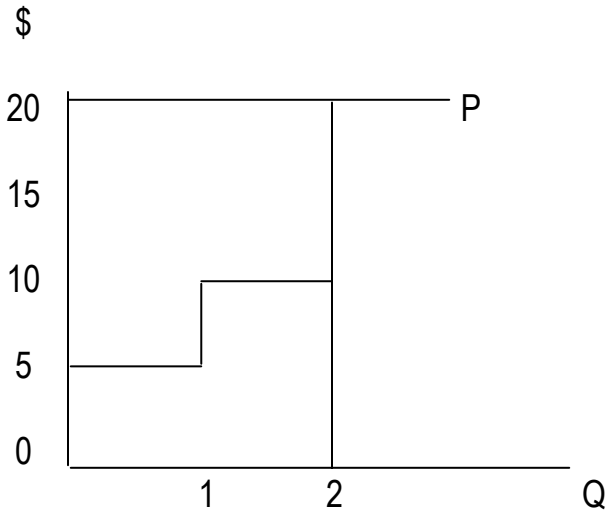
* New consumer surplus is P1(V)E1

* Buyers who were buying the good at a price of PO now have a larger surplus. For these buyers it increases by the amount P0(E0)a(P1). New buyers also enter the market The C.S. they receive is of the size E0(a)E1.

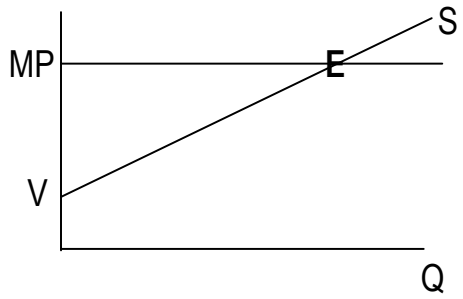
Producer's surplus – the difference between the price firms are willing to accept (which is their cost) and the price they actually receive.

Say you need to hire someone to mow your lawn. There are two neighborhood kids who are able mow the lawn (and willing, if the price is right) once a week, Wanda, who will do it for $5, and Hajime, who will not do it unless you're offering at least $10.

If you create an advertisement that they both see offering $20, who will show up for the interview?



Producer Surplus = Price – Cost



Here, PS is given by MP(**E**)V

In other words, the producer surplus is *the area above the supply curve and below the market price*

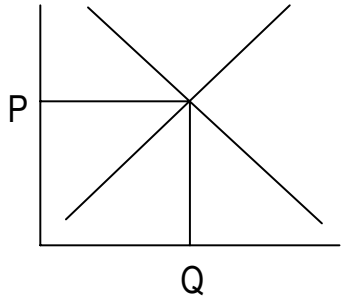
As in our example on the previous slide, sometimes different producers have different cost structures. Therefore different producers will receive different levels of surplus from engaging in market transactions.

Total Surplus is the surplus of buyers and producers T.S. = C.S. + P.S.

T.S. = Value – Price + Price – Cost = Value – Cost

If we assume that both buyers and sellers are equally important, then a benevolent social planner who is interested in efficiency will try to maximize total surplus. If the social planner is interested in equity, then he or she will not only be interested in maximizing total surplus.

Equilibrium outcome brought about by the market results in efficient allocation of resources. Why is this? Consider the market equilibrium in the graph below



If the economy produced any quantity greater than Q, it would mean inefficiency because for any quantity above Q, it costs more to produce that quantity than consumers are willing to pay. If the economy produced any quantity below Q, it would mean there were consumers willing to pay more than what it costs someone to produce the good. This is also inefficient…there are unexploited gains from trade.

In many situations, economists advocate the free market as best way to organize. One of Mankiw's 10 principles of economics goes something like this. However there are several reasons why we (society) might not be happy with the allocation the market achieves. These things were left out of our discussion. Some are:

A monopoly firm → single seller can control prices

Externalities → may be inefficient from the point of view of the society as a whole

Equity → if the objective is equality

One example of an externality is a crime free society. However, there is not a usual market for safety. Even though we all demand safety, we have an incentive to understate our preferences in order to not have to pay for it…if someone else pays for having a free society, we will all benefit. Thus safety is a public good. So, one solution to the free-rider problem is to force people to pay through taxation.

Taxation

Let's say city officials determine that the city needs to hire more police due to problems caused by rowdy students who drink too much. They argue that the best way to pay for the police is to impose a tax on the consumption of beer.

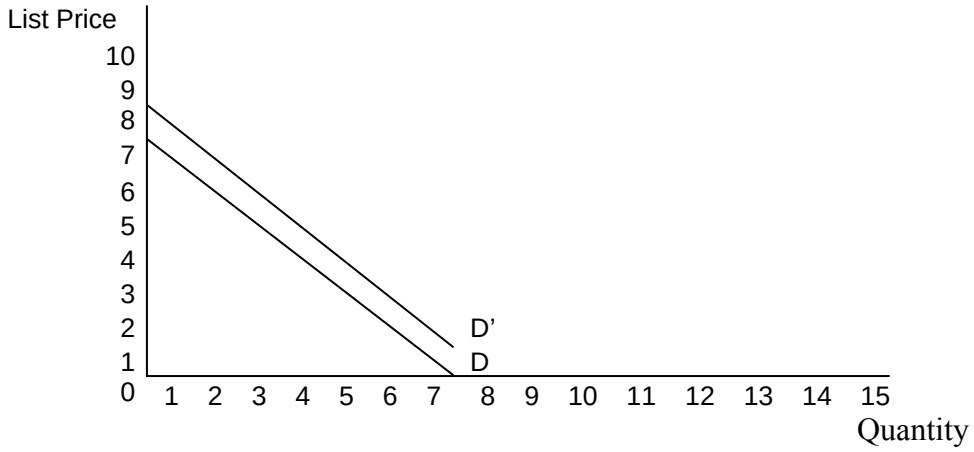
First, it will be helpful here to distinguish between the *list price* and the *effective price.*

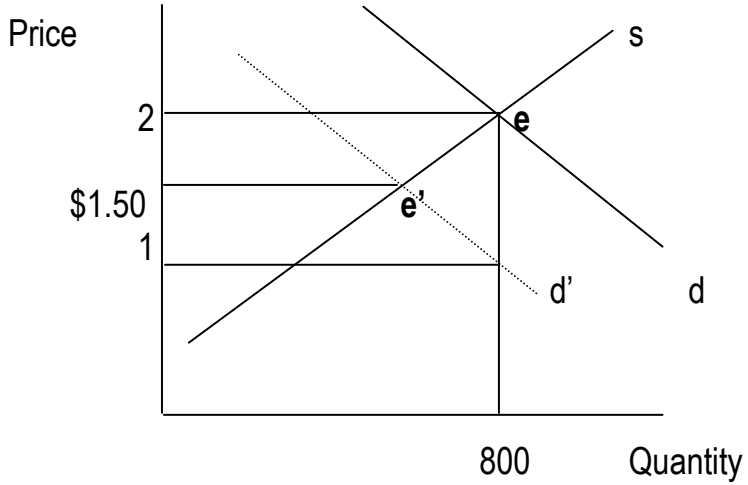
Effective Price = List Price + Tax

Effective Price	Q
8	0
7	1
6	2
5	3
4	4
3	5
2	6
1	7

Consider the demand schedule to the left, that corresponds w/ the graph below.

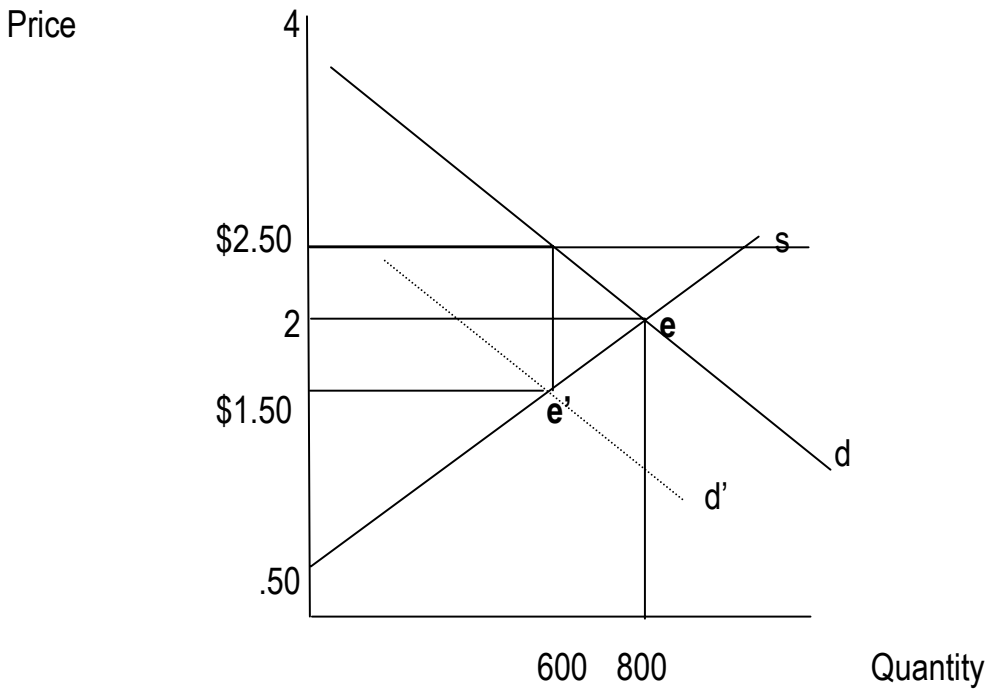
What is the size of the tax at D? at D'?





Government imposes a one-dollar tax per unit. The demand curve shifts down by the amount of the tax. Because of decreased demand, price will go down, and reach a new equilibrium. The old equilibrium price was $2. The new equilibrium price (that results from decreased demand due to the tax) is $1.50 Note that $1.50 is the "list" or "sticker price." The "effective price" the consumer will pay is $2.50. This is the "out the door" price. Thus in sum, buyers are really paying .50 more than they were before the tax and sellers are receiving .50 less than they were before the tax. However the government receives $1.00 from each beer sold.

If the new equilibrium quantity is 600, tax revenue is $600 ($1 x 600 = $600)



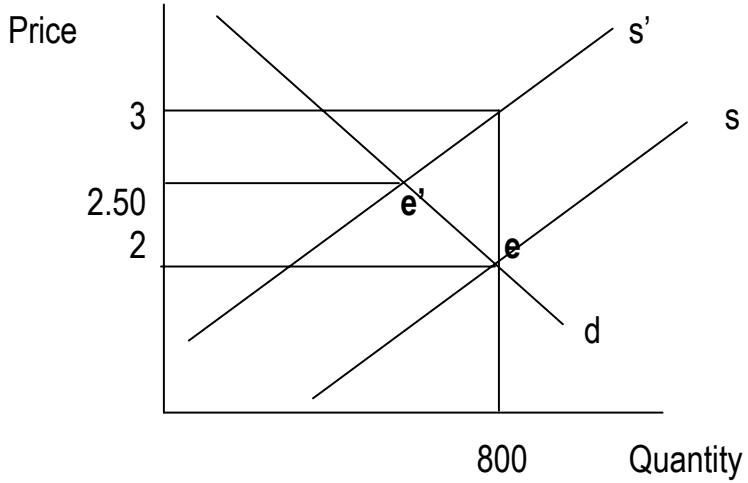
What happened to CS, PS, and TS? What about government revenue?

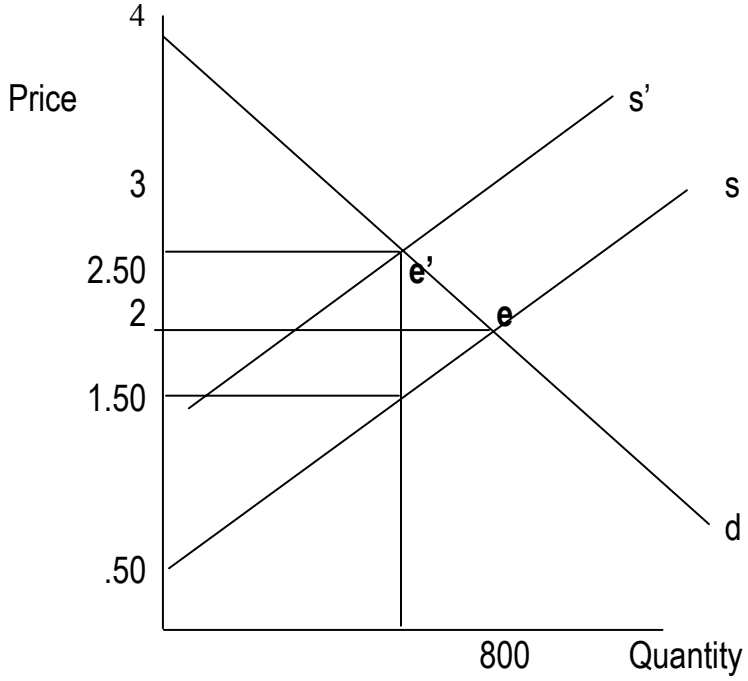
CS decreased, PS decreased and TS decreased. However now the government is making revenue. Note that government revenue is included in the definition of TS (before we ignored it because we hadn't yet introduced taxation) but even so TS still decreased.

TS = CS + PS + Government Revenue

However raising this revenue comes at a cost. The difference between the TS before and after the tax is called the deadweight loss – more on this later.

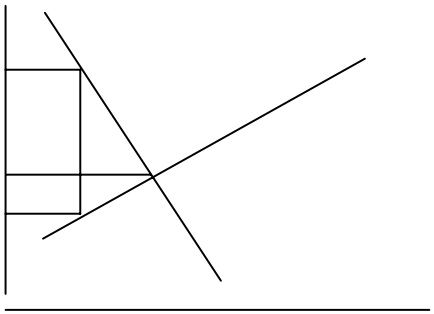
What about a tax on sellers?



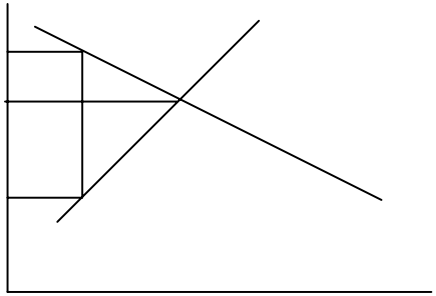


The picture is basically the same as when the tax was distributed on buyers. In this case, both buyers and sellers share the burden equally, regardless of on which group the tax is imposed.

What determines how is the tax burden distributed? (Or tax incidence?)



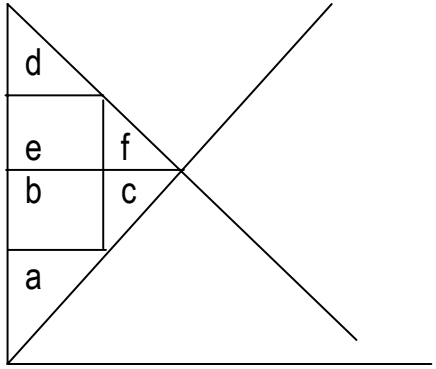
Sellers bear less of a burden of the tax than the price paid by buyers. From the diagram one can see that the tax revenue is mainly coming out of what was once consumer surplus. This is because demand is more inelastic than supply, which implies that buyers don't have many alternatives. In the case of inelastic supply and elastic demand



Now, sellers bear more of the burden. The side that is more inelastic bears a greater share of the burden, whether the tax is imposed on buyers or sellers. This example shows what happens in markets for luxury goods. These goods tend to have an elastic price elasticity of demand. For example, a tax on sparkling wine is meant to make rich consumers bear a larger burden of the tax, but in fact producers are hurt more because they see demand for their product decrease and must accept a lower price. In this case, the rich consumers switch to other types of wine.

Calculating the deadweight loss from taxation.

Recall that with taxation, total surplus was less than without taxation, even after taking into account the addition of government revenue.



CS = area d
PS = area a
Government Revenue = areas e + b

The area f + c is deadweight loss

Deadweight loss arises because there are buyers who are willing to pay sellers more than their cost to get the good, but they don't buy it in order to avoid the tax. This is inefficient, by definition. Some "money is left on the table" in a sense.

With tax, buyers buy less, producers produce less, the market falls below its optimal size

What determines the size of the deadweight loss?

The more inelastic demand, the smaller the deadweight loss → buyers less responsive to change in prices, distortion in market due to taxes is smaller

Is deadweight loss of taxing labor large or small

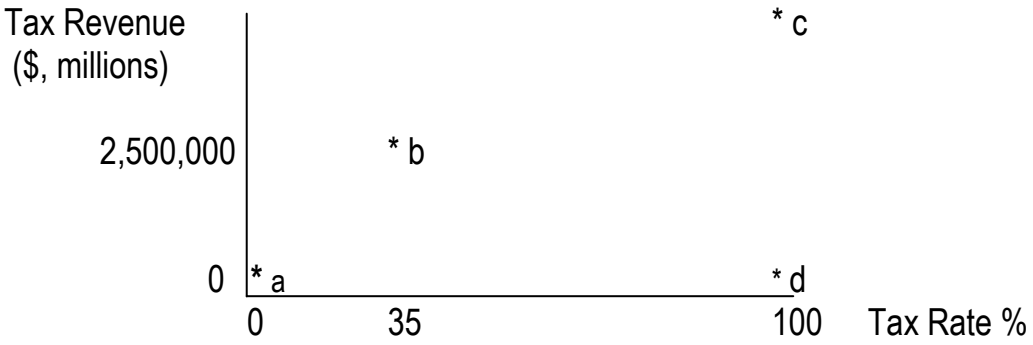
1. Deadweight loss is small if supply is inelastic
2. deadweight loss is large if supply is elastic

workers may adjust # of hours worked, issue of two income houses, underground activity.

To summarize: elasticity affects 1.) how the burden is distributed, and 2.) how large is the deadweight loss

Laffer Curve

The idea behind the Laffer curve is related to the idea of deadweight loss from taxation. The idea is rather simple, but has had a big influence on policy since the early 1980s.



The U.S. Federal Government collected $2,568 billion in FY2007 (Wikipedia.com). The highest tax bracket is 35%, and so although this is a big simplification, this is how I decided where to place point b

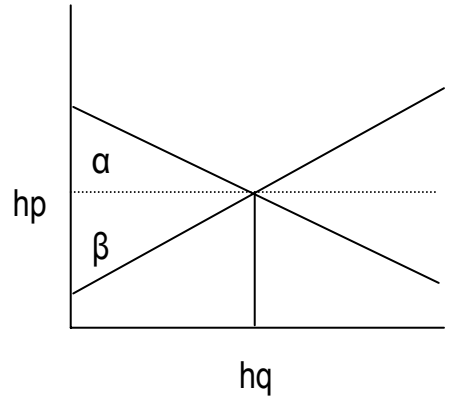
How much revenue do you think the U.S. government would collect if everyone was taxed at 100%? Does point c or point d seem more plausible?

International Trade

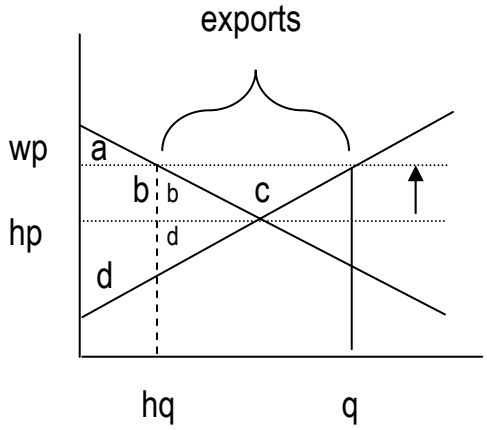
We saw that countries specialize in the production of goods in which they have a comparative advantage.

In reality, countries do not barter, they use money to make transactions. Still, comparative advantage comes in to play, by determining whether the price of a good in some country that does not trade is higher or lower than the world price; that is, the price that is determined by countries that do trade.

The winners and losers in an exporting country



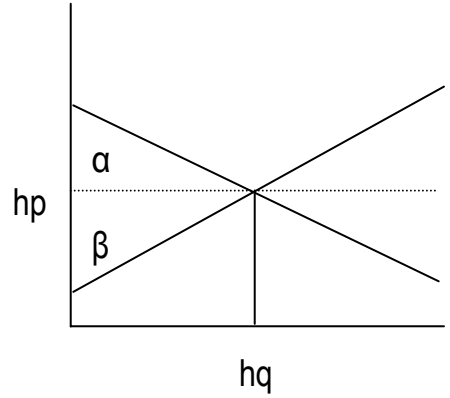
α: consumer surplus
β: producer surplus



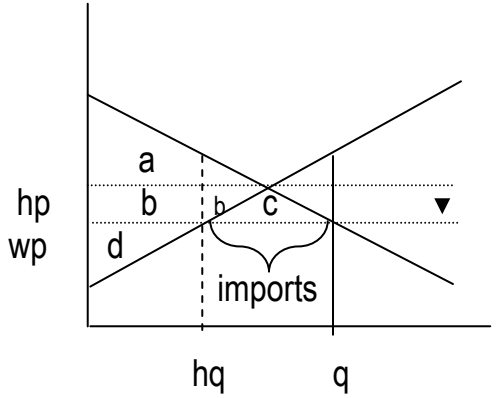
a: consumer surplus
b:
c: } producer surplus
d:

The quantity produced after trade (q) equals the amount of home consumption (hq) plus the amount of exports.
As for the welfare analysis, consumers lose area **b**, and producers gain area **b**.
However, producers also gain area **c**, and so total surplus is larger after trade.

The winners and losers in an importing country



α: consumer surplus
β: producer surplus



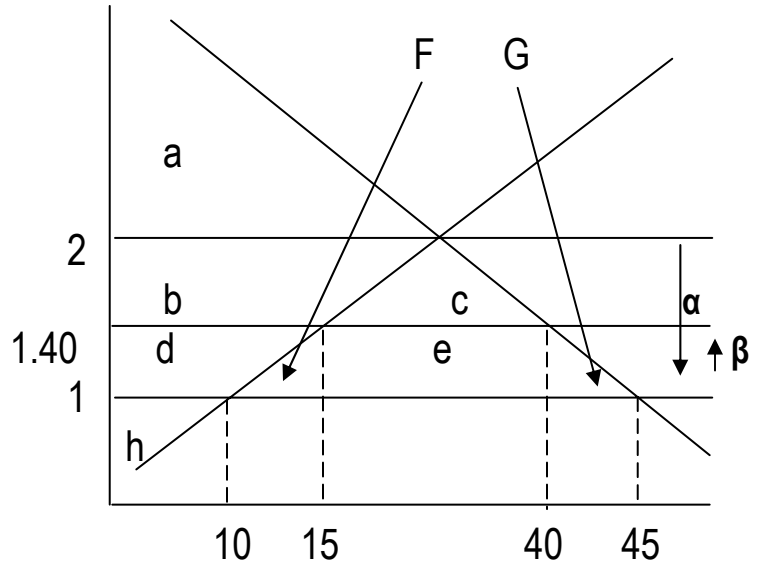
a:
b: } consumer surplus
c:
d: producer surplus

The quantity consumed after trade (q) equals the amount of home production (hq) plus the amount of imports.
As for the welfare analysis, producers lose area **b**, and consumers gain area **b**.
However, consumers also gain area **c**, and so total surplus is larger after trade.

Sometimes lobbying groups can force governments to enact tariffs and quotas, despite the fact that total surplus rises after trade.

Tariffs and Quotas

We will analyze the effects of tariffs, which are basically just a tax on imports. The analysis of quotas is similar, and so to save time we won't go through the formal analysis here. However, take International Economics for that and much more.



The removal of trade barriers causes the price to fall from \$2 to \$1 (arrow **α**).

Then, a 40 cent tariff causes the price to rise from \$1 to \$1.40 (arrow **β**).

Immediately after trade barriers fell, consumers gained b+c+d+e+F+G, and producers lost area b

Then, after the tariff, consumers lost F+e+G and the government gained area e.

As a result of the tariff, total surplus is lower by areas F+G

Arguments for Restricting Trade

- The Jobs Argument
- The National-Security Argument
- The Infant-Industry Argument
- The Unfair-Competition Argument
- The Protection-as-a-Bargaining-Chip Argument

Many of the concepts we'll discuss in the next section are relevant to this political discussion. For example, the free-rider problem suggests why some interest groups are better at lobbying for protection than others.

Externalities

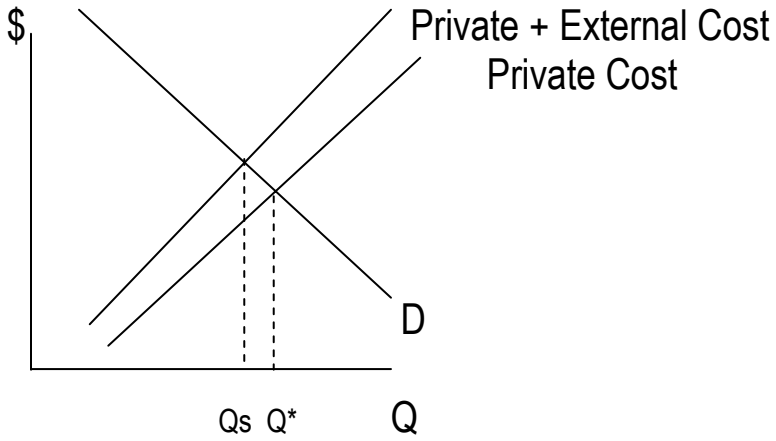
Externalities arise when the actions of one person affect the well being of others; can be positive or negative.

An example of a positive externality is the creation of knowledge – once one person creates and reveals some knowledge, it is available for use by anyone who hears and understands it.

Pollution is an example of a negative externality – the pollution from a factory may affect the ability of a Laundromat to dry its clothes outside in the sun.

Public goods, which we'll discuss later in this lecture, share a very close connection with externalities. In particular, public goods are those goods that are consumed in the form of (positive) externalities.

How a Negative Externality affects Supply and Demand

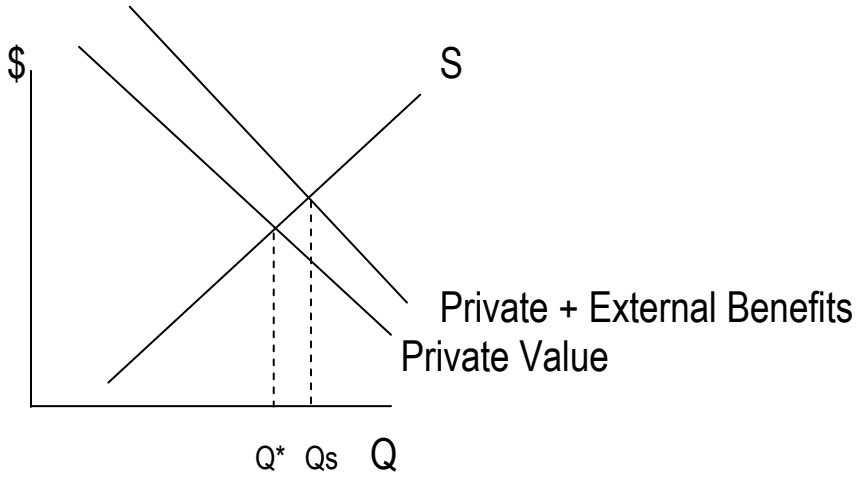


The equilibrium (Q*) that arises naturally in the market is too big, because sellers don't take into account the external costs of their actions

Taxes can achieve this reduction in the firm's supply curve, thereby *internalizing the externality*

Internalizing the externality means altering incentives so that people take account of the external effects of their actions.

What about a positive externality?



The equilibrium (Q*) that arises naturally in the market is too small, because buyers don't take into account the external benefits of their actions

Subsidies can achieve the outcome of Qs by either increasing the consumer's demand curve, or if sellers receive the subsidy, by shifting the supply curve down.

Market-based Solutions to Externalities:

patents

Private Solutions to Externalities:

moral (*do unto others as you would have them do unto you*)
charities (income tax deductions)
contracting and bargaining
integration (economies of scope)

The Coase Theorem and Transaction Costs

Example: Loud Music and Neighbors

If you live in an apartment or dorm, a common negative externality occurs when one person plays music loudly. Jack likes to listen to rock n' roll music. How much he enjoys the music depends on how loudly he plays it. Here, the amount of the activity undertaken by Jack is measured in units of volume.

However, Tonya hates rock n' roll music.

Can they reach a deal through bargaining that makes them both better off? What if they speak different languages? (That is, what if there are *transaction costs*?)

Volume	Jack's Total Benefit	Jack's Marginal Benefit	Tonya's Total Benefit	Tonya's Marginal Cost
0	0	--	0	--
1	.50	.50	.10	.10
2	.90	.40	.25	.15
3	1.20	.30	.45	.20
4	1.40	.20	.70	.25
5	1.50	.10	1.00	.30
6	1.40	-.10	1.35	.35
7	1.20	-.20	1.75	.40
8	.90	-.30	2.20	.45
9	.50	-.40	2.70	.50
10	0	-.50	3.25	.55

If Jack's objective is to maximize his total benefit, at what volume will he play his music?

By setting V=5, he receives a benefit equal to $1.50

But at V=5, Jack is imposing a cost on Tonya that Tonya perceives to be equal to $1.00. This means she would be willing to pay $1.00 to have silence.

Note that the marginal benefit of the fifth volume level is only .10 for Jack, but the marginal cost of the fifth level is .30 for Tonya.

Let's imagine Tonya approaches Jack. She may ask him to turn down his music, and a simple private solution to Tonya's problem could arise if Jack followed the Golden Rule, and took Tonya's costs into account.

However, even if Jack doesn't follow the Golden Rule, there may still be a private solution.

Say Tonya offers Jack $0.20 to turn his stereo down from V=5 to 4. Will he accept? Would Tonya ever offer this to Jack? Would she ever offer him $0.22 to turn his stereo down one level further (to V=3)?

Is the outcome V=3 efficient?

Volume	Jack's Total Benefit	Jack's Total Cost	Tonya's Total Benefit	Tonya's Total Cost	Total Social Net Benefit
0	0	0	0	0	0
1	.50	0	0	.10	.40
2	.90	0	0	.25	.65
3	1.20	0	0	.45	.75
4	1.40	0	0	.70	.70
5	1.50	0	0	1.00	.50
6	1.40	0	0	1.35	.05
7	1.20	0	0	1.75	- .55
8	.90	0	0	2.20	-1.30
9	.50	0	0	2.70	-2.20
10	0	0	0	3.25	-3.25

Social Benefits are maximized at V=3. Thus, if Jack has the right to play music, Tonya can bargain with him to turn it down to a level that maximizes social benefit.

The main insight of the Coase Theorem, however, is that this outcome (V=3) would arise even if Tonya had the property right over the stereo's volume.

If Tonya has the property right, she would set V=0. But then Jack can offer her any amount between $0.10-0.50 and she would agree to increase the volume to V=1. And so on…

(Why is the $0.10-0.50 the range of acceptable offers for this first increase in volume?)

If there are transaction costs, they must be less than the difference between the parties' benefits and costs or bargaining will not bring about the efficient outcome.

Public Policies toward Externalities

- command and control policies (regulation)
- market-based policies: (taxes and subsidies, permits)

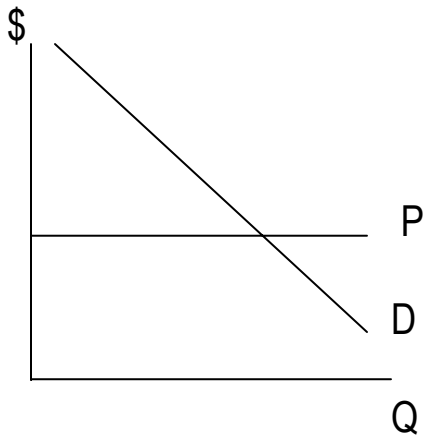
Fuel efficiency standards for auto makers are an example of a command and control policy, whereas gasoline taxes for consumers are an example of a market-based policy.

Regulation legislates behavior directly.

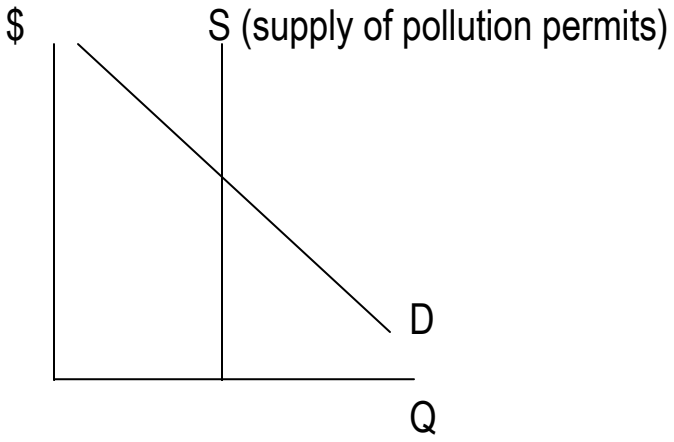
Market-based policies provide incentives so that private decision makers will choose to solve the problem on their own

The similarity between taxes and permits:

Corrective Tax



Pollution Permit



Public Goods and Common Resources

Economists distinguish between types of goods based on two characteristics, excludability and rivalry.

Excludability – the property of a good whereby a person can be prevented from using it

Rivalry in Consumption – the property fo a good whereby one person's use diminishes other people's use

Excludable?	Rival in Consumption? Yes	Rival in Consumption? No
Yes	Private Goods	Natural Monopolies
No	Common Resources	Public Goods

Examples:

Private Goods – *ice-cream cones, congested toll roads, national defense, basic research, fighting poverty*
Natural Monopolies – *fire protection, cable TV, uncongested toll roads*
Common Resources – *fish in the ocean, clean air and water, congested nontoll roads*
Public Goods – *tornado siren, FM radio signal national defense, uncongested nontoll roads*

What type of good is a satellite radio?

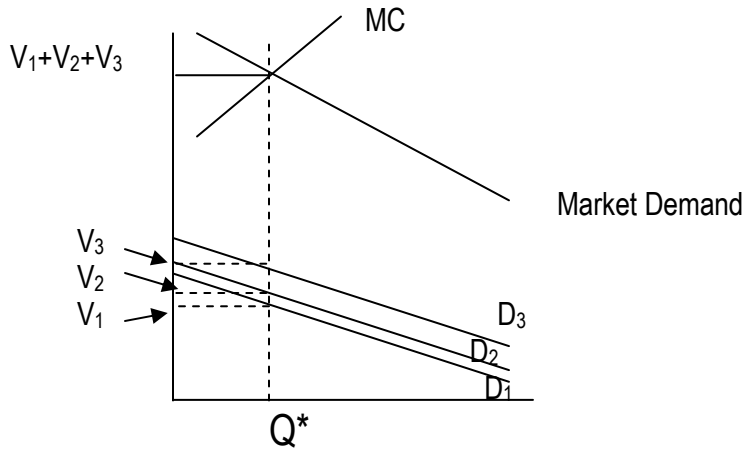
The Efficient Provision of a Public Good

In the first portion of this course, we saw that the market demand curve for a private good is the horizontal sum of the individual demand curves. At each price, each individual's quantity demanded is summed.

Because a public good is nonrivalrous and nonexcludable, to derive a market demand curve for a public good the individual demand curves must be summed vertically rather than horizontally (as with private goods).

Assume that there are three individuals with demand curves D1, D2 and D3. The market willingness to pay at output level Q*, then, is V1 + V2 + V3. Summing the marginal willingness to pay at each point yields the market demand curve.

Market Demand for a Public Good



No one consumer is willing to pay enough to provide the efficient level of the good, but if they can agree to all chip in, they could purchase the efficient level of provision, Q*. Why might this be hard to achieve?

The Free-Rider Problem – A problem with all non-excludable goods; when a person receives the benefit of a good but avoids paying for it.

Tragedy of the Commons – A problem with common resources; a parable that illustrates why common resources get used more than is desirable from the standpoint of society as a whole.

***Common resources are prone to both the free-rider problem and the tragedy of the commons, however public goods are only prone to the free-rider problem. Why?

Solutions to the free-rider problem:

Public -- taxes and government provision
Private -- charities, or make goods excludable

- lighthouses

Solutions to the tragedy of the commons:

Public -- create property rights (elephants in Botswana)
Private -- make goods excludable (road pricing in London)

Many types of organizations need to conduct CBA, but it is particularly difficult to determine the benefit of a public good, due to:

- underreporting benefit (exaggerating cost)
- exaggerating benefit

When governments or charities are considering whether or not to provide public goods, they often find that the costs are easy to calculate but the benefits are not. For example, how much is a life worth?

Monopoly

Greek word – one seller

A firm is a monopoly if it is the sole seller of its product and the product does not have any close substitutes.

The main reason for a monopoly is *barriers to entry*

Possible reasons for barriers:

1. Key resource is owned by a single firm

   e.g. DeBeers consolidated mines. Controls about 80% of diamond production

2. Government created monopolies

   e.g. Govt. gives one person in firm exclusive right over good
   (patent and copyright laws) patent allows exclusive rights for 20 years;

   Pro – encourages research and development
   Con – higher prices for consumers

   e.g. License and entry restrictions certain firms license broadcast TV, radio, electricity, cable

The Copyright Term Extension Act (CTEA) of 1998 –or pejoratively the Mickey Mouse Protection Act – extended copyright terms in the United States by 20 years. Before the Act (under the Copyright Act of 1976), copyright would last for the life of the author plus 50 years, or 75 years for a work of corporate authorship; the Act extended these terms to life of the author plus 70 years and for works of corporate authorship to 120 years after creation or 95 years after publication, whichever endpoint is earlier. (www.wikipedia.com)

3. Natural monopoly – when a single firm can supply a good or service to an entire market at the lowest cost

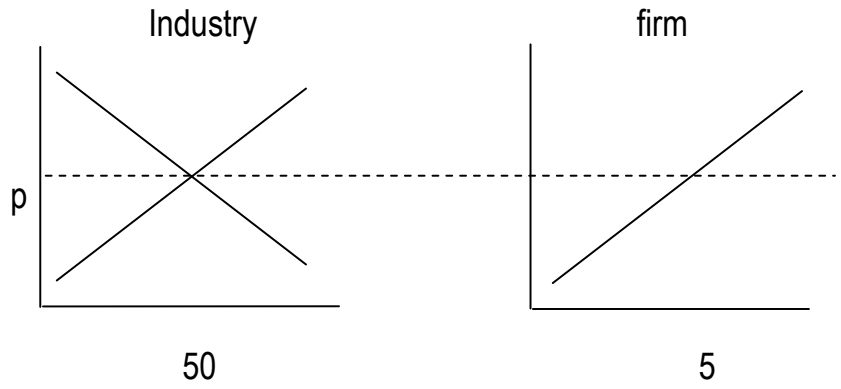
   e.g. the transmission of electricity or distribution of water

Fixed costs are very high As production increases, AFC will decrease (economies of scale)

Monopolies versus competition

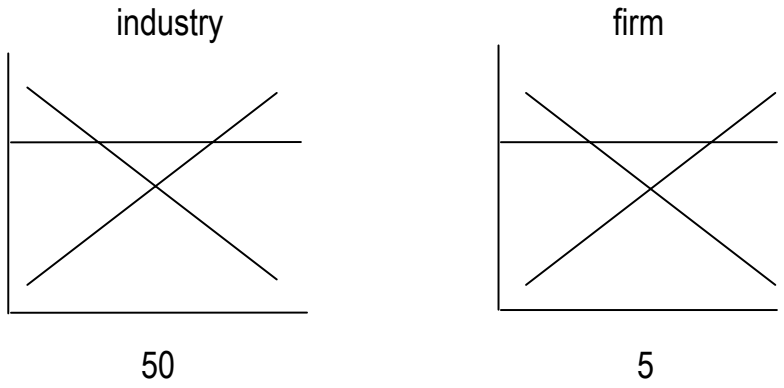
A competitive firm is a *price taker* A monopolist is a *price maker*

Competitive firm – takes p



For industry, demand is downward sloping. For a firm, the demand curve is perfectly elastic.

Monopoly → the market demand curve *is* the monopolist firm's demand curve



If a monopolist is the only seller, why doesn't it simply raise price of product very high?

Because a monopolist is limited by the market demand

The monopolist chooses Q just as a competitive firm does. By adjusting Q, the monopolist can maximize his profit…
…But there are some differences (by producing where MR = MC)

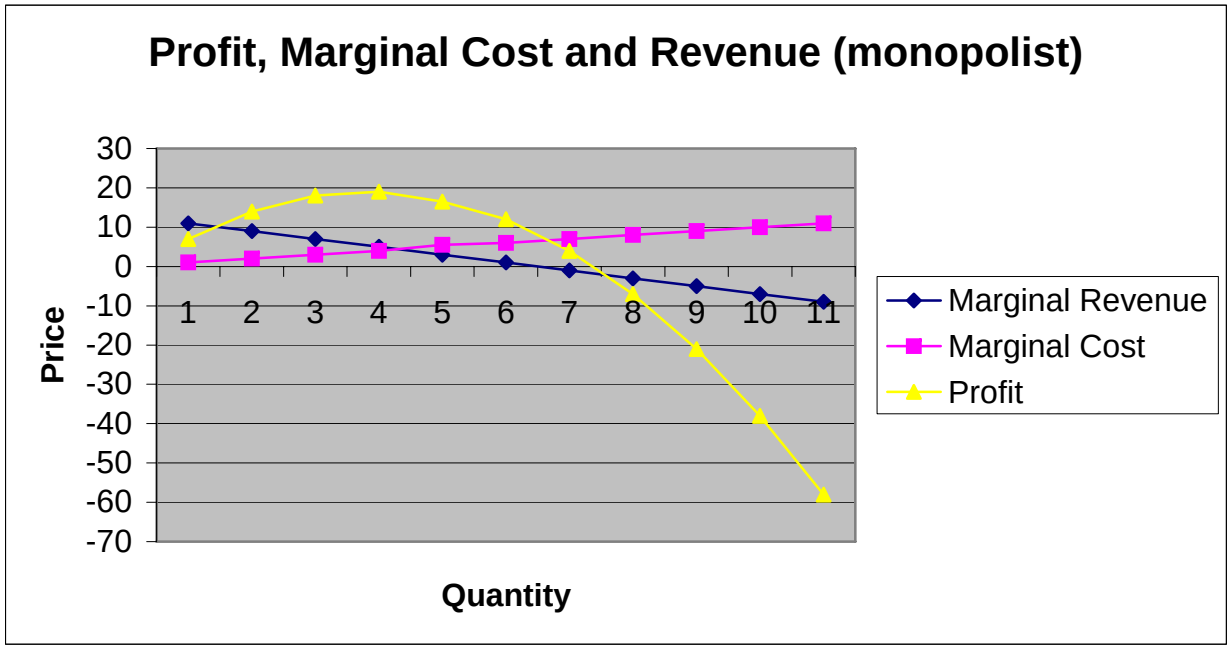
For a competitive firm

quantity	price	TR	TC	MR	MC	Profit
0	6	0	3			
1	6	6	4	6	1	2
2	6	12	6	6	2	6
3	6	18	9	6	3	9
4	6	24	13	6	4	11
5	6	30	18.5	6	5.5	11.5
6	6	36	24	6	6	12
7	6	42	31	6	7	11
8	6	48	39	6	8	9
9	6	54	48	6	9	6
10	6	60	58	6	10	2
11	6	66	69	6	11	-3

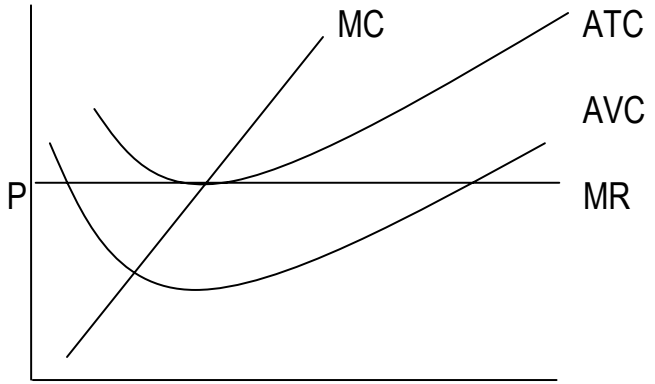
But, the monopolist should still increase quantity up until the point where MR=MC

For a monopolist

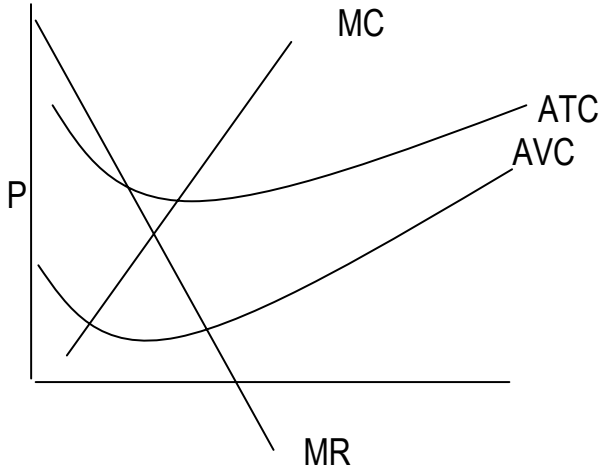
quantity	price	TR	TC	MR	MC	Profit
0	12	0	3			-3
1	11	11	4	11	1	7
2	10	20	6	9	2	14
3	9	27	9	7	3	18
4	8	32	13	5	4	19
5	7	35	18.5	3	5.5	16.5
6	6	36	24	1	6	12
7	5	35	31	-1	7	4
8	4	32	39	-3	8	-7
9	3	27	48	-5	9	-21
10	2	20	58	-7	10	-38
11	1	11	69	-9	11	-58


Profit, Marginal Cost and Revenue (monopolist)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Price
1
2
3
4
5
6
7
8
9
10
11
Quantity
Marginal Revenue
Marginal Cost
Profit

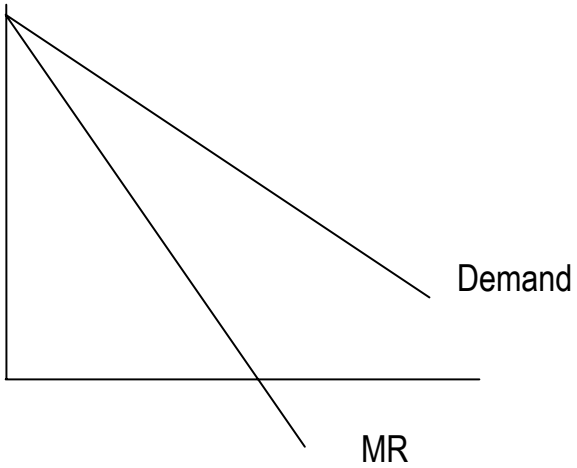
This is what the cost structure and MR looks like for a competitive firm…



…for a monopolist, marginal revenue is different than for a competitive firm.



The following shows the relation between MR and Demand for a monopolist



For all levels of output (except at zero) MR < Price (taken from demand curve)

(note that AR=P…why is this? TR = P x Q → TR/Q = AR = P)

The reason MR<P is that, when Q increases,

1.) the monopolist must lower the price to sell an additional unit
2.) all the previous units are now sold at the lower price

With point 2.) we are making some implicit assumptions, and one is that the monopolist cannot *price discriminate*…more on this later.

When a monopolist increases the amount sold it has two effects

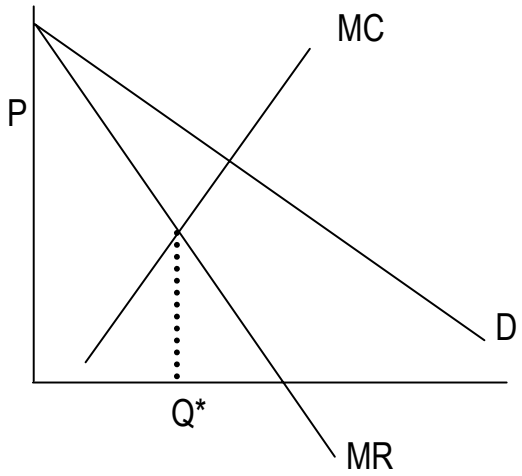
1. Output effect: an increase in Q *ceteris paribus* increases TR
2. Price effect: after an increase in Q the monopolist must decrease P in order to sell the additional output

In a competitive firm → no price effect

Profit maximizing *quantity* is when MC = MR, but for that quantity the monopolist charges a *price* equal to the maximum the market is willing to pay.

1. Chooses Q where MR = MC
2. Chooses P based on demand curve

1.

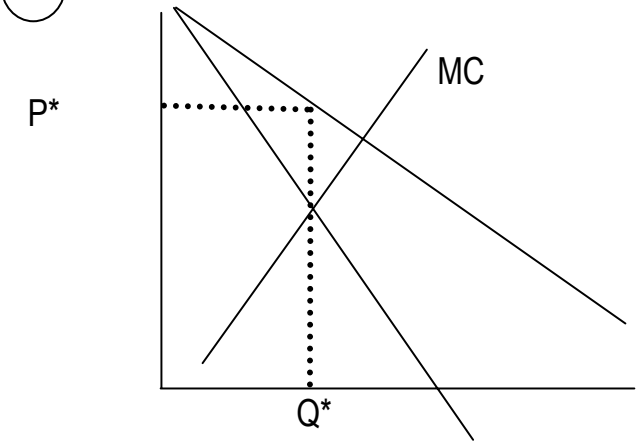


w/ competitive firms, P=MR…now MR depends on Q

This is how profit maximizing quantity is determined.
But how does the monopolist determine the price?
Ask yourself this question:
how much are consumers *willing to pay* for the quantity Q*?

For the Quantity Q*, consumers are willing to pay P*

2.



For each unit it sells, the monopolist firm is receiving a price of P*, but each unit only costs C on average.

Its total revenue is P* times Q* and its total cost is C times Q* → TR=P*xQ*, TC=C*Q*

→ Profit = P*Q* - CQ* = (P* - C)Q*

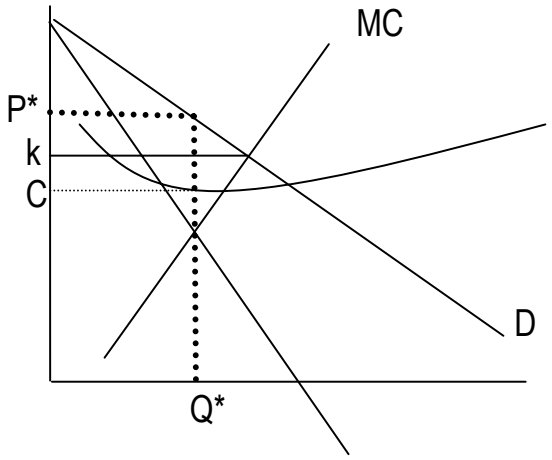
Recall a competitive firm made zero profit

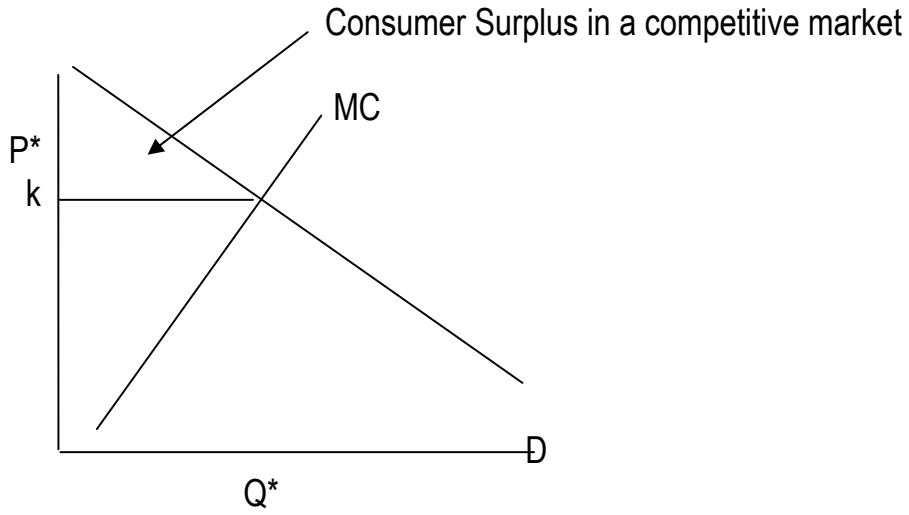
***Important lesson:**

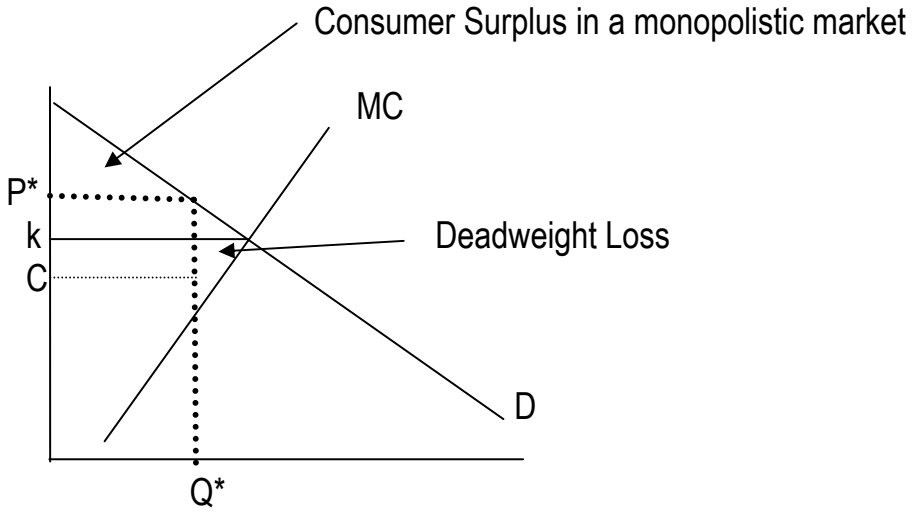
Competitive firms charge P=C, monopolists charge P = what consumers are willing to pay

(or more precisely, what the marginal consumer at Q* is willing to pay)

What are the welfare implications of a monopolist?







Because a monopolist must only charge one price, the firm sets a price higher than would a competitive firm. Some consumers are willing to pay the monopolist more than it would cost the firm to produce one more unit, but the firm doesn't lower its price…if it did, it would have to lower the price for everyone.

Price Discrimination

Practice of charging different prices to different consumers for the identical output

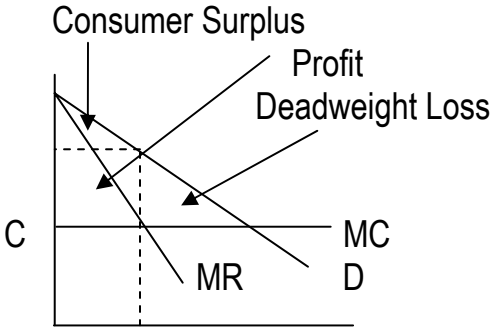
Following conditions must hold for a firm to be able to price discriminate

1.) Firm has to have some market power
2.) At least two classes of customers with different price elasticities of demand. (Higher price to the less elastic)
3.) Must be able to identify each class of customers
4.) Must prevent those who pay the lower price from reselling the product at a higher price (no arbitrage)

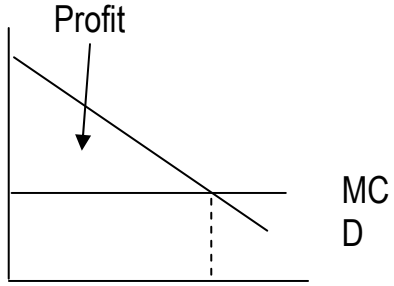
Examples: discount coupons, airline tickets, tickets to sporting events, operas, etc., telephone rates, quantity discounts (doughnuts), and hard cover vs. soft cover books

If a monopolist can charge everyone his or her willingness to pay (that is, perfectly price discriminate) the deadweight loss will disappear.

Monopolist with a single price



Monopolist w/ perfect price discrimination



(Here, MC=ATC…this would arise if there are no fixed costs)

Public Policies Towards Monopolies

1.) Trying to make monopolies more competitive

Anti-trust laws

1. Prevents mergers
2. Breaks up companies thought to be monopolies
3. prevents companies from coordinating activities to make the markets less competitive

In 1996 Boeing proposed merger with McDonnell Douglas, but government did not oppose because fixed costs are very high

Then…output increases, AC decreases

Cost reducing benefits from mergers are called *synergies…*these can be either economies of scale or scope

Govt. must be able to distinguish between good and bad mergers

2.) Regulation

Govt. regulates behavior of monopolies
Usually in the case of natural monopolies

3.) Public ownership

When govt. itself owns the firm (postal service, city bus lines)

4.) Doing nothing

Sometimes the imperfections due to political failure are greater than imperfection when the market deviates from the efficient outcome

Oligopolies

Sometimes there is not a single seller, but a few. Economists characterize industries by their four firm concentration ratio, which is the output of the largest four firms, divided by total output in the industry.

Most industries have a concentration ratio below .5, but some industries (breakfast cereals, tennis balls) have ratios between .7-.9.

Let's look at an example:

Quantity (in gallons)	Price	Total Revenue (and Total Profit)
0	$120	$ 0
10	110	1,100
20	100	2,000
30	90	2,700
40	80	3,200
50	70	3,500
60	60	3,600
70	50	3,500
80	40	3,200
90	30	2,700
100	20	2,000
110	10	1,100
120	0	0

Assume TC=$0 for all levels of output (FC = MC = 0). Then the competitive output would be 120 gallons, and the monopoly output would be 60 gallons

If two producers (a duopoly) could agree (**collude**) to produce 30 gallons each, they could bring about the monopoly outcome. They would then each get $1,800 profit, which is much better than the competitive profit of $0. However, if each were producing 30 gallons, both have the incentive to produce more.

If one is producing 30 gallons and the other produces 40 gallons, the price will be $50, and the profit of the person producing 40 gallons will be $2000.

$2000 > $1800, and this extra profit is the incentive to deviate from the collusive agreement.

Say each produces 40 gallons…then the price will be $40, each will make $1,600 profit. Does either party have an incentive to deviate now? If one party increases output from 40 to 50 gallons, price will fall to $30…this would mean that total profit would equal 50x$30=$1,500, which is less than $1,600.

Thus there is no incentive to deviate for either party from producing 40 gallons each, and **this outcome would result even if the parties did not collude.**

The example above can also be analyzed with game theory. A fundamental concept of game theory is:

Nash equilibrium – situation in which economic actors interacting with one another each choose their best strategy given the strategies that all the other actors have chosen.

		Firm 2: 30	Firm 2: 40
Firm 1	30	1800, 1800	1500, 2000
	40	2000, 1500	1600, 1600

John Nash wrote his dissertation in 1950, but the basic idea behind the Nash equilibrium had been around since Cournot first discussed duopoly in the nineteenth century. The Cournot model shows how two firms behave when the firms' strategic decision is over quantity. Bertrand came up with another equilibrium where firms' strategic decision is over price.

To analyze the situation of oligopoly and many other *strategic* situations, we can use the tools of game theory. A game consists of four components: players, rules, strategies and payoffs. We can represent players, rules and strategies:

		Player 2: Left	Player 2: Right
Player 1	Up	state 1	state 2
	Down	state 3	state 4

If player 1 chooses Up and Player 2 chooses Left, state 1 occurs

If player 1 chooses Up and Player 2 chooses Right, state 2 occurs

If player 1 chooses Down and Player 2 chooses Left, state 3 occurs

If player 1 chooses Down and Player 2 chooses Right, state 4 occurs

There are two players, and each player can take two actions. Player 1 can move either up or down, and player two can move either left or right. Depending on what move each player takes, four possible states could occur.

In state 1, Player 1 receives payoff amount x1 and Player 2 receives payoff amount y1
In state 2, Player 1 receives payoff amount x2 and Player 2 receives payoff amount y2
In state 3, Player 1 receives payoff amount x3 and Player 2 receives payoff amount y3
In state 4, Player 1 receives payoff amount x4 and Player 2 receives payoff amount y4

Therefore, we can represent the game like this:

		Player 2: Left	Player 2: Right
Player 1	Up	x1, y1	x2, y2
	Down	x3, y3	x4, y4

x1 is the payoff to player 1, and y1 is the payoff to player 2 in state 1, the state of the world when player 1 plays up and player 2 plays left.

With the above describes the general setup, we can analyze many different situations in life with these representations of games by inserting numbers for the payoffs (x1, y1, x2, y2, etc.), giving the players actual names, and making their moves (Left, Up, etc) have actual meaning.

OPEC is a famous cartel, which has eleven member countries (Algeria, Angola, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, UAE, and Venezuela). In the problem below, we will analyze a fictional situation with only two countries.

		Iraq: High	Iraq: Low
Iran	High	40, 40	60, 30
	Low	30, 60	50, 50

If Iran produces high, it is better for Iraq to produce high (40 > 30), and if Iran produces low, it is better for Iraq to produce high (60 > 50).

Dominant Strategy: A strategy that is best for a player in a game regardless of the strategies chosen by the other players

Thus High is a dominant strategy for Iraq. You can check that this is also true for Iran.
Producing High is dominant strategy for both, and (High, High) is a Nash equilibrium.

The monopoly outcome (which can only come about with a low level of quantity) could be attained if both countries agree to produce only half of the monopoly output; say this occurs when both produce Low. The outcome (Low, Low) maximizes their profits.

Splitting the monopoly output is jointly rational for the cartel, but each member has an incentive to cheat, and producing only half the monopoly output becomes individually irrational. That is, cooperation is individually irrational.

"It does not follow, because all of the individuals in a group would gain if they achieved their group objective, that they would act to achieve that objective, even if they were all rational and self-interested."

M. Olson (1965) p.2

If firms can cooperate, however, then they can receive higher payoff than when both produce High, but the game Iran/Iraq game above illustrates why it is hard to cooperate. However, sometimes groups can cooperate.

Quote from Adam Smith's *The Wealth of Nations* (1776).

"People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices."

What Adam Smith is talking about is explicit collusion, a practice that is illegal today. However, sometimes collusion is tacit, or implicit. Cartels can sometimes be sustained by the following rule:

If 1 party breaks agreement, the other does the same forever

The mechanisms that enable cooperation in dynamic (more than one time period) models are punishment and reward. If both parties cooperate in time period 1, then they reward each other by cooperating in time period 2…but if either cheats in time period 1, then the other punishes the cheating party by playing the single stage Nash for as long as it takes to convince the other party that cheating is not worthwhile. The length of punishment is determined by how much the other party values current payoffs versus future payoffs.

A tit-for-tat strategy may also enable cooperation. Reciprocity is one of those things that keeps the wheels of society turning. (You scratch my back and I'll scratch yours.) To model reciprocity we have to introduce time into the model, which happens in more advanced microeconomics classes.

It is impossible for reciprocity to emerge in a one-shot game, because Eve cannot threaten to stop scratching Adam's back if he stops scratching hers without time entering the picture.

-- Ken Binmore

Public Policy Towards Oligopoly

Sherman Act makes it illegal to form a contract to keep prices high or to restrict output
(before this act, the courts simply wouldn't enforce contracts to fix prices)

Clayton Act provides incentives to private parties to bring lawsuits against price-fixing companies.

Therefore, these laws not only prevent companies from merging to monopoly, but they also prevent companies from colluding.

In general, these laws (and the departments charged with enforcing these laws) try to limit "anti-competitive" behavior. But, it is sometimes difficult to determine which behaviors are really anti-competitive.

For example, resale price maintenance (RPM) prevents retailers from competing on price, and so the courts have often viewed RPM as a violation of antitrust laws. But retailers that provide product demonstrations and knowledgeable sales representatives provide public goods. These retailers also incur a cost in providing product demonstrations. Therefore, a retail store that doesn't provide these services can cut the price, and undercut retailers that do provide these services. RPM can be used by manufacturers to ensure that retailers don't free-ride on each other's services.

Predatory pricing is another practice often called anti-competitive. The argument is very similar to dumping.

Tying is where firms sell two of their products together. Microsoft did this and the DOJ brought a lawsuit against them.

Another example: Common Pool Resources

		Chevron: High	Chevron: Low
Exxon	High	4, 4	6, 3
	Low	3, 6	5, 5

Fool-proof method of solving for Nash Equilibrium:

Start in the lower right box (state 4). Ask yourself, "Does Exxon have an incentive to deviate?"

This means, does Exxon have an incentive to stop playing Low and play instead High, if Chevron is playing Low?

We must compare the payoff Exxon gets from playing Low with what it would get if playing High. It turns out he gets 5 in the first case and 6 in the second, so yes, he has an incentive to deviate. (note: this is holding Chevron 's move – Low – constant.)

Therefore, Low, Low (state 4) cannot be a Nash equilibrium.

Move on to State 3 (the lower left box)

"Does Exxon have an incentive to deviate in State 3?" Yes, b/c 4>3. So Low, High (state 3) cannot be a Nash equilibrium.

Move on to State 2 (upper right box)

Does Exxon have an incentive to deviate? No! 5<6. Does this mean we've found a Nash Equilibrium?

No again. We need to make sure that neither player has an incentive to deviate. So, before concluding that there is no Nash equilibrium in State 2, we must ask if Chevron has an incentive to deviate. It turns out he does, b/c 4>3.

Finally, we must determine whether state 1 is a Nash equilibrium. Does Exxon have an incentive to deviate? No, b/c 4>3. Does Chevron have an incentive to deviate? No again, b/c 4>3.

Neither player has an incentive to deviate, and so we've determined that there is a Nash equilibrium in state 1, where both players play High.

Here's another game, loosely based on a scene from Ron Howard's *A Beautiful Mind*

Each player can ask one girl to dance. Bill can ask either the Blonde or Brunette 1, and John can ask either the Blonde or Brunette2. A girl will dance if asked by one of them, but If both ask the same girl to dance she will not dance with them, because in this case they will "block each other's play" (to use the term from the movie). Can you find a Nash equilibrium (or equilibriums)?

		John: Blonde	John: Brunette 2
Bill	Blonde	0, 0	2, 1
	Brunette 1	1, 2	1, 1

Notice the Nash equilibriums are not the same as the one proposed in the movie.

In the final part of this lecture, we will consider one simple but interesting and intuitive model, Hotelling's Beach Model, a model of locational choice.

Assumptions:

1. people definitely buy ice cream and are uniformly (evenly) distributed on a beach that is one mile long.
2. there are two ice cream vendors that *must* charge $1 for an ice cream cone. They sell the same product, so the only way they can compete is by strategically locating their carts. Their carts are mobile for the whole day
3. people buy ice cream from whichever vendor is closer.

Question – where will the two vendors decide to locate?

The Answer — ???

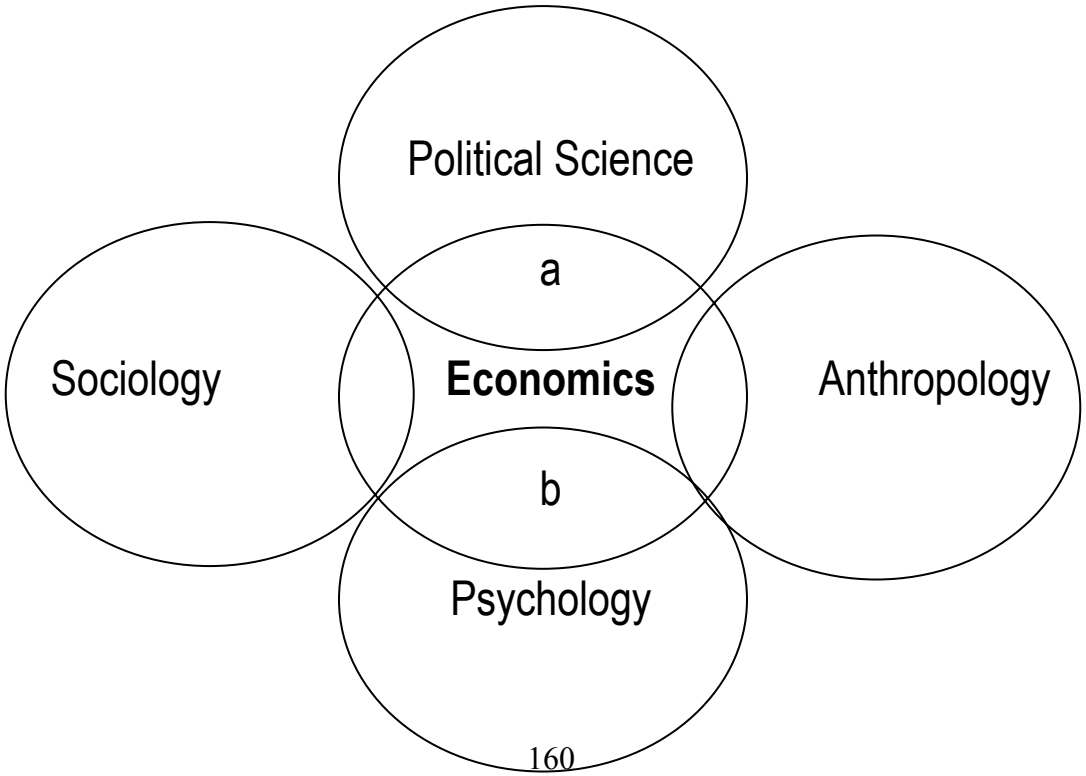
(It is a Nash equilibrium if no one has an incentive to deviate.)

Hotelling's Beach Model also has an application to politics: rather than ice cream vendors on the beach maneuvering for customers, imagine the vendors are politicians jockeying for votes. The beach is now the left-right political spectrum. Politicians themselves don't have a political ideology; they will move to whichever position maximizes their vote share. The same result (both politicians in the middle of the "beach") obtains, and this result is known as the median-voter model. It is a fundamental result of the field of economics known as Public Choice, (a.k.a. Political Economy).

Frontiers of Microeconomics:

I. Political Economy (located in position *a* in the figure below)
II. Information Economics
III. Behavioral Economics (located in position *b* in the figure below)

Much of what goes on in current economic research can be considered interdisciplinary (e.g. political economy is at the intersection of political science and economics, whereas behavioral economics is at the intersection of psychology and economics). Information economics may be less interdisciplinary, but the field of game theory has allowed this branch of economics to advance, and game theory is interdisciplinary in so far as both mathematicians and economists practice it.



Area a -- Political Economy (or Public Choice)

- Median Voter Theorem

Hotelling's beach model demonstrates the logic behind this result: if two political parties are each trying to maximize their chance of election, they will both move their positions toward the median voter. This implies that minority preferences (and their intensity) won't be taken into account, because it is only the preferences of the median voter that matters.

- Arrow's Impossibility Theorem

Kenneth Arrow considered four properties that society thinks voting systems should have: unanimity, transitivity, independence of irrelevant alternatives and non-dictatorial. It turns out that every voting system violates at least one of these properties. This suggests that democratic governance is inherently an imperfect institution.

- Condorcet's Voting Paradox

Marquis de Condorcet discovered that democratic outcomes do not always obey the property of transitivity. This implies that "society's preferences" are not always rational. Another implication is that the order of voting is important; that is, the agenda setter has the ability to influence the outcomes of elections.

Problem:

Three friends – Harold, Bill and Masao – are deciding how they will spend the Saturday evening. They all agree that they should do one of three things: go to a movie, go to a concert, or go out to dinner. They also agree that they will have two pairwise votes to determine how to spend their evening, with the majority determining the outcome on each vote. The first, second, and third choices for each person are as indicated in the table below:

	Harold	**Bill**	**Masao**
First Choice	Dinner	Concert	Movie
Second Choice	Concert	Movie	Dinner
Third Choice	Movie	Dinner	Concert

1. If (1) the first vote pits "dinner" against "movie" and (2) the second vote pits "concert" against the winner of the first vote, what is the outcome?

2. If (1) the first vote pits "dinner" against "concert" and (2) the second vote pits "movie" against the winner of the first vote, what is the outcome?

Quick Quiz A public school district is voting on the school budget and the resulting student-teacher ratio. A poll finds that 35 percent of the voters want a ratio of 9:1, 25 percent want a ratio of 10:1, and 40 percent want a ratio of 12:1. What outcome would you expect the district to end up with?

Information Economics

Many exchanges occur between parties where one party has more information than the other, or there is an *information asymmetry*. For example,

- A worker (the agent) knows more than his boss (the principal) about how hard he works.
- A seller of a used car knows more about its quality than a potential buyer.

The problem in the first example (principal/agent) is one of **hidden action**. The problem in the second example is one of **hidden information** (or hidden characteristic).

Hidden action → moral hazard

Hidden information → adverse selection

Other Examples of Moral Hazard

- Homeowner fails to purchase a smoke detector, because he knows the cost of rebuilding his house will be borne by the insurance company
- Some families build in places that are prone to hurricanes, believing that the federal government will bail them out
- Managers at Fannie Mae and Freddie Mac made risky investments, believing that the government would bail them out if they got in trouble…they were right (to an extent)

Other Examples of Adverse Selection

- Labor market (is the employee competent and hard-working?)
- Financial market (is the applicant likely to default?)
- Health insurance market (is the applicant health-conscience?)

Coping with…

…Moral Hazard:

- A principal may try to limit the agent's moral hazard by *MONITORING*, for example:
    i. The parents of an infant secretly place video cameras in their house before the baby-sitter arrives.
    ii. An employer examines his workers' output on a daily basis

- *Delayed payment* (bonus, in the case of employee)

…Adverse Selection

- *Signaling* – When the informed party takes actions to credibly reveal his private information

    e.g. signaling theory of education versus human capital theory of education

- *Screening* – When the uninformed party takes actions to induce the informed party to reveal private information

    e.g. charging different deductibles may induce the high-risk people to take the low deductible policy

- *Delayed payment* (money back guarantee)

Case Study: Corporate Governance

Legal Aspects of Corporations:

The defining feature of a corporation is its legal independence from the people who create it. If a corporation fails, shareholders only stand to lose their investment, and employees will lose their jobs, but neither will be liable for debts that remain owing to the corporation's creditors. This rule is called limited liability*

Economic Aspects of Public Corporations:

A public company usually refers to a company that is permitted to offer its registered securities (stocks, bonds, etc.) for sale to the general public, typically through a stock exchange* This **leads to the separation of ownership and control.**

In this case, the managers of the corporation are the agents or the shareholders (the principals)
Do you think moral hazard or adverse selection is a bigger problem with the separation of ownership and control?

Sarbanes-Oxley was passed in 2002. It strengthened corporate accounting controls (among other things). Opponents of the bill claim that it has introduced an overly complex and regulatory environment into U.S. financial markets.*
*(http://wikipedia.com)

Case Study: Health Insurance

Health insurance works like this: a group of people make regular payments, or premiums, and then those members of the group who suffer a specified bad experience receive payments from this pool. Administrative costs need to be covered, but a fundamental law of insurance is that: what the average person pays into insurance over time must be very similar to what the average person gets out.

The problem of adverse selection is that if insurance companies cannot tell the difference between thouse with low and high risks, and it charges a premium that averages together the cost of paying out to both types, those with low risks will avoid buying insurance and the company will be left with high-risk only.

Health insurance can only be provided, therefore, if the company can separate out the different types (risk-classes) of consumers. Sometimes insurers *can* screen different customer classes. In this case, insurers may only offer policies to low risk types. This is the problem that more often captures the attention of politicians.

Politicians have proposed requiring all citizens to purchase insurance to solve the adverse selection problem

Problems of both moral hazard also exist in insurance markets. For moral hazard, people with insurance may engage in riskier behavior than they would otherwise.

Quick Quiz A person who buys a life insurance policy pays a certain amount per year and receives for his family a much larger payment in the event of his death. Would you expect buyers of life insurance to have higher or lower death rates than the average person? How might this be an example of moral hazard? Of adverse selection? How might a life insurance company deal with these problems?

Area b: Behavioral Economics

People aren't always rational.

- People are over confident
- People assign too much weight to vivid observations.
- People are reluctant to change their mind

People are inconsistent over time.

- Imagine you are asked the following question:

  Would you prefer (A) to spend 50 minutes doing an unpleasant task right now or (B) to spend 60 minutes doing an unpleasant task tomorrow?

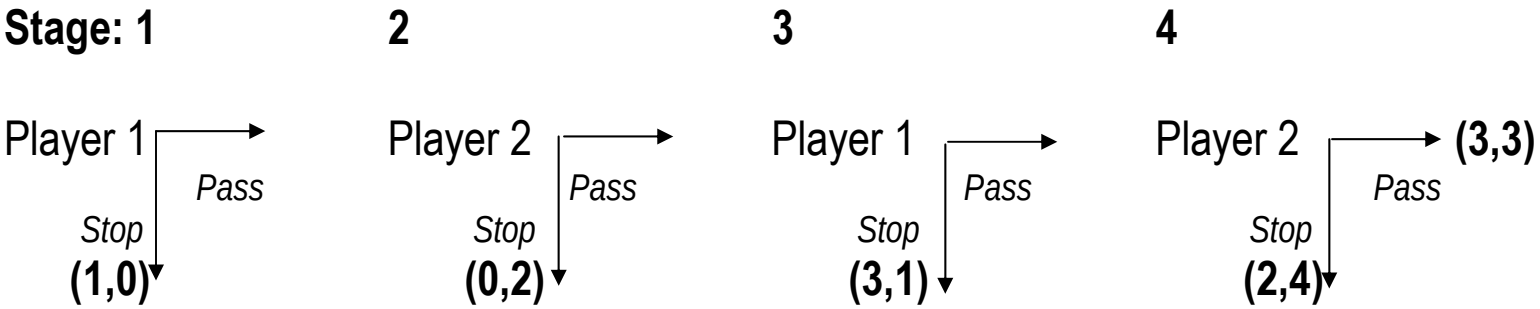
  Would you prefer (A) to spend 50 minutes doing an unpleasant task in 90 days or (B) to spend 60 minutes doing the unpleasant task in 91 days?

People care about fairness.

- The Ultimatum Game

One person proposes a division of a dollar, and the other person accepts or rejects; if the other person accepts, the payoffs are as specified in the first person's proposal.

The Centipede Game



Wikipedia provides a nice explanation of this game and experiments involving real players.
See: http://en.wikipedia.org/wiki/Centipede_game