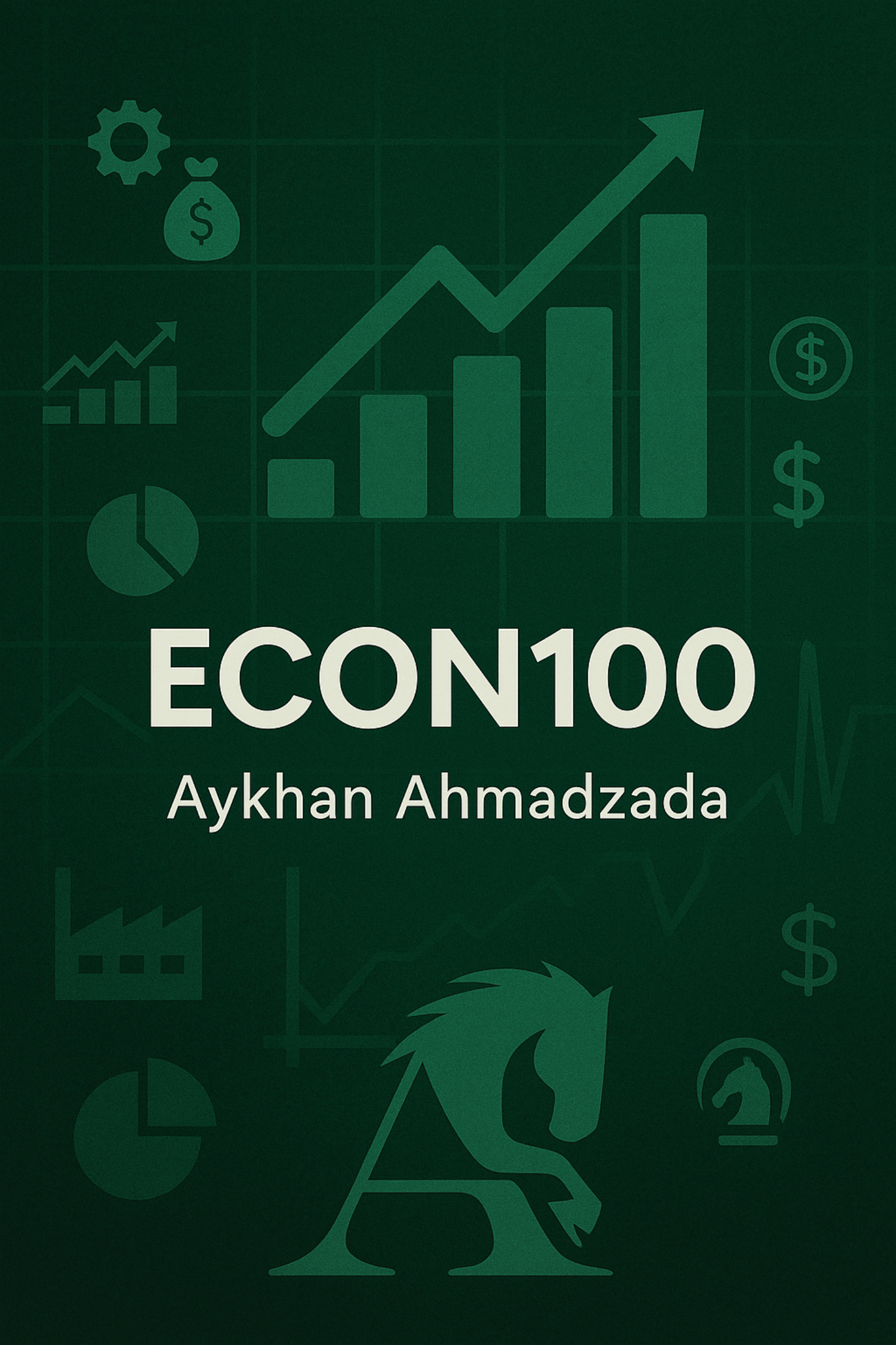


The background is a dark green grid with various economic icons. In the top left, there is a gear and a money bag with a dollar sign. To the left of the main chart is a small bar chart with an upward arrow. The main chart features a bar graph with five bars of increasing height and a line graph with an upward arrow. To the right of the main chart are two dollar signs, one inside a circle and one plain. In the bottom left, there is a pie chart and a factory icon. In the bottom right, there is a chess knight icon and another dollar sign.

ECON100

Aykhan Ahmadzada

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This work is a personal academic compilation created for educational purposes as part of the **ECON100 (PRINCIPLES OF ECONOMICS)** course at **Koç University**.

Compiled in **Istanbul, Turkey**.



ECON100

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- ✿ 2. Opportunity Cost and Willingness to Pay: Understanding Economic Trade-Offs
- ✿ 3. Deciding on the Optimal Level of Activity: Marginal Benefit, Marginal Cost, and Sunk Costs
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- ✿ 23. Productivity, Growth Accounting, and Determinants of Economic Growth



1. Introduction to Economics: Understanding Scarcity and Resources

What is economy?

- Economy is the study of how society manages its scarce resources.

What is scarcity?

- It is the limited nature of society's resources.

There are 10 principles of Economy. Our primary focus is on these 3:

1. People face trade-offs.
2. The cost of something is what you give up to get it.
3. Rational people think at the margin.

Other principles are as follows:

4. People respond to incentives.
5. Trading can make everyone better off

6. Markets are usually a good ways to improve economy activities.
7. Governments can sometimes improve market outcomes.
8. A country's living standards are dependent on its ability to produce and its services.
9. Printing too much money results in increase of prices.
10. There is a trade off between inflation and unemployment. Generally, when one of them decrease the other one increase.

#Principle 1: The Trade-Off Principle

When there is scarcity, then having more of something necessarily means having less of another.

Dictionary definition of trade off is "a situation in which you must choose between or balance two things that are opposite or cannot be had at the same time"

#Principle 2: Opportunity Cost

The cost is something is what you give up to get it.

For example, seeing a movie is not just the cost of the ticket, but also the value of the time you spend in the theater.

#Principle 3: Rationality

Rational People systematically and purposefully do the best that they can do to achieve what they want, to achieve their objectives. They are utility maximizers. They have an understanding of Benefit versus Cost. They make decisions by evaluating cost and benefits of marginal changes (the small additional cost of producing or consuming one more unit), by making incremental adjustments to their plans.

For example, when a manager wants to increase the output, she compares the cost of needed extra labor and materials to the revenue.

Benefit vs Cost

Economists assume that people have well defined goals and tend to choose correct ways to achieve them. They think that people are rational! So that people would follow the simple rule:

Do activity if $B(x) \geq C(x)$, where $B(x)$ is benefit and $C(x)$ is cost.



2. Opportunity Cost and Willingness to Pay: Understanding Economic Trade-Offs

Lets turn back to opportunity cost. Defining opportunity cost is now always straightforward meaning that it is not always the cost of something you give up to get something.

To compare benefit and cost we need to have a common unit of measurement. So, we will assign monetary values to benefit (B) and cost (C).

How to do this? I do not know yet.

Willingness To Pay (WTP)

An important idea: Economist measure benefit of a good or service to a person by the maximum amount of money that the person is **willing to pay** to obtain that good or service. We can also tell that your $WTP = \text{Benefit}$.

Example: Ironing a Shirt

Lets say that you will meet with your friends and you have 20 minutes to get ready, to iron your shirt. Will you iron you shirt? We have to take a look at the benefit (B) and the cost (C). Let x be the action of ironing the shirt. If $B(x) > C(x)$, then we will iron the shirt. Before we conduct a mental auction, lets think of the benefit and the cost of ironing your shirt. The benefit may be looking good in ironed shirt. The cost may be burning your finger, missing ending of a live sporting event, or exerting an effort. Here we cannot compare benefit and cost since they do not have a common measurement unit. So, we will conduct a mental auction, meaning that we will assign monetary values to benefit and cost. At the end, we conclude that we would pay maximum 15 dollars to someone to iron our shirt. This is our benefit, which is also our willingness to pay ($B = 15$, $WTP = 15$). We would also do the ironing only for a minimum of 20 dollars (so, $C = 20$). Here, now we can compare B and C. Since $B(x) < C(x)$, we do not do the ironing.

Opportunity Cost, Defined

The value of the next-best alternative that is forgone (given up) in order to undertake an activity. Even the use of a good that we own is not free. The opportunity cost here is the benefit that we could take it from selling or using for some other purposes. Always ask yourself this question:

"If I do not do this, what is my best-next alternative?"

One more thing to add. The opportunity cost of something can be defined as the net benefit of the alternative.

Question Example

Lets say you have a free ticket to a Eric Clapton concert which you can sell for 35 dollars. Bob Dylan is also performing at the same night and ticket cost to Bob Dylan's concert is 40 dollars. But you are willing to pay 50 dollars for Bob Dylan's concert. There are no other costs to see these two performers. What is the opportunity cost of seeing Clapton?

So, we choose Clapton see and give up our next-best alternate who is Dylan. Net benefit of this alternative is $50 - 40 = 10$ dollars. Give gave up 10 dollars to see Clapton. Additionally, by not selling the ticket to Clapton concert and using it will cost us 35 dollars since this is the amount we could have earned by selling the ticket. As a result, $10 + 35 = 45$ dollars is our opportunity cost of seeing Clapton.

Introduction to Principle 4: People Respond To Incentives

People compare Cost and Benefit to decide to do some action. So, when $B(x)$ is greater than $C(x)$, they will do this action. If the costs and benefits change, rational people will change their behavior. They will reevaluate. Economists capture this point by saying that "people respond to incentives".

#Principle 4: People Respond To Incentives

Incentive is something that motivates people to do something. It induces people to act. Rational people respond to incentives.

Let's give an example. Let's say we increase the cost of apple. Rational people will respond to this incentive. People will eat less apples and possibly buy more pears instead. This is because the cost of buying apples is higher. At the same time, producers will hire more workers to harvest more apples since selling apple will benefit them more. As we can see rational people responded to incentive, to increasing the price of apple.

Another example of this principle. According to Common Agriculture Policy (CAP) in European Union, farmers receive a subsidy by government to sustain agricultural practices. For some farmers these subsidies are big part of their income. Subsidy amount is based on the area of land but not what or how much does a farmer produce in her land. But there is one thing. It is required to clear unwanted vegetation in these lands. As people respond to incentives, farmers do as well. They clear trees from their lands. But, in fact, soil under the tree absorb water 67 time the rate at which soil under grass does. As a result of getting rid of trees, floods cover the land of the farmers. This was the unwanted result of incentives. We saw that monetary incentive can sometimes backfire.



3. Deciding on the Optimal Level of Activity: Marginal Benefit, Marginal Cost, and Sunk Costs

Deciding On The Level Of Activity

Rational people, rational decision makers compare the additional benefits to additional costs.

Marginal Benefit And Marginal Cost

We define **marginal benefit** as the increase in the total benefit from carrying out one additional unit of the activity. We define **marginal cost** as the increase in the total cost from carrying out one additional unit of the activity.

Finding Optimal Level

At the given level, if the marginal level is greater than marginal cost **increase the level** of the activity.

If marginal benefit is lower than marginal cost **decrease the level** of the activity. The optimal level is when marginal benefit (MB) is equal to marginal cost (MC): $MB = MC$.

Sunk Cost

A sunk cost is a cost that cannot be recovered, regardless of future decision or actions. Sunk costs are borne whether or not the action is taken. Sunk costs are expenditures that are irretrievable. So, sunk costs are irrelevant to a decision on whether to take an action.

The Economist as Scientist

Economists play two roles:

1. Scientist
2. Policy Advisor

Economists as scientists employ the scientific method, the dispassionate development and testing of theories about how the world works.

Assumptions & Models

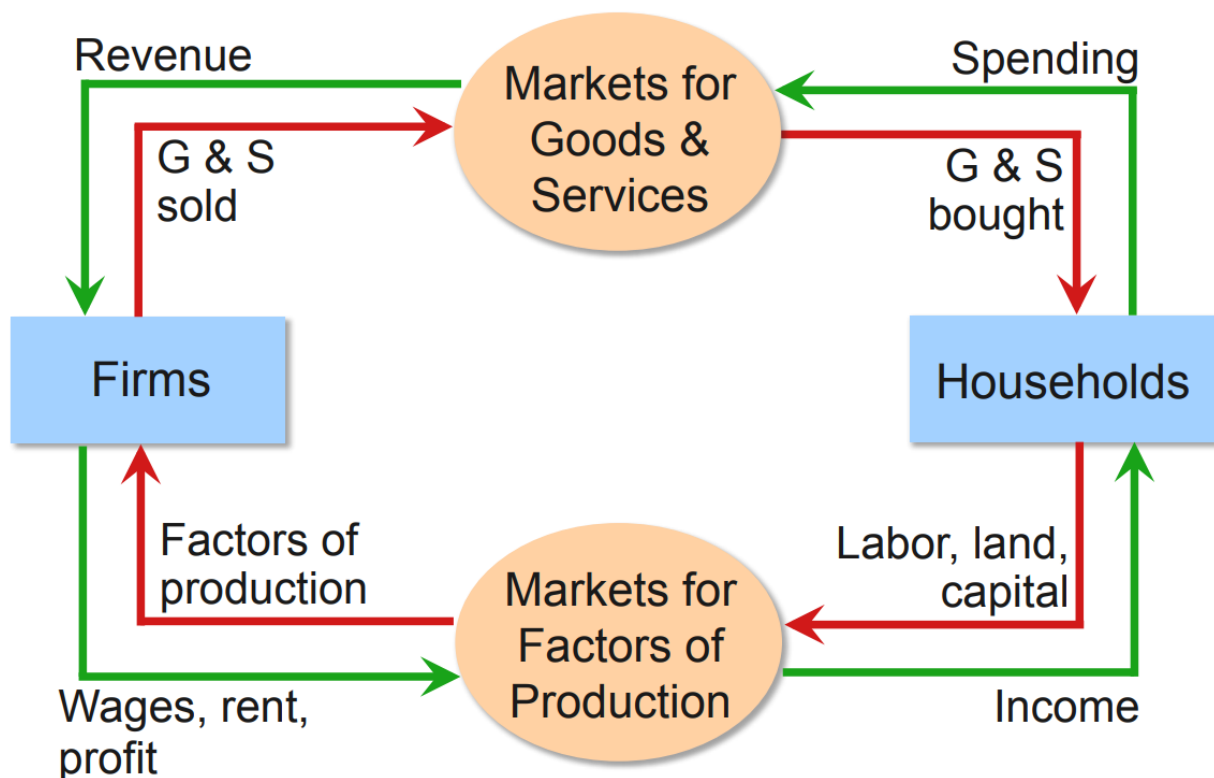
Assumption simplify the complex world, make it easier to understand. For example: To study international trade, assume two countries and two goods.

Model is a highly simplified representation of a more complicated reality. Economists use models to study economic issues.

#Our First Model: The Circular-Flow Diagram

The Circular-Flow Diagram is an economy model visualizing the flow of dollar through households and markets. There are two types of actors here: households and firms. Households act as consumers, buying goods and services, while also supplying factor of productions (essential inputs used in the creation of goods and services) such as labor, land and capital. Firms, on the other hand, produce goods and services, purchasing required factors of productions from households.

FIGURE 1: The Circular-Flow Diagram



There Is No Such Thing Called Free Lunch!

Although we have boundless needs and desires, the resources that are available to us are limited. Therefore, having more of one good necessarily means having less of another ([#Principle 1: The Trade-off Principle](#)). For example, you might consider citizens of Sweden are lucky since they have free health care, while you have to pay for it. But the citizens of Sweden pay higher taxes. Thus, there is trade-off.

#Our Second Model: The Production Possibilities Frontier (PPF)

The Production Possibilities Frontier is a graph that show the combinations of two goods that the economy can possibly produce given the available resources and the available technology.

PPF Example:

- Economy has 50,000 labor hours per month available for production.

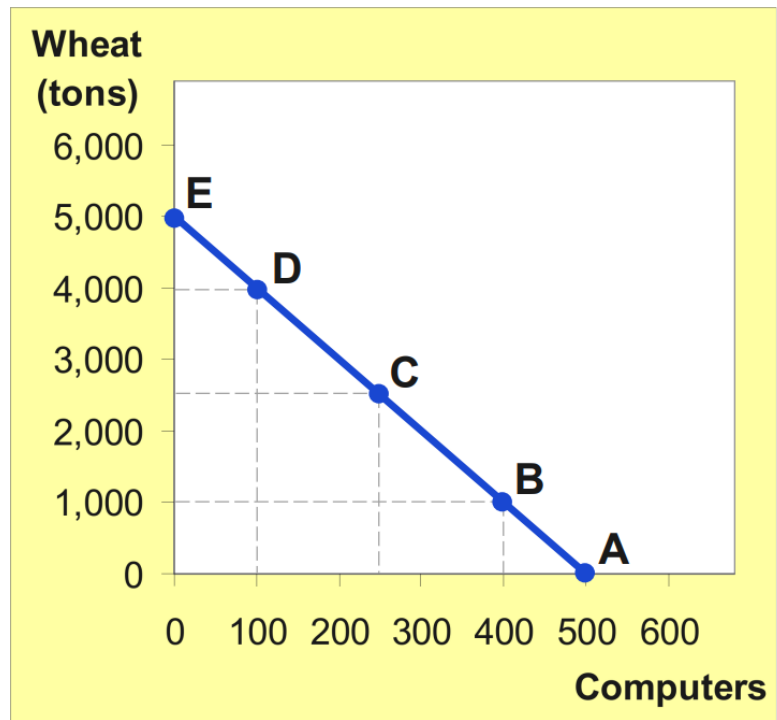
PPF Example

- Producing one computer requires 100 hours labor.
- Producing one ton of wheat requires 10 hours labor.

	Employment of labor hours		Production	
	Computers	Wheat	Computers	Wheat
A	50,000	0	500	0
B	40,000	10,000	400	1,000
C	25,000	25,000	250	2,500
D	10,000	40,000	100	4,000
E	0	50,000	0	5,000

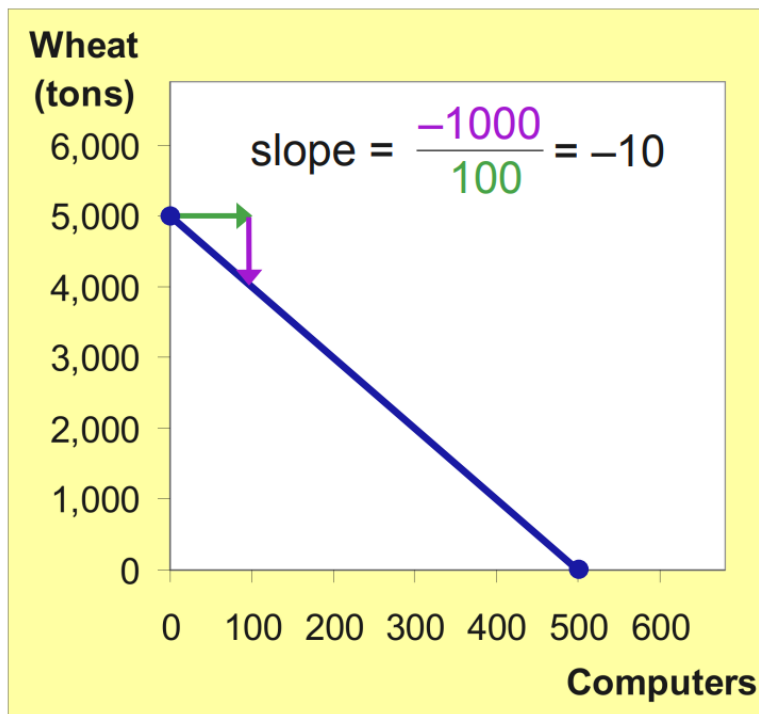
PPF Example

Point on graph	Production	
	Com- puters	Wheat
A	500	0
B	400	1,000
C	250	2,500
D	100	4,000
E	0	5,000



- The slope of the PPF tells you the opportunity cost of one good in terms of the other.

The PPF and Opportunity Cost



The slope of a line equals the “rise over the run,” the amount the line rises when you move to the right by one unit.

Here, the opportunity cost of a computer is 10 tons of wheat.

Why the PPF Might Be Bow-Shaped?

So, PPF is bow-shaped when different workers have different skills, different opportunity costs of producing one good in terms of the other; The PPF would also be bow-shaped when there is some other resource, or mix of resources with varying opportunity costs (e.g., different types of land suited for different uses).

Microeconomics & Macroeconomics

Microeconomics is the study of how households and firms make decisions and how they interact in markets.

Macroeconomics is the study of wide-economy phenomena, such as inflation, unemployment, and economic growth.

These two branches of economics are closely connected, yet distinct—they address different questions.

The Economist As Policy Advisor

As scientists, economists make **positive statements**, which attempt to describe the world as it is. These statements can be tested and validated through facts and data.

As policy advisors, economists make **negative statements**, which attempt to prescribe how the world should be. These statements involve value judgments and cannot be tested.



4. The Production Possibilities Frontier: Trade-Offs, Opportunity Costs, and Economic Growth

The Production Possibility Frontier

PPF is a graph that shows the combinations of goods (and services) that the economy can produce given available resources (labor and physical capital) and existing technology.

PPFs help us to talk about scarcity, trade-offs and opportunity costs. In the PPF graph of an economy we can calculate the opportunity cost at any given point not depending on if the function of graph is linear or non-linear (bow shaped). From the graph we can also see that there is always trade-off. If we produce more of one good, we will have to less of other good. Additionally, the function's line (sometimes bow) show the boundary. Above it we can see the scarcity of economy, that sources are limited. Below the line (or bow) shows all points that would be inefficient for the economy.

The scarcity principle means that countries (very much like people) also face trade offs!

If there are additional resources or improvements in technology we can see outward shifts in graphs, meaning that there is an economic growth.

The shape of PPF depends on opportunity cost. If opportunity cost is constant, shape of PPF will be a line. If opportunity cost is not constant, and changes constantly, it will be bow-shaped.

Summary: The PPF illustrates the concepts of trade-off, opportunity cost, efficiency and inefficiency, unemployment and economic growth. (*The PPF illustrates unemployment when the economy operates inside the curve. This represents inefficient use of resources, meaning not all labor and capital are fully employed. If resources were fully utilized, the economy would be on the PPF, producing at maximum capacity.)

Why Economists Disagree

Economist often give conflicting policy advices. They sometimes disagree about the validity of positive theories about the world. This is because they might have different values and, therefore, different normative views about what policy should try to accomplish. Yet, they may agree on many propositions. For example: "A ceiling on rents reduces the quantity and quality of housing available. (93%)."

#Principle 5: Trading Can Make Everyone Better Off

We can be economically self-sufficient. Or, we can trade with other countries and become economically interdependent.



5. Specialization and Trade: How Comparative Advantage Boosts Consumption

Without trade CONSUMPTION = PRODUCTION!

Specialization and Trade

Why specialize and trade? Because with specialization each person/country will have more goods to consume.

We need to decide on number of things:

1. Production
2. Trade
3. Consumption

There are 2 types of specialization: **complete and partial**. Let's say we have two goods to produce, fish and bread. **Complete specialization** focuses on producing only one good, for example, only fish. **Partial specialization**, on the other hand, produces both goods, but produces one good much more than the other one.

Opportunity Cost & Comparative Advantage

"Gains in trade" are created when individuals specialize in activity which they have a **comparative advantage**. For example, Poorlander has a comparative advantage in bread because its opportunity cost in terms of fish is lower. Likewise, Richlander has a comparative advantage in fish because its opportunity cost in terms of bread is lower. When these two individuals/countries trade, they will have "gains in trade", meaning that each individual/country will be able to produce more sandwich.

Absolute Advantage

There is also something called **absolute advantage**. The individual who can produce one unit/larger of good with a smaller/given quantity of resources has an **absolute advantage** in producing that good.

Adam Smith thought that absolute advantage was key explanation for division of labor, specialization, and gains from trade. He was wrong! It is true that if one person/country has absolute advantage in good X and other person/country has an absolute advantage in good Y, they will both benefit from trading (specialization and trade). But this difference in absolute advantage (that each person/country has an advantage in one good) is not a condition that is necessary for both to benefit. Both person/country can still benefit even when one of them has absolute advantage in both good X and Y. The key is comparative advantage. In simple trading (two goods/two individuals) there will always be gains from trading. It is because each individual will have a comparative advantage in one good. It is impossible for one individual to have comparative advantage in both goods. For any technology one can imagine, there will **always** be gains from trade. This is David Ricardo's contribution, who was often credited with systematizing economics.

Export & Imports

Exports: goods that are produced domestically and sold abroad. To export means to sell domestically produced goods abroad.

Imports: goods that are produced abroad and sold domestically. To import means to buy good produced in other countries.

Note: Absolute advantage is not necessary for comparative advantage!

Summary

- Gains from trade arises from comparative advantage (differences in opportunity cost).
- When each country specializes in the good(s) in which it has comparative advantage, total production in all countries is higher, the world's "economic pie" is bigger, and all countries can gain from trade.
- The same applies to individual producers specializing in different goods and trading with each other.

Economists use the simple idea of rational action based on costs and benefits to build a model that explains how markets work.

This model, the model of supply and demand, is the most basic of the models economists use to explain everything (almost!).

Demand and Supply

Demand and supply are the two words that economists use most often. Supply and demand are forces that make market economies work. Modern economics is all supply, demand and market equilibrium.

#Principle 6: Markets Are Usually a Good Way to Organize Economic Activity

A **market** is a group of buyers and sellers of a particular good or service. The terms demand and supply refer to behavior of people as they interact with each other in markets. Buyers determine *demand*, and sellers determine *supply*.

What is a **perfectly competitive market**? In a perfectly competitive market there are many buyers and many sellers, so that each individual buyer and seller has no effect on price. In a perfectly competitive market all firms produce exactly same goods.

Competition: Perfect and Otherwise

- **Perfect Competition:** All firms produce the exact same product. There are numerous (small) buyers and (small) sellers that none of them can influence the price.
- **Monopoly:** There is only one seller. There is no competition. The word "**monopoly**" comes from Greek words "**monos**" meaning "single", "**polein**" meaning "to sell".

- **Oligopoly:** There are few sellers (few large firms dominate the market). There is not always aggressive competition. The word "**oligopoly**" comes from the Greek words "**oligos**" meaning "few," and "**polein**" meaning "to sell."
 - **Monopolistic Competition:** There are many (small) sellers. There is slightly differentiated products.
-



6. The Law of Demand: How Price Changes Affect Quantity Demanded

The **quantity demanded** on a product is normally dependent on the price of a product. It is also dependent on other determinants such as population size, consumer income, tastes and prices of other products.

People usually think of consumer demand as fixed amounts. For example, when a designer proposes a new computer model, management asks: "What is the market potential of it?". Economists think that such questions are not well posed since there is not a single answer to that question. The market potential, or how many units of something is "required" or "needed", depends on many factors, most importantly on the price it is charged. As an example of relationship between price and demand, let's think of the quantity of beef demanded. If the price of beef is high, its "market potential" will be low. People will find ways to get by without beef, probably by switching to fish and chicken. But if the price of beef is low, its "market potential" will be high, meaning that people will eat more beef. So, there is no one demand figure for the beef, rather there is a different quantity demanded for each possible price, all other influenced being held constant.

Important Definitions: Demand & Quantity Demanded

Quantity Demanded is the quantity of a good that consumers are willing to pay and can afford to buy. **Demand**, on the other hand, is relationship between quantity demanded and its determinants, such as the price of a good.

Law of demand is the claim that quantity demanded of a good falls when the price of it rises, other determinants being constant.

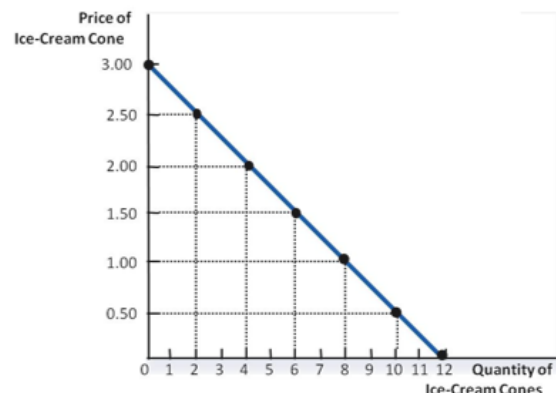
The **determinants of quantity demanded** are the price of the good, consumer income (normal goods, inferior goods), prices of other related goods (substitute goods, complement goods), tastes and preferences of consumers, and expectations about future prices and income.

There are 2 ways of showing the relationship between quantity demanded and price: as a table ("the demand schedule"), as a graph ("the demand curve"). (with other variables (determinants) kept constant).

As a table, "the demand schedule"

Price of Ice-cream cone (in ₪)	Quantity of Ice-cream cones demanded
0.00	12
0.50	10
1.00	8
1.50	6
2.00	4
2.50	2
3.00	0

As a graph, "the demand curve"



The (Glorious) Law of Demand

The Law of Demand is the claim that, other thing being equal if the price of good rises, the quantity demanded falls, and if the price of a good falls, the quantity demanded rises.

People respond to incentives! An increase in the price of the good makes the consumer decrease their quantity demanded.

The Market Demand Curve

The Market Demand Curve is the horizontal sum of the individual demand curves of all buyers.

The market demand curve is the horizontal sum of the individual demand curves

Zeynep's Demand + **Emre's Demand** = **Market Demand**

When the price is 2.00,
Zeynep demands
4 ice-cream cones.

When the price is 2.00,
Emre demands
3 ice-cream cones.

When the price is 2.00,
the market demand is
7 ice-cream cones.

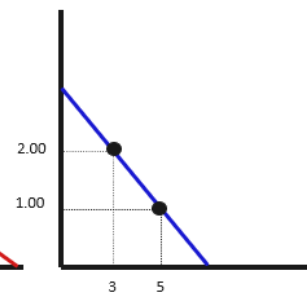
Price of Ice-
Cream Cone



Quantity of Ice-Cream Cones

When the price is 1.00,
Zeynep demands
8 ice-cream cones.

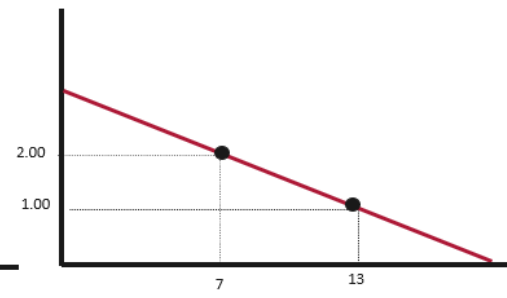
Price of Ice-
Cream Cone



Quantity of Ice-Cream Cones

When the price is 1.00,
Emre demands
5 ice-cream cones.

Price of Ice-
Cream Cone



Quantity of Ice-Cream Cones

When the price is 1.00,
the market demand is
13 ice-cream cones.

Market Demand versus Individual Demand

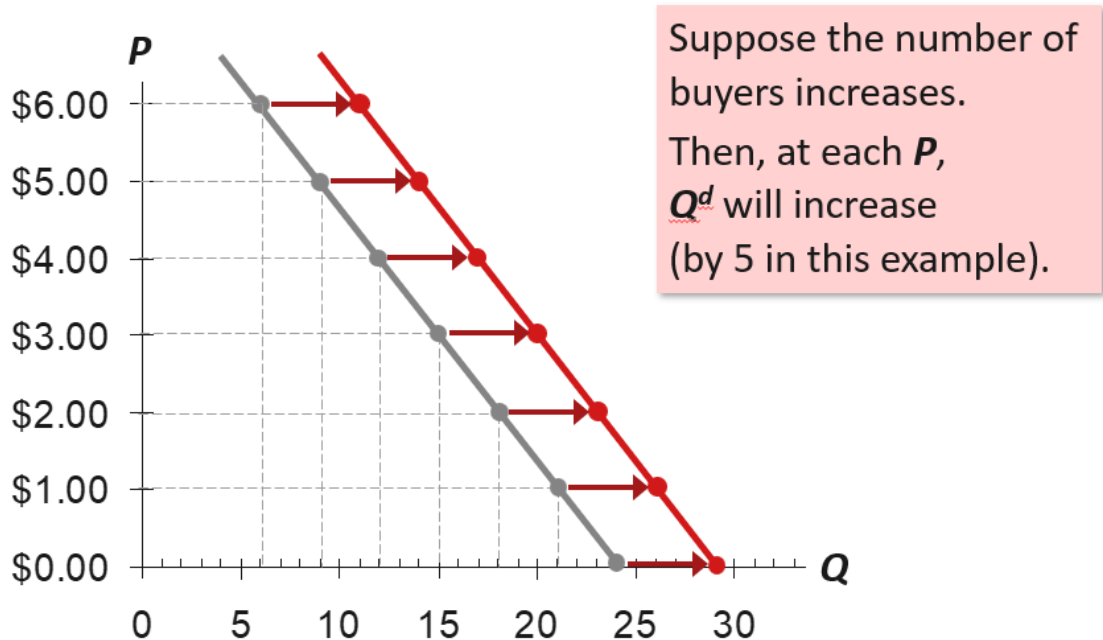
- The quantity demanded in the market is the sum of the quantities demanded by all buyers at each price.
- Suppose Helen and Ken are the only two buyers in the Latte market. (Q^d = quantity demanded)

Price	Helen's Q^d		Ken's Q^d		Market Q^d
\$0.00	16	+	8	=	24
1.00	14	+	7	=	21
2.00	12	+	6	=	18
3.00	10	+	5	=	15
4.00	8	+	4	=	12
5.00	6	+	3	=	9
6.00	4	+	2	=	6

Demand Curve Shifters

The demand curve shows how price affect quantity demanded, other things (non-price determinants) being equal. Changed in non-prices determinants shift the curve to the right.

Demand Curve Shifters: # of Buyers



Normal Goods vs. Inferior Goods (Demand Curve Shifter: Income)

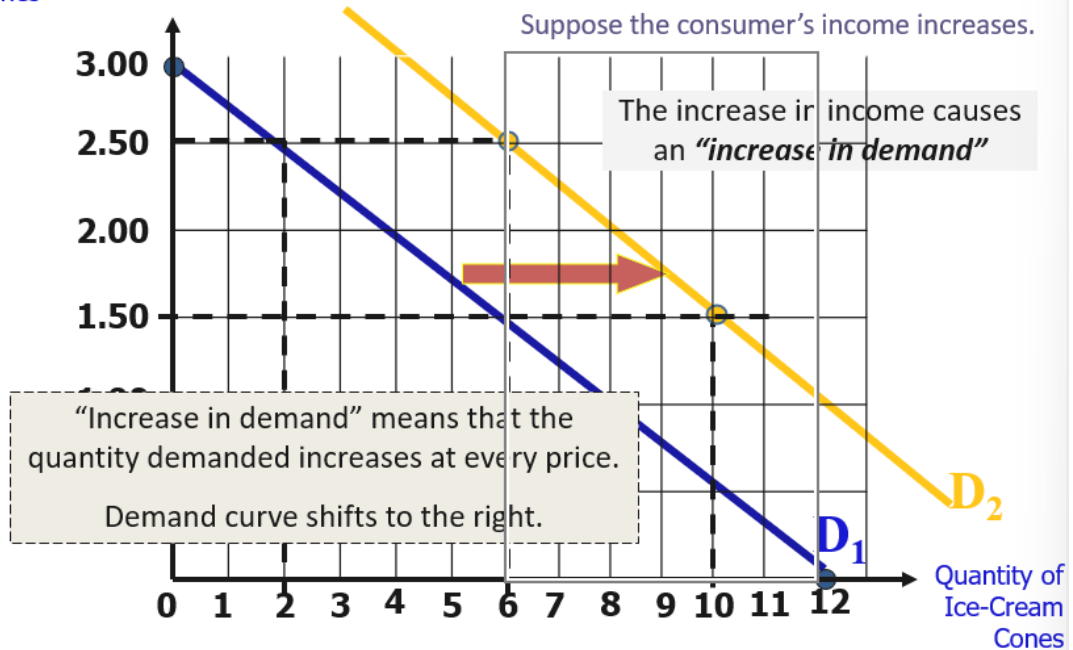
Normal Goods $\Rightarrow$ Positive Income Effects

Normal goods are goods for which, other thing being equal, consumer demands more of it when their income increases. Demand for a normal good increase as income increases, decreases as income decreases.

*Here consumer income is non-price determinant which shifts curve to the right.

A change in consumer's income: Normal Goods

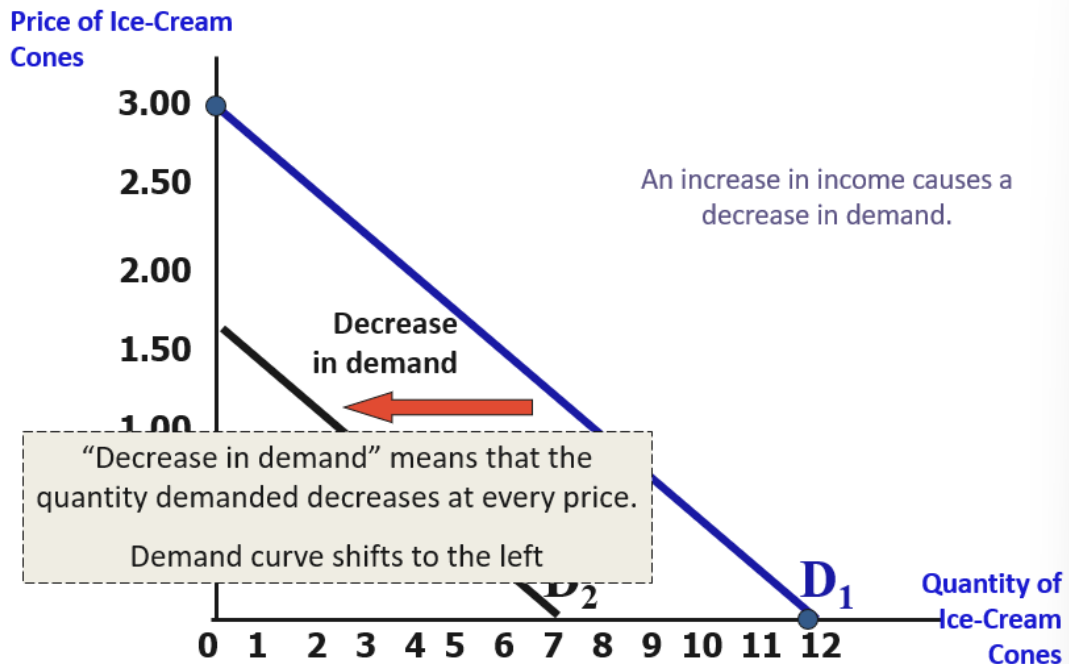
Price of Ice-Cream
Cones



Inferior Goods $\Rightarrow$ Negative Income Effects

Demand for an inferior good decreases as income increases, increases as income decreases.

A change in consumer's income: Inferior Goods



Income Elasticity

Income elasticity = X_D means that a 1% increase in consume income lead to X% change in demand. $X < 0$ means that when income increases demand decreases.

TABLE 4.5
Income Elasticities of Demand for Selected Products*

Good or service	Income elasticity
Automobiles	2.46
Furniture	1.48
Restaurant meals	1.40
Water	1.02
Tobacco	0.64
Gasoline and oil	0.48
Electricity	0.20
Margarine	−0.20
Pork products	−0.20
Public transportation	−0.36

*These estimates come from H. S. Houthakker and Lester Taylor, *Consumer Demand in the United States: Analyses and Projections*, 2d ed., Cambridge, MA: Harvard University Press, 1970; L. Taylor and R. Halvorsen, "Energy Substitution in U.S. Manufacturing," *Review of Economics and Statistics*, November 1977; H. Wold and L. Jureen, *Demand Analysis*, New York: Wiley, 1953.

$$\text{Income elasticity} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

Changes in the Prices of Related Goods

Two related goods can be **complements**, meaning that they are used together, or they can be **substitutes**, meaning that they are alternatives for each other.

Complement Goods

Here are examples of complement goods: cars and gasoline, toothbrush and toothpaste, smart phones and apps, fatty foods and healthcare services, fish and bread. Demand for a good will decrease if the price of complement good increases.

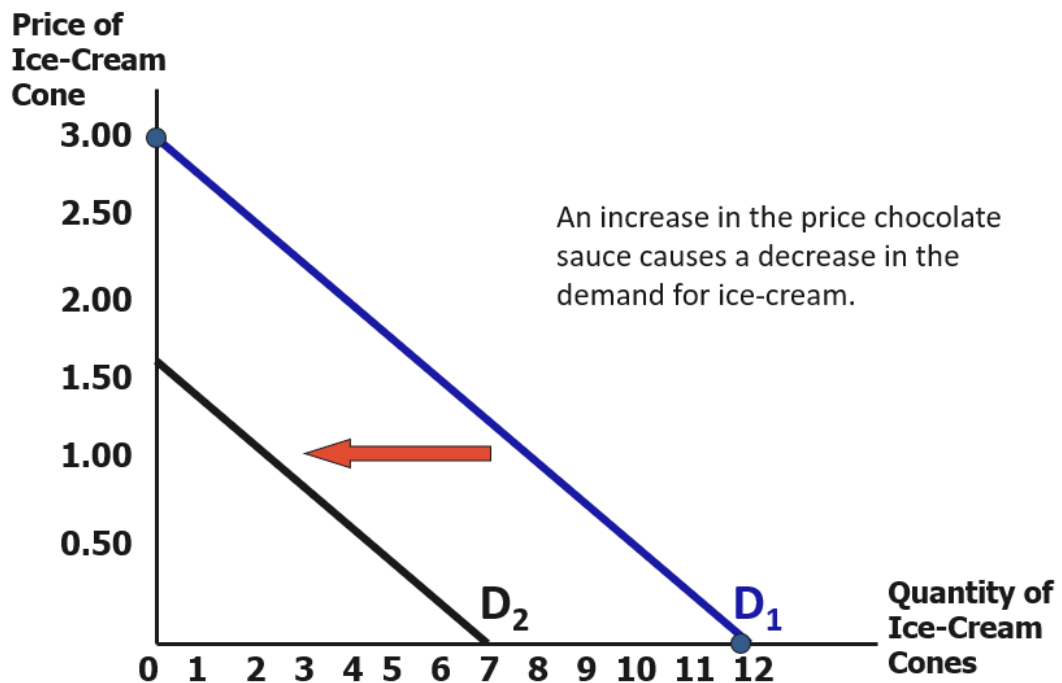
Example:

Demand for (big) cars will decrease if the price of gasoline increases



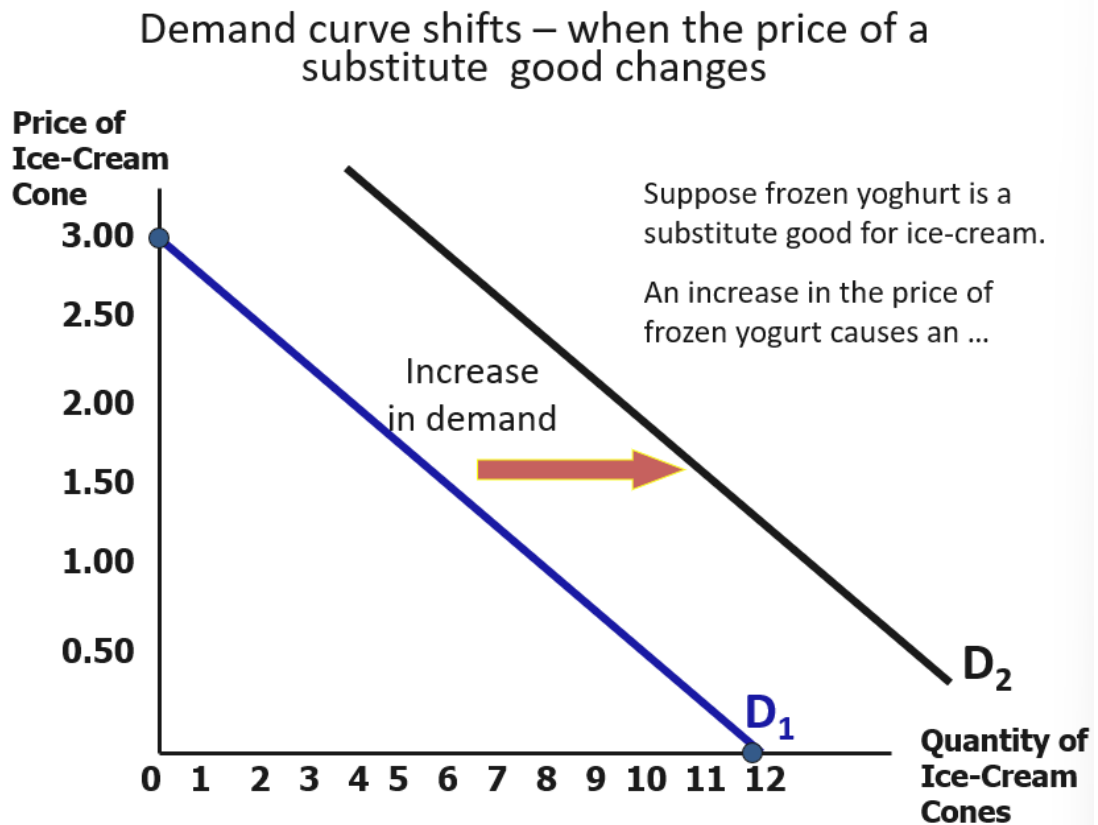
Remember: Two goods are complement if an increase in the price of one causes a fall in demand for the other. That will shift the curve inward.

Price of related good :
Complement goods: ice-cream and chocolate sauce



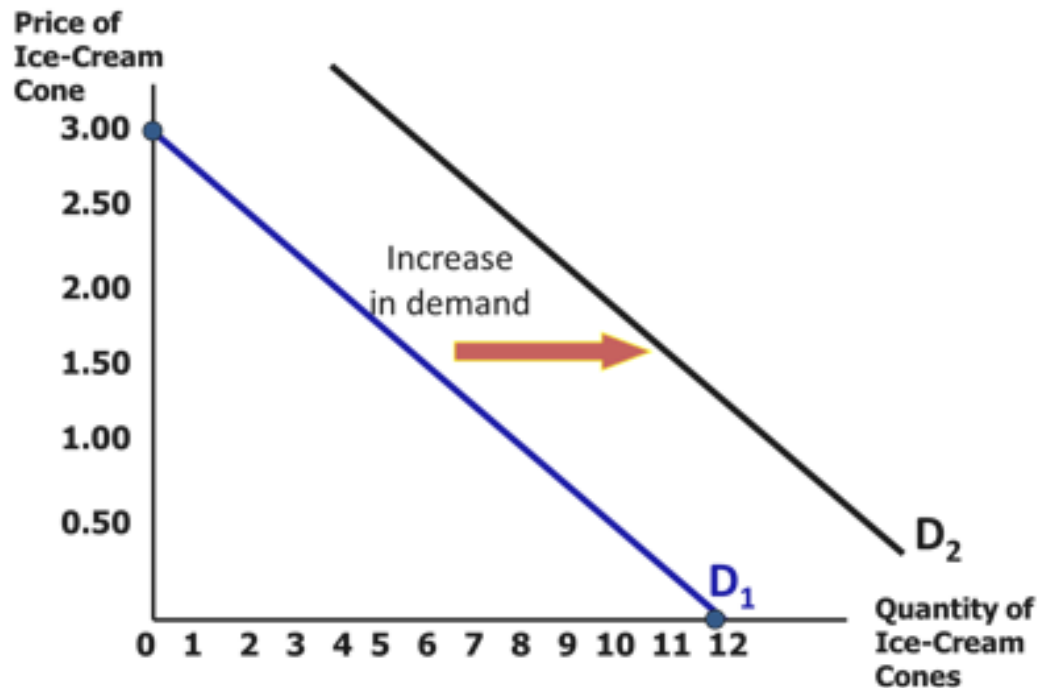
Substitute Goods

Here are examples for substitute goods: pepsi and cola, olive oil and vegetable oil, desktop computers and laptop computers, pizza and hamburgers. Demand for a good will increase if the price of substitute good increases. This will result in shift outwards.



Demand Curve Shifter: Taste

Let's take ice-cream as an example. If a scientific study shows that eating ice-cream is good for health, demand for ice-cream will increase, resulting in shift of the curve to the right.

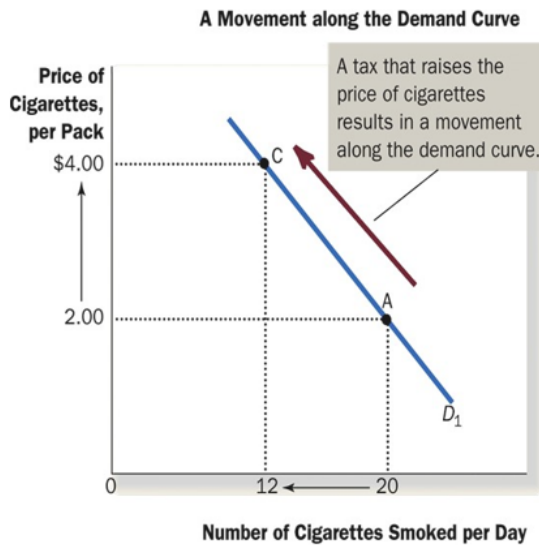


A Change in Quantity Demanded vs. A Change in Demand

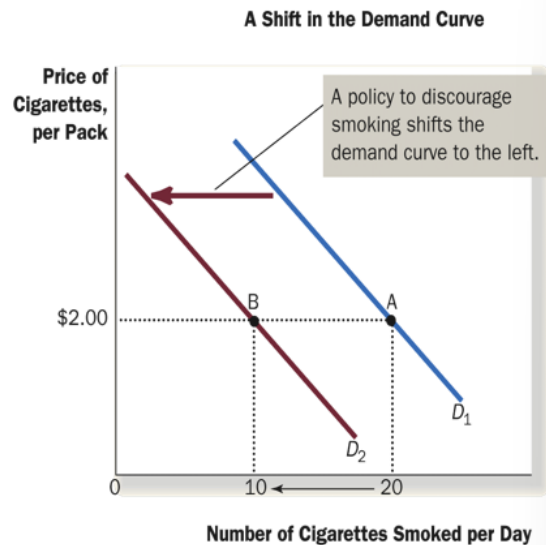
A **change in quantity demanded** is caused by a change in the price of the product. This is shown as a movement along demand curve.

A **change in demand** is caused by a change in consumer's income, prices of related goods, or consumer's taste (non-price determinants). This is shown as a shift in the demand curve, either to the left or right.

A Change in Quantity Demanded:
caused by a change in the price of the
good



A Change in Demand:
caused by a change in a non-price
determinant of demand



Expectations

Expectations affect consumers buying decisions. For example, if people expect their income to rise, their demand for meals at expensive restaurants may increase now.

Summary

- A change in the price causes a movement along the curve. (a change in quantity demanded)
- A change in number of buyers, income, price of related goods, tastes and expectations shift the curve. (a change in demand)



7. The Law of Supply: How Price Influences the Quantity Supplied

Supply

Sellers determine supply. **Quantity supplied** is the amount of good a seller is willing and able to produce, or offer for sale, or bring to market. Determinants of supply contain the price of good being produced and sold, price of inputs used to produce good, seller's technology and expectations. **Supply** is relationship between quantity supplied and its determinants.

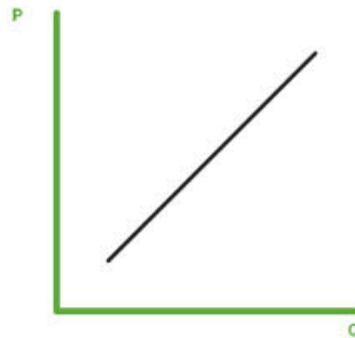
Let's assume that the other determinants of quantity supplied are constant and focus on how quantity supplied depends on price.

The relationship between quantity supplied and price

The supply schedule is a table that shows the relationship between the price of the good and the quantity supplied, with other determinants of quantity supplied kept constant.

Price	Quantity supplied
0.00	0
1.00	3
2.00	6
3.00	9
4.00	12
5.00	15
6.00	18

The supply curve is a graph that shows the relationship between the price of a good and the quantity supplied, with other determinants of quantity supplied kept constant.



Market Supply vs. Individual Supply

Market Supply versus Individual Supply

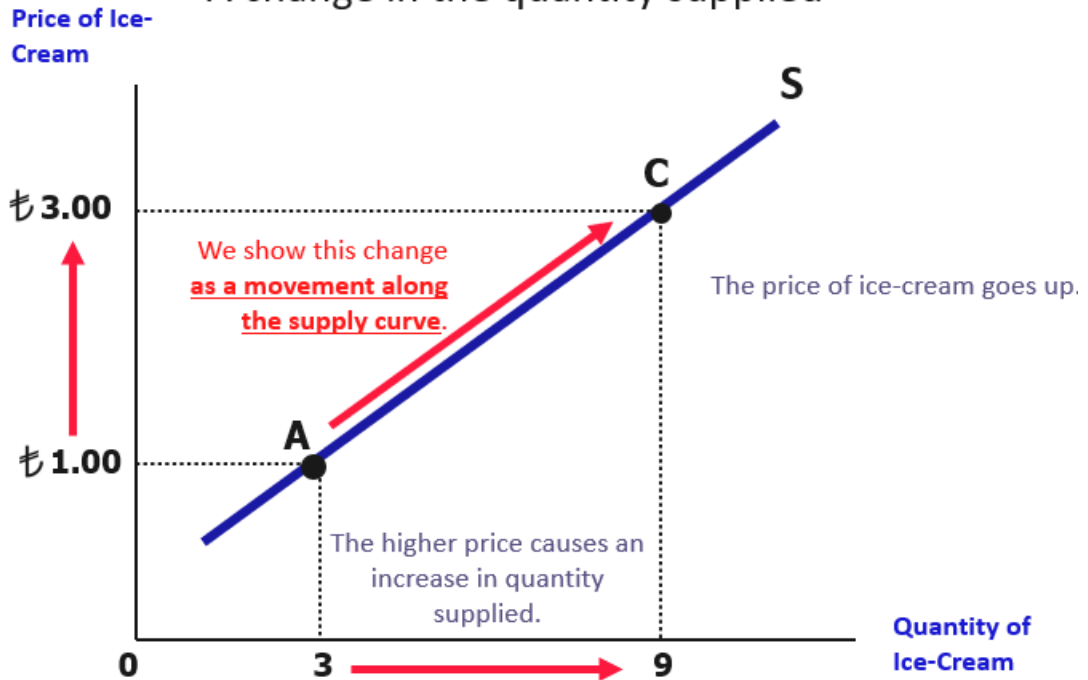
- The quantity supplied in the market is the sum of the quantities supplied by all sellers at each price.
- Suppose Starbucks and Jitters are the only two sellers in this market. (Q^s = quantity supplied)

Price	Starbucks		Jitters		Market Q^s
\$0.00	0	+	0	=	0
1.00	3	+	2	=	5
2.00	6	+	4	=	10
3.00	9	+	6	=	15
4.00	12	+	8	=	20
5.00	15	+	10	=	25
6.00	18	+	12	=	30

The Law Of Supply

The **law of supply** is the claim that, other things being equal, if the price of good rises, the quantity supplied increases, and if the price of good falls, the quantity supplied decreases.

The law of supply in action: A change in the quantity supplied



Supply Curve: Example

Some oil is in deep-water locations where the ocean depth is 2 miles and the oil is another 8 miles below the seafloor. Such wells are drilled by specialized ships two football fields long, which are staffed by hundreds of workers and equipped with robotic, unmanned submarines. Because of the enormous expense, such wells are only drilled when the price of oil is over \$70 per barrel. This shows that as the price of oil goes up, the company tries to supply more oil by extracting oil from locations where it is harder to obtain oil since these locations become profitable for the company.

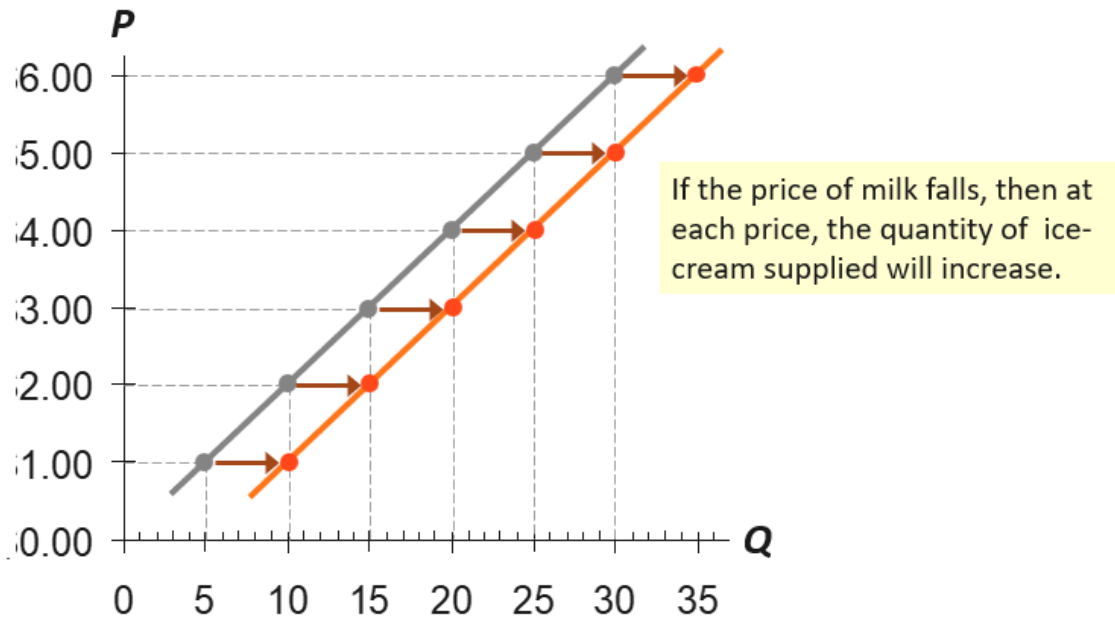
Supply Curve Shifters

Change in determinants of supply, except price of the good, shifts the supply curve.

Supply Curve Shifters: Input Prices

If the price of input falls, then at each price, the quantity of the product supplied will increase. The decrease in the input price of a good causes an increase in supply. A decrease in input price makes production more profitable at each output price. So, the firm supplies a larger quantity at each price. As a result, the supply curve shifts to the right.

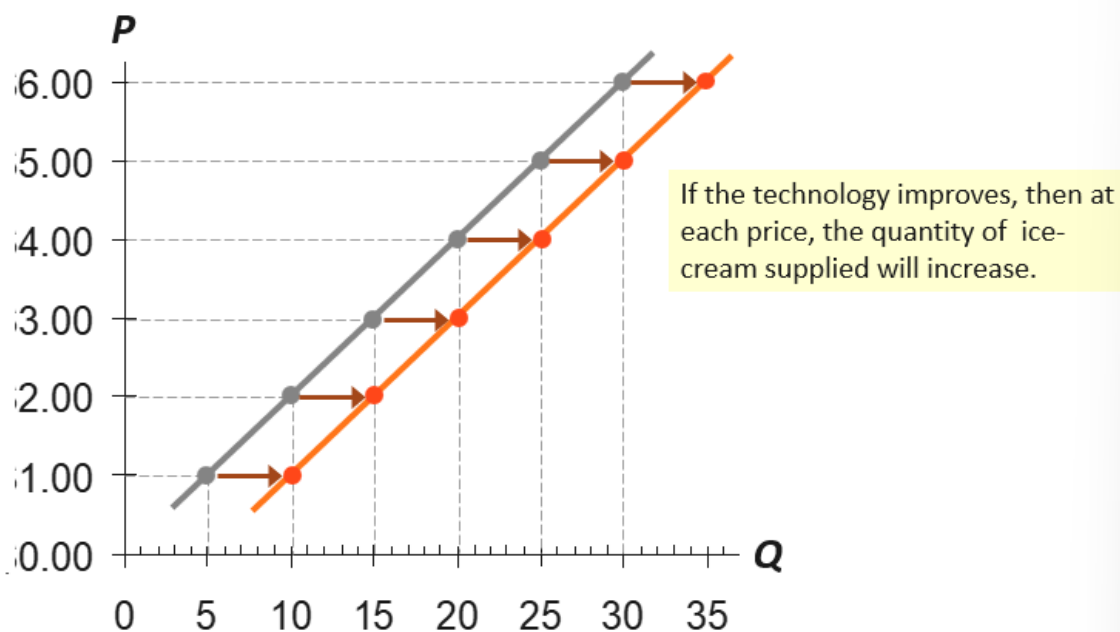
Supply Curve of ice cream shifts to the right Input Prices (milk)



Supply Curve Shifters: Technology

If the technology improves, then at each price, the quantity of product supplied will increase. The improvement in technology causes an increase in supply. Technology determines how much inputs are required to produce one unit of product. A technological improvement means more can be produced with the given amount of input. When there is a technological improvement, the firm supplies a larger quantity at each price. So, supply curve shifts to the right (and down!).

Supply Curve Shifters: The ice-cream making technology improves!



Supply Curve Shifters: Expectations

Let's take events in the Middle East as an example. These events lead to expectations of higher oil prices. In response, oil seller reduce supply now since they have an expectation that oil price will be greater in the future, so they can profit a lot more. As a result, supply decreases and supply curve shifts to the left. In general, sellers may adjust supply (if good is not perishable) when their expectations of future prices change.

Supply Curve Shifters: Number of Sellers

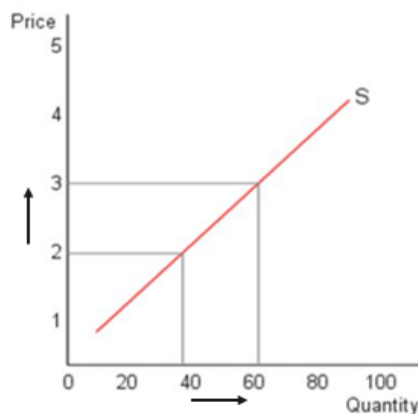
An increase in the number of sellers increases the quantity supplied at each price. As a result, supply curve shifts to the right.

A Change in Quantity Supplied vs. A Change in Supply

Shifts versus movements along the supply curve: A change in supply versus a change in quantity supplied

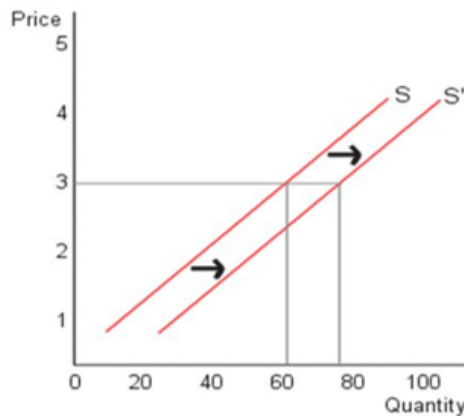
When the price of the good changes we show this as a movement along the supply curve.

We call it **a change in quantity supplied**.



When input prices, or technology change, we show this as a shift in the supply curve.

We call it **a change in supply**.



Summary

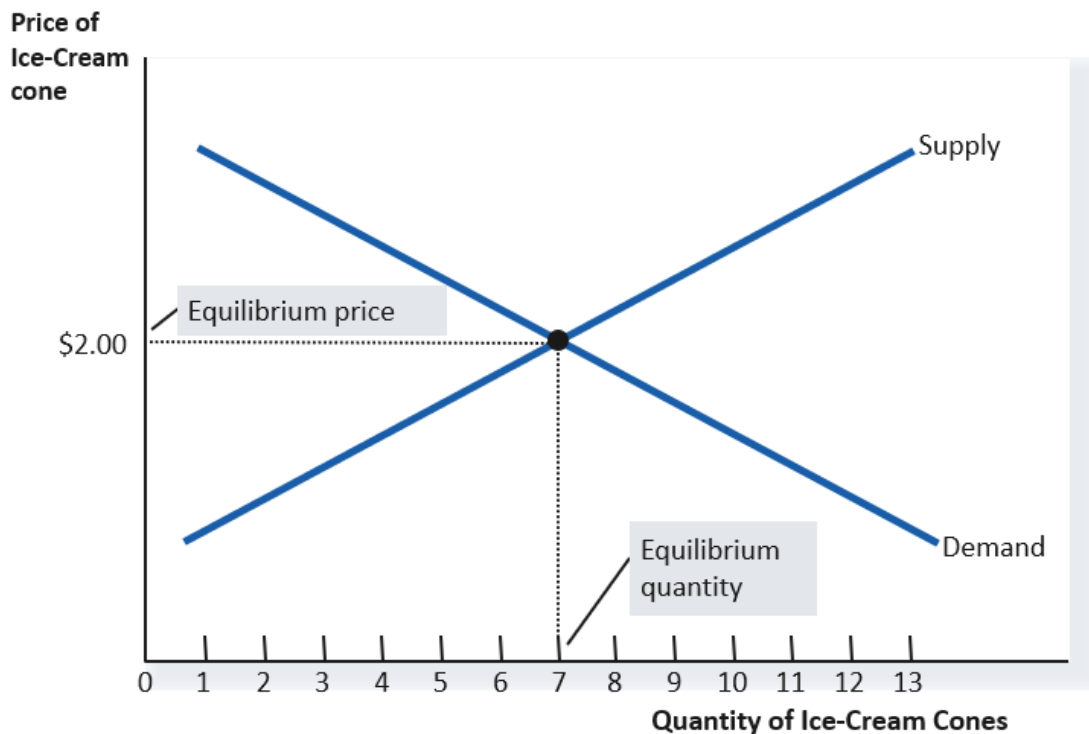
- A change in price causes a movement along the supply curve.
- A change in input prices, technology, number of sellers and expectations shifts the supply curve.

The Interaction of Supply and Demand and the Equilibrium in the Competitive Market

What determines the price of good in a market? In a competitive market the interaction between sellers and buyers determine the price of the good. Sellers determine supply and buyers determine demand. So, in a competitive market the price is determined by the interaction of supply and demand.

The Equilibrium in the Competitive Market

When there is an **equilibrium** in the market, then the price has reached the level where the quantity supplied equals the quantity demanded. **The equilibrium price** is the price at which the quantity supplied equals the quantity demanded. **The equilibrium quantity** is the quantity supplied when the quantity supplied equals the quantity demanded.



The Price Mechanism at Work

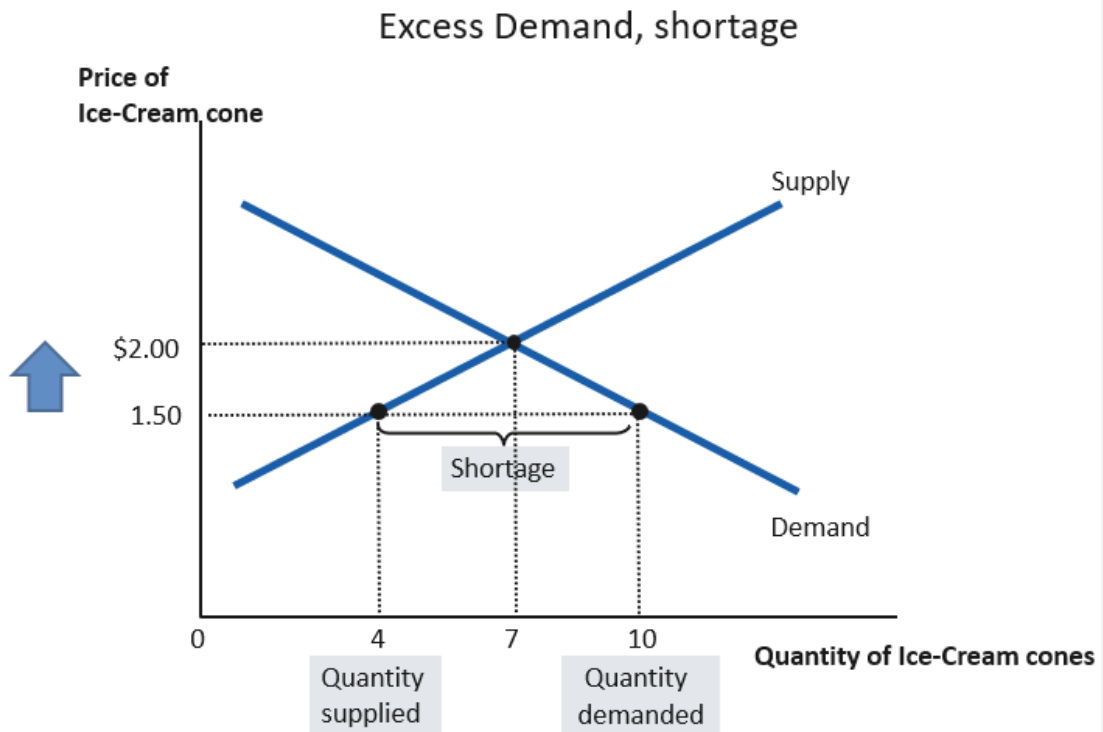
The price adjusts so as to bring the quantity supplied and the quantity demanded into balance. The price is the tool through which the market is cleared. Competitive markets reach the equilibrium through the interaction of many buyers and sellers.

In a market economy, prices act as signals that guide the allocation of scarce resources. Prices tend toward and eventually settle at the equilibrium price, the price at which quantity demanded equals quantity supplied. Prices are determined by the market forces of supply and demand. So, if demand and/or supply change, then the price will change.

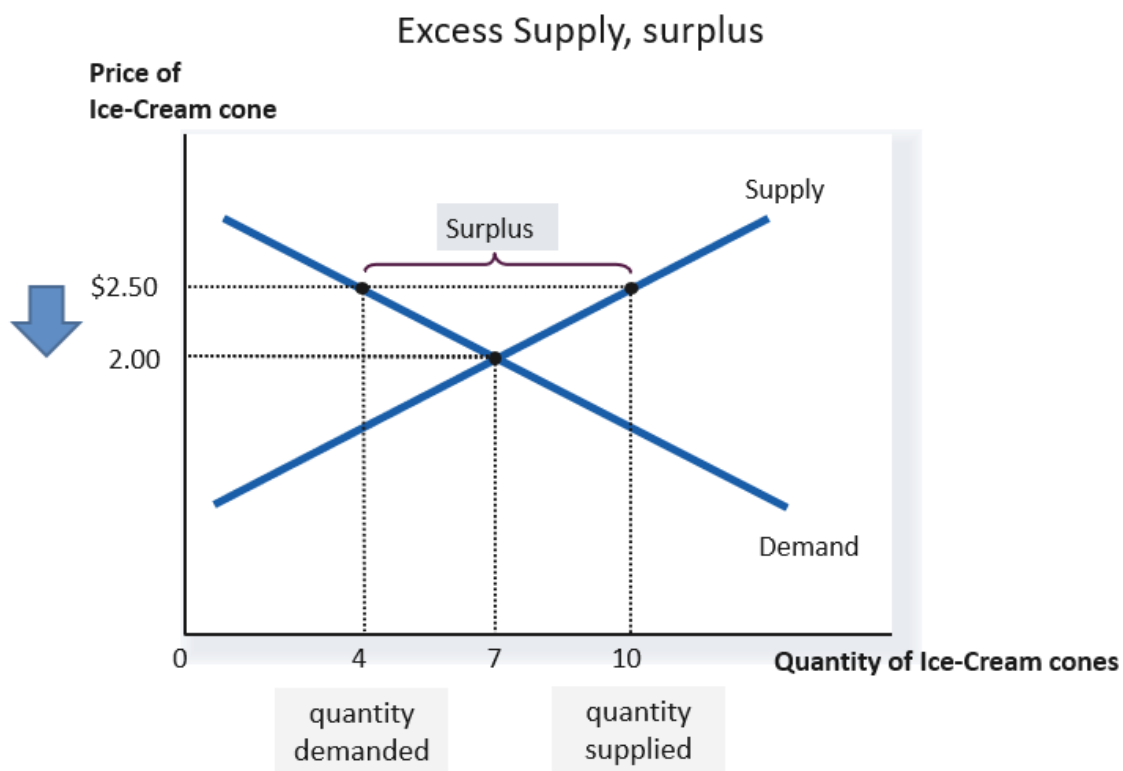
How does Price Mechanism Work?

But how do the market dynamics work to bring prices & quantities into an equilibrium level?

(Version 1) At the current price, if the quantity demanded is greater than the quantity supplied, then the price will rise until the excess demand is eliminated. Prices continue to increase until market reaches equilibrium.



(Version 2) At the current price, if the quantity demanded is less than the quantity supplied, then the price will decrease until the excess supply is eliminated. Prices continue to fall until market reaches equilibrium.



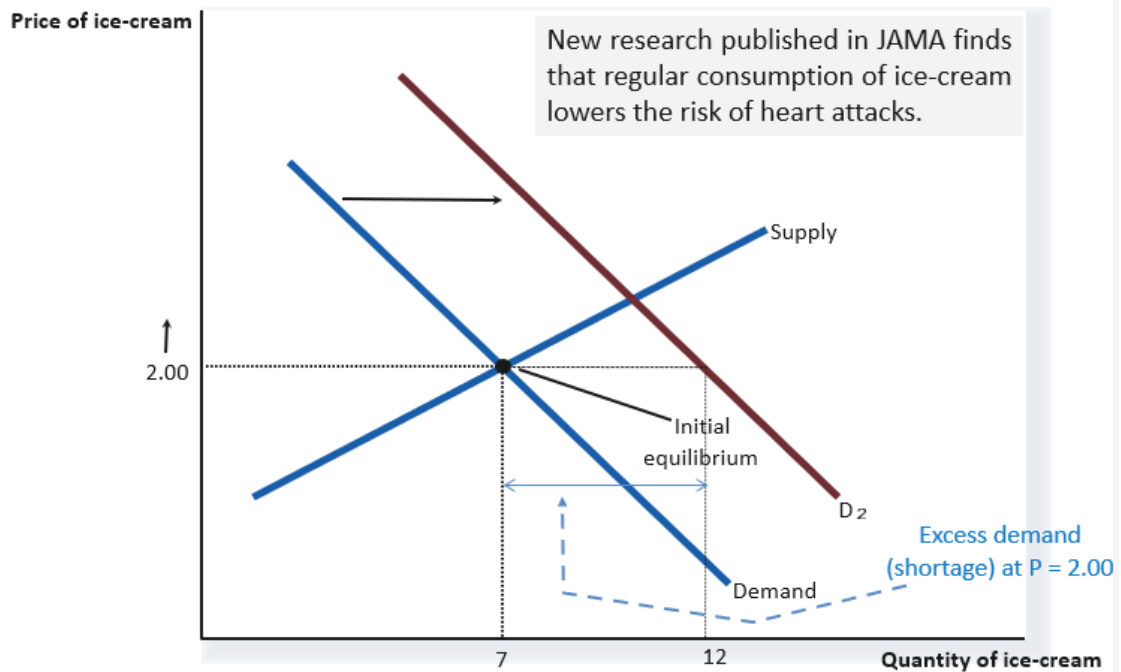
How does the Equilibrium Level Change with the Shifts in Demand and Supply Curves?

Assume an event happens. Analyze Change in Equilibrium using these 3 steps:

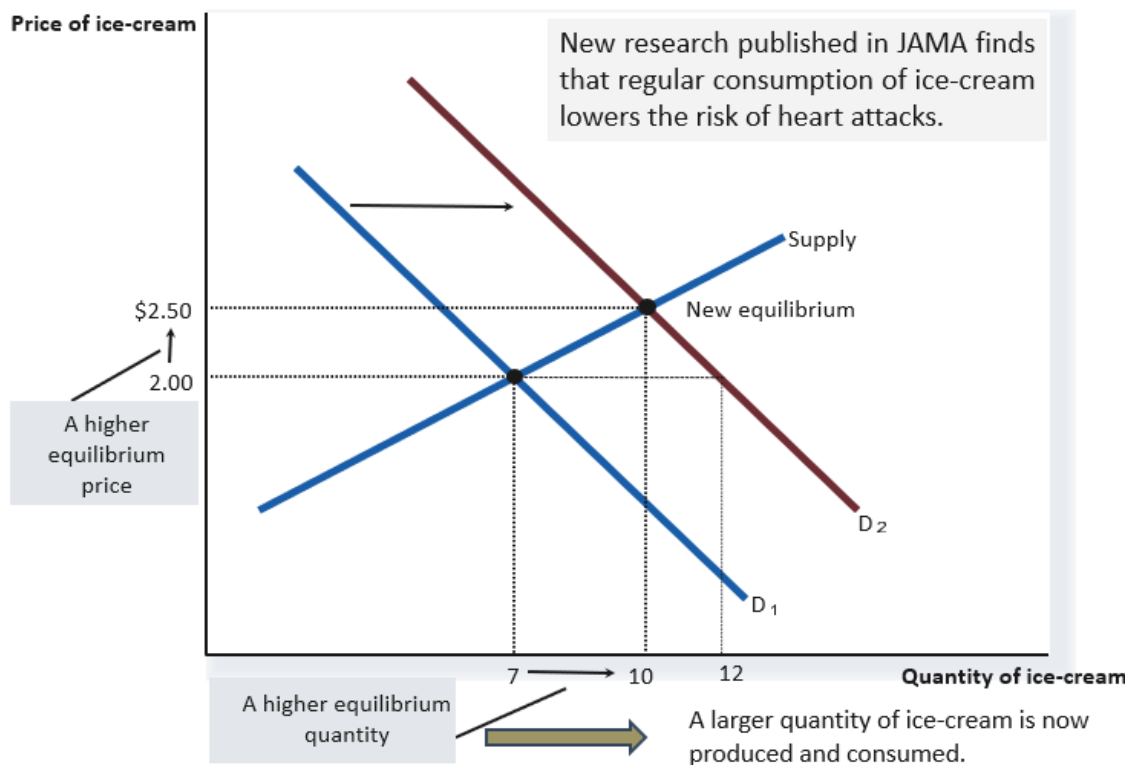
1. Decide whether the event shifts the supply curve, or the demand curve, or both.
2. Decide whether the curve shifts to the left or to the right.
3. Use the supply-and-demand diagram to determine how the shift changes the equilibrium price and the equilibrium quantity.

This is called **Comparative Statics Analysis**. Economists use this method to analyze how the **equilibrium price** and **equilibrium quantity** are affected by changes in the demand and supply determinants by comparing "the before" and "the after".

How a Change in Demand Affects the Equilibrium



How a Change in Demand Affects the Equilibrium





8. Price Elasticity of Demand: How Price Changes Affect Quantity Demanded

Elasticity

Elasticity allows us analyze supply and demand with greater precision. It is a measure of how much buyers and sellers respond to changes in market conditions.



Elasticity measures how much one variable responds to changes in other variable.

Definition of Elasticity

Elasticity is a numerical measure of the responsiveness of Q^d or Q^s to one of its determinants.

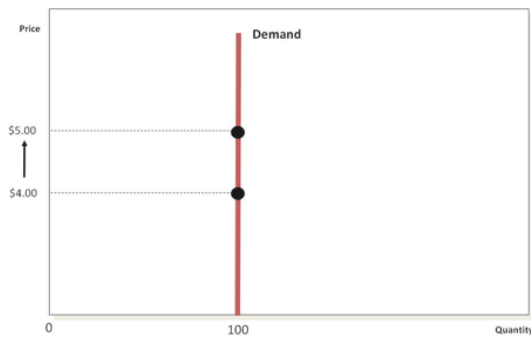
Examples: income elasticity of demand, price elasticity of supply, input price elasticity of supply.

The Price Elasticity of Demand

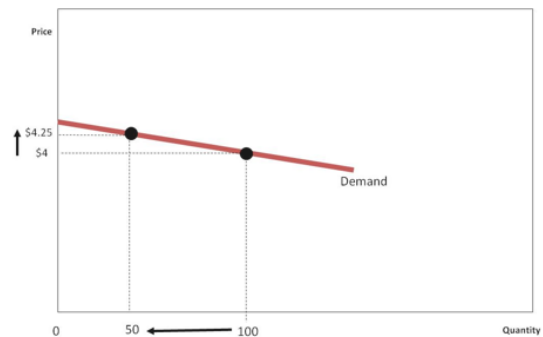
Price Elasticity of Demand is a "measure" of how responsive is quantity demanded to a change in price. Or, how responsive is quantity demanded to changes in the price?

Inelastic vs. Elastic

Case 1:
“Demand is inelastic”



Case 2:
“Demand is elastic .”



What Makes Demand More Price-Elastic?

Demand tends to be more elastic if ...

- **there are close substitutes (alternatives).**

Demand will be more elastic if there are substitutes. For example, the patent for drug A expires and five generic drugs come on the market. As a result, demand for drug A becomes more price elastic because the generic drugs are almost perfect substitutes. *Price elasticity is higher when close substitutes are available.*

- **the market is narrowly defined (milk(narrow) versus food(broad)).**

The more general the classifications, fewer substitutes there are and this makes demand less elastic. For example, demand for food (general) is less price-elastic than demand for lettuce (specific).

- **more time is allowed after the price change.**

Consumers need more time to adjust their behavior by finding substitutes. This makes their demand more price-elastic in long-run. So, more time to adjust means demand is more price elastic in long run. For example, the price of gasoline rises 20%. Does the Q^d for gasoline drop more in short-run or in long-run? There is not much that people can do in short-run, other than ride the bus or carpool. In the long run, people can switch to smaller cars or live closer to where they need to travel often. Lesson from this example is that price elasticity is higher in long-run than the short-run.

- **the good is a luxury. (necessities have inelastic demand)**

Demand for necessities is price-inelastic. Demand for luxury is price-elastic. For

example, the prices for both insulin and Caribbean Cruises increase by 20%. For which good does Q^d drop the most? To millions of diabetes insulin is a necessity. An increase in price would cause a little or no demand decrease. But cruise is a luxury, so some people can forego it. This shows that price elasticity is higher for luxuries than for necessities.

Price Elasticity of Demand: Formulation

Price Elasticity of Demand measures how much Q^d responds to a change in P .

$$E_p = \text{Price Elasticity of Demand} = \frac{\text{Percentage change in } Q^d}{\text{Percentage change in } P}$$

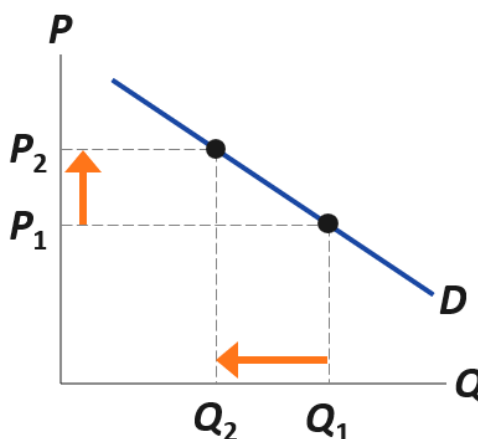
Loosely speaking, it measures the price-sensitivity of buyers' demand.

Example:

Price elasticity
of demand
equals

$$\frac{15\%}{10\%} = 1.5$$

P rises
by 10%

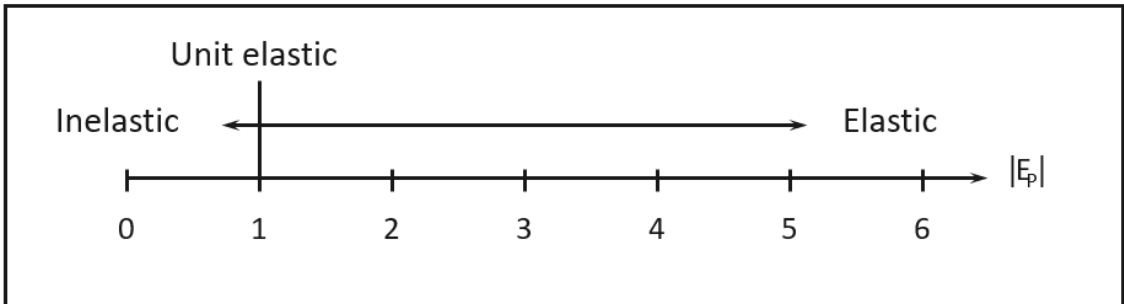


Q falls
by 15%

Along a D curve, P and Q move in opposite directions, which would make price elasticity negative. We will drop the minus sign and report all price elasticities as positive numbers.

Elastic vs. inelastic demand

Compute E_p then take the absolute value of E_p .



- Inelastic: $|E_p| < 1$
- Unit elastic: $|E_p| = 1$
- Elastic: $|E_p| > 1$

When the price elasticity E_p in absolute value is between 0 and 1, we say that demand is **inelastic**. It means that quantity demanded is not very responsive to the price.

When the price elasticity E_p in absolute value is greater than 1, we say that demand is **elastic**. It means that quantity demanded is responsive to the price.

If the price elasticity E_p in absolute value is equal to 1, then we say that demand is **unit elastic**.

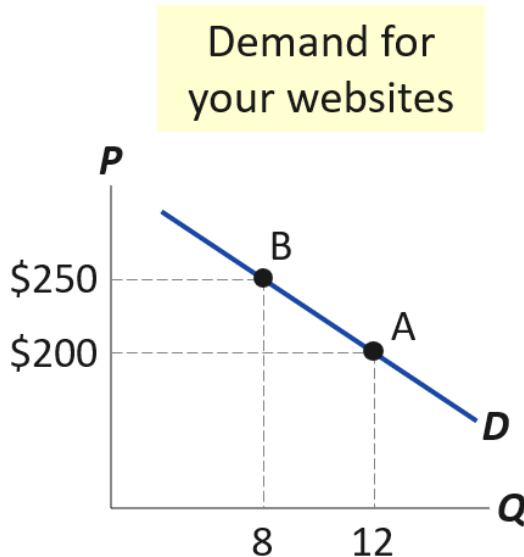
What if The Start Value is Uncertain

What happens if the “start value” is uncertain?

Standard method
of computing the
percentage (%) change:

$$\frac{\text{end value} - \text{start value}}{\text{start value}} \times 100\%$$

Going from A to B,
the % change in **P** equals
 $(\$250 - \$200) / \$200 = 25\%$



Use the **Midpoint Method**:

$$\frac{\text{end value} - \text{start value}}{\text{midpoint}} * 100\%$$

The midpoint is the number halfway between end and start value, the average of those values. It does not matter which value you use as the start and which as the end - you get the same answer either way!

Use of Midpoint Method

- Using the midpoint method, the % change in **P** equals

$$\frac{\$250 - \$200}{\$225} \times 100\% = 22.2\%$$

- The % change in **Q** equals

$$\frac{12 - 8}{10} \times 100\% = 40.0\%$$

- The price elasticity of demand equals

$$40/22.2 = 1.8$$

The Variety of Demand Curves

The Price Elasticity of Demand is closely related to the slope of the the demand curve. According to **Rule of Thumb**, the flatter the curve, the bigger the elasticity, the steeper the curve, the smaller the elasticity. As a result, there are 5 different classifications of demand curves:

- **Perfectly Inelastic Demand (extreme case 1)**

“Perfectly inelastic demand” (one extreme case)

$$\text{Price elasticity of demand} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{0\%}{10\%} = 0$$

D curve:

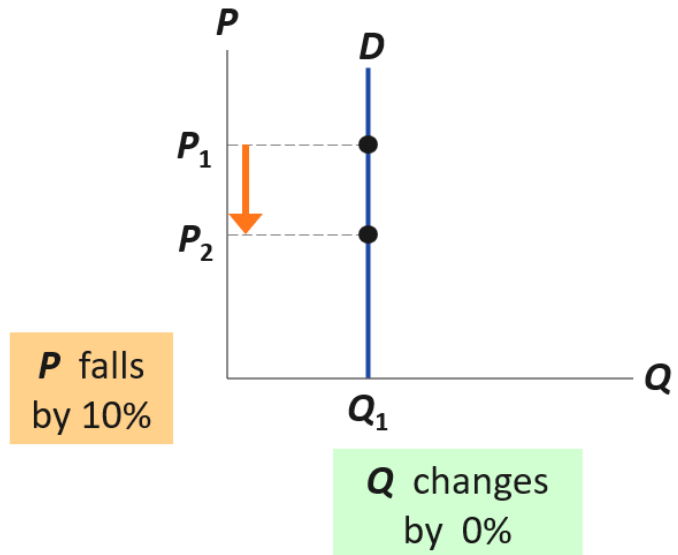
vertical

Consumers’
price sensitivity:

none

Elasticity:

0



- Inelastic Demand

“Inelastic demand”

$$\text{Price elasticity of demand} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{< 10\%}{10\%} < 1$$

D curve:

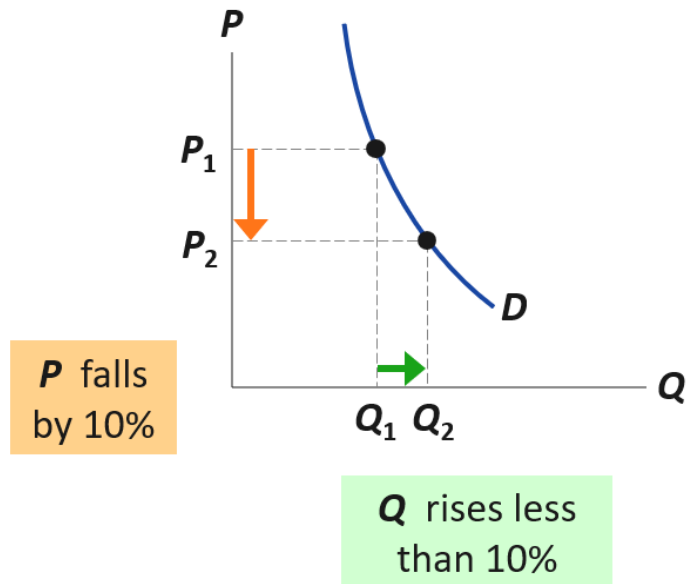
relatively steep

Consumers’
price sensitivity:

relatively low

Elasticity:

< 1



- Unit Elastic Demand

“Unit elastic demand”

$$\text{Price elasticity of demand} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{10\%}{10\%} = 1$$

D curve:

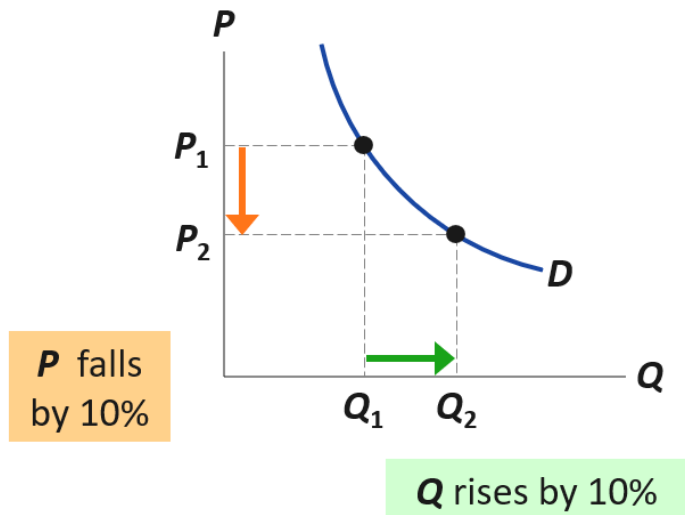
intermediate slope

Consumers’
price sensitivity:

intermediate

Elasticity:

1



- Elastic Demand

“Elastic demand”

$$\text{Price elasticity of demand} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{> 10\%}{10\%} > 1$$

D curve:

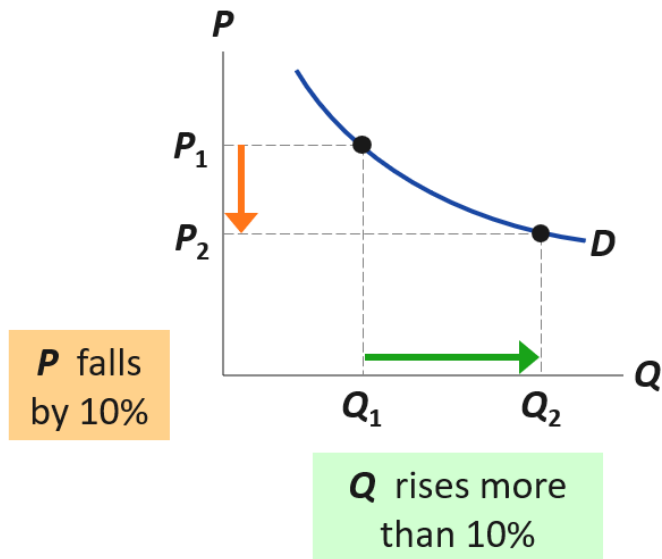
relatively flat

Consumers’
price sensitivity:

relatively high

Elasticity:

> 1



- Perfectly Elastic Demand (extreme case 2)

“Perfectly elastic demand” (the other extreme)

$$\text{Price elasticity of demand} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{\text{any } \%}{0\%} = \text{infinity}$$

D curve:

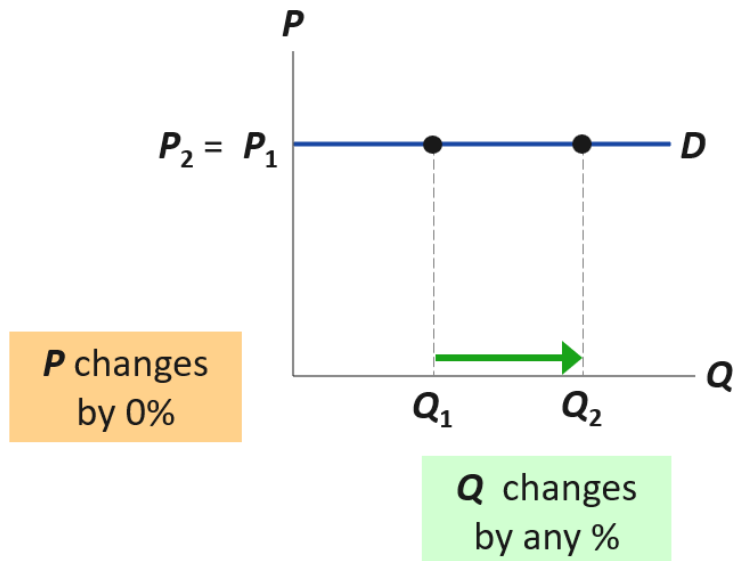
horizontal

Consumers’
price sensitivity:

extreme

Elasticity:

infinity



Example

What does the E_p number mean? Suppose the price elasticity of demand for gasoline is -0.2. This means when the price of gasoline increases by 1%, the demand for gasoline decreases by 0.2%. Likewise, when the price of gasoline increases by 5%, the demand for gasoline decreases by 1%. Gasoline demand is not very price sensitive. Let's take gold as an example. Suppose the price elasticity of demand for gold is -2.5. This means when the price of gold jewelry increases by 1%, the quantity demanded falls by 2.5%. Likewise, when the price of gold jewelry rises by 5%, the quantity demanded falls by 12.5%. As you can see, demand for gold jewelry is more price sensitive.

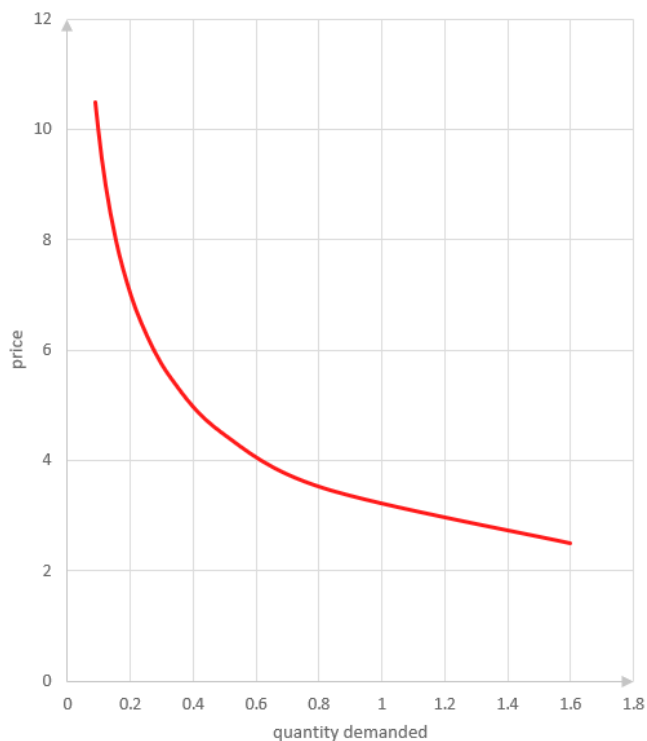


9. Understanding Price Elasticity: Variations Along Demand Curves

The Price Elasticity

The price elasticity along the demand curve may not be constant. It can change. But also it can be constant.

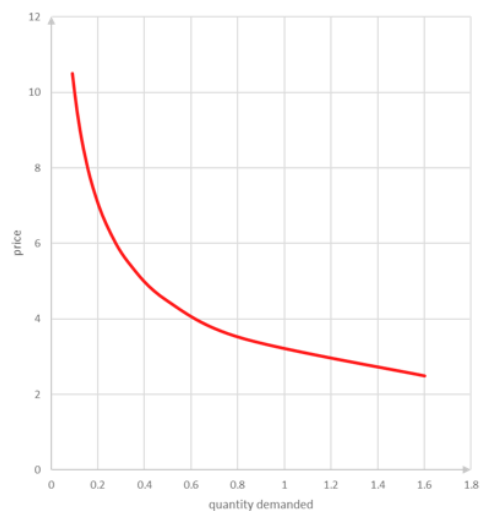
At any price P , a 1% change in price causes a 2% change in quantity demanded.



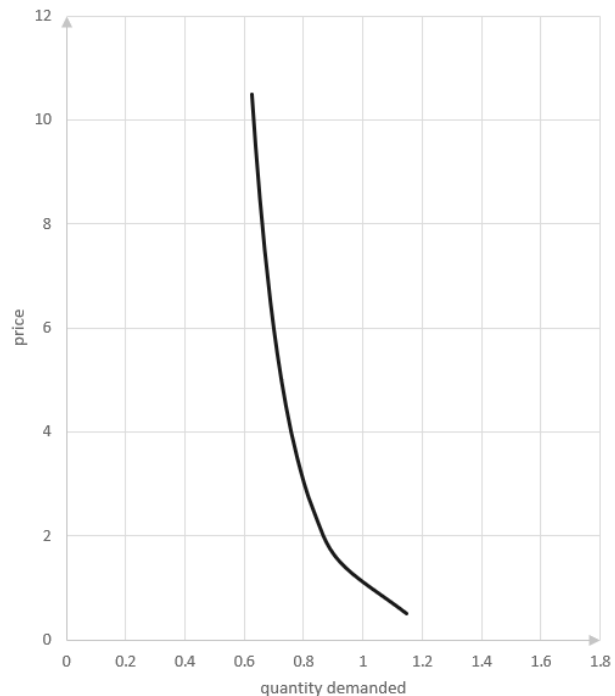
The equation for the red demand curve is

$$Q_D(p) = \frac{10}{p^2}$$

The price elasticity of demand is $E_p = -2.00$ for any price of this good.



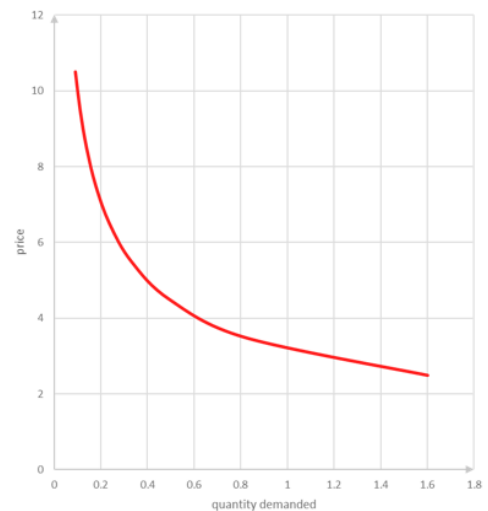
At any price P , a 1% change in price causes a 0.2% change in quantity demanded.



The equation for the red demand curve is

$$Q_D(p) = \frac{10}{p^2}$$

The price elasticity of demand is $E_p = -2.00$ for any price of this good.



These demand curves of the form $Q_D(P) = \frac{A}{p^\alpha}$, where A and α are positive numbers, are called **iso-elastic demand curves** or **constant elasticity demand curves**. In this

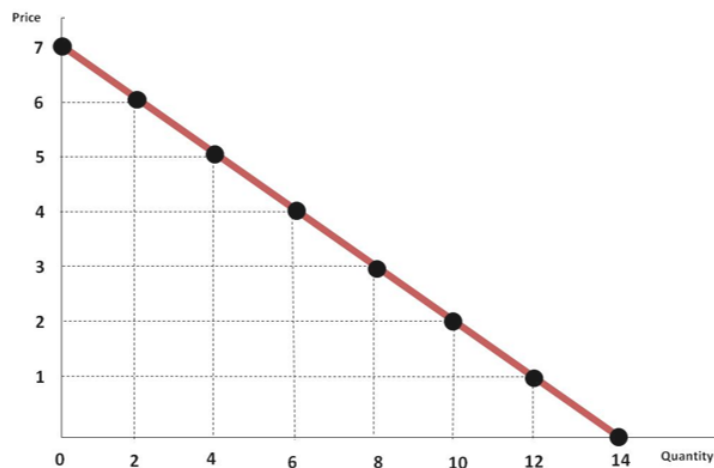
type of curves, elasticity is constant. It means that the percentage change in quantity demanded is always proportional to the percentage change in price, regardless of the price level. For these curves, **elasticity is constant** and equal to α .

The price elasticity is **NOT** constant along a **linear demand curve**.

The price elasticity is NOT constant along a linear demand curve.

The price elasticity is $E_p = -6.00$ when $P = 6$.

The price elasticity is $E_p = -0.40$ when $P = 2$.

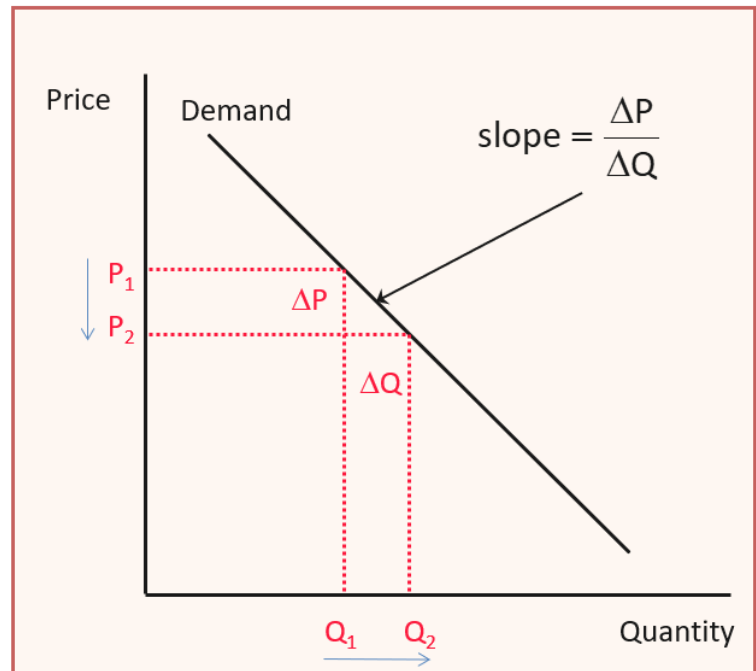


$$E_P = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

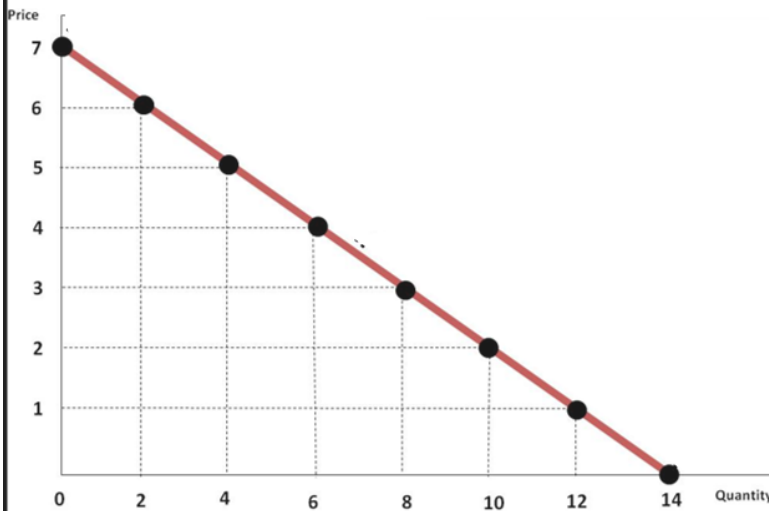
Elasticity $E_P = \frac{\Delta Q}{\Delta P} \frac{P}{Q}$

Elasticity $E_P = (1/\text{slope}) \times (P/Q)$

That's it. This is the end of the heavy notation, a lot of math part of the lecture.



$$E_P = \frac{\Delta Q}{\Delta P} \frac{P}{Q} \text{ which we can also write as } E_P = \frac{1}{\text{slope}} \frac{P}{Q}$$



What is the slope of this demand curve?

$$\text{Slope} = -\frac{1}{2}$$

$$1/\text{slope} = -2$$

E_P at $P = 6$ is

$$-2 \times (6/2) = -6$$

E_P at $P = 3.5$ is

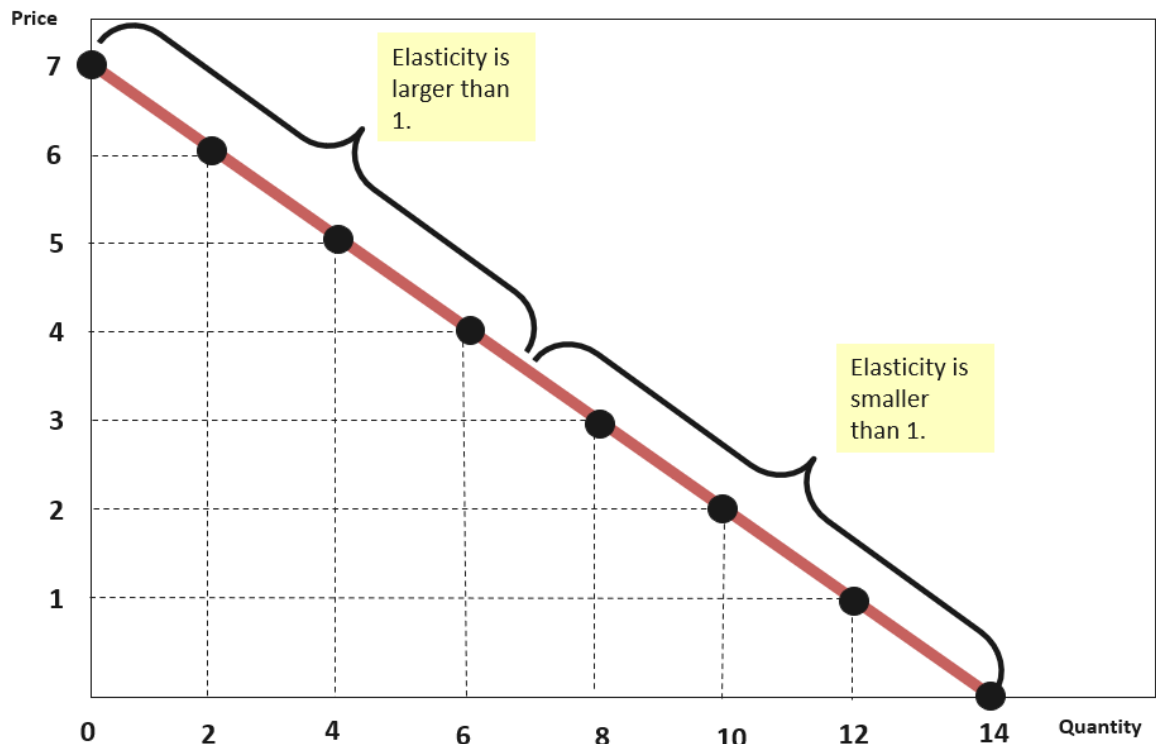
$$-2 \times (3.5/7) = -1$$

E_P at $P = 1$ is

$$-2 \times (1/12) = -1/6$$

A Linear Demand Curve

A Linear Demand Curve



Elasticity in linear demand curve varies. In the midpoint it is unit-elastic, meaning that it equals to 1. For the points above midpoint elasticity is elastic, where elasticity value is greater than 1. For the points below midpoint elasticity is inelastic, where elasticity value is lower than 1.

Total Revenue and Price Elasticity of Demand

Total revenue is the amount paid by buyers and received by sellers of a good. Total revenue is computed as the prices time quantity sold.

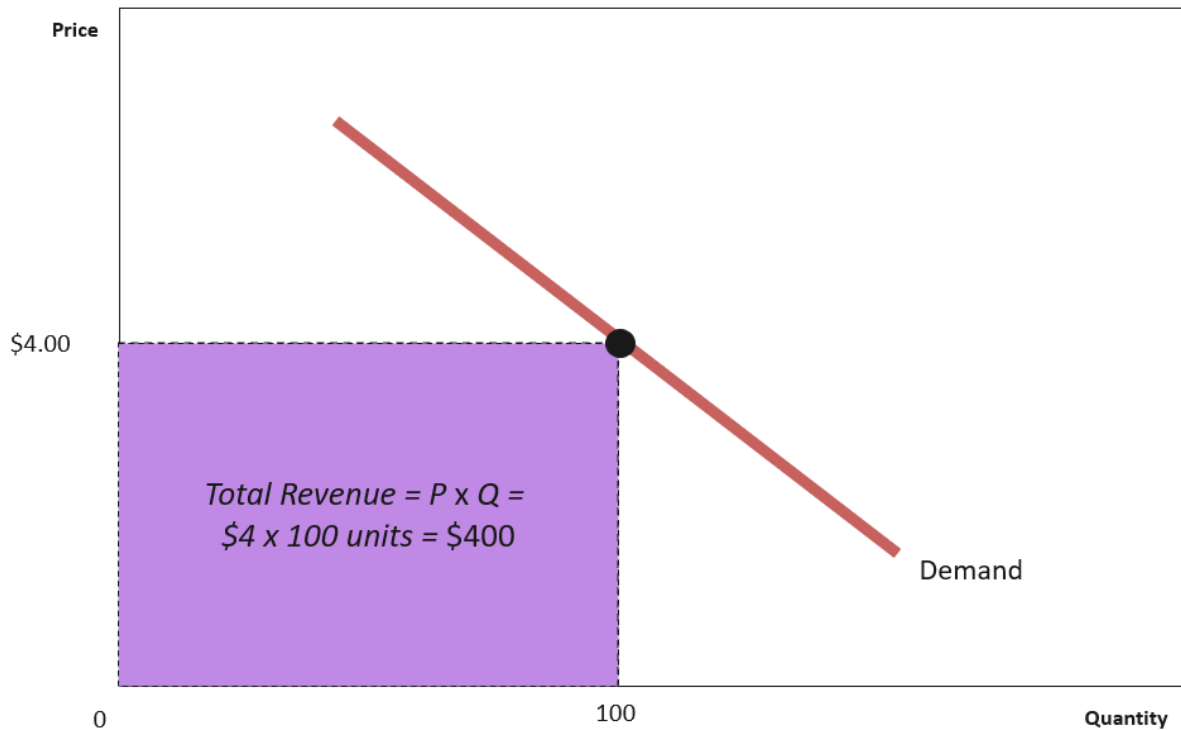
$$TR = P * Q$$

$$\text{Total Revenue} = \text{Price} \times \text{Quantity}$$

The elasticity of good directly influences revenues when the price of the good changes. A price increase has two effects on revenue.

- Higher P means more revenue on each unit you sell.
- But you sell fewer units (lower Q), due to law of demand.

Total Revenue



- If demand is inelastic at $P = P^o$, a small increase in price will cause an increase in total revenue.
 - Raise P by 10% $\Rightarrow Q_D$ will decline by 5% $\Rightarrow TR = P * Q$ will rise.
- If demand is elastic at $P = P^o$, a small increase in price will cause a decrease in total revenue.
 - Raise P by 10% $\Rightarrow Q_D$ will decline by 20% $\Rightarrow TR = P * Q$ will decline.

So, we will have greater revenue if the demand is inelastic.

Summary: Relationship Between Elasticity and Total Revenue

	Price Rise	Price Decline
Elastic ($E_p > 1$)	TR decreases	TR increases
Unit Elastic ($E_p = 1$)	TR constant	TR constant
Inelastic ($E_p < 1$)	TR increases	TR decreases

Elasticity calculation can be tricky, because there are many (simultaneous) influences on demand.

Consider a demand curve drawn on the P vs. Q graph. EP is a measure that corresponds to movements up and down the demand curve. But changes in other variables (such as income and prices of other goods, or taste) also impact the quantity demanded.

To calculate EP correctly, we have to make sure that *all else is held constant*.

Price Elasticity of Supply

Price elasticity of supply measures how much Q_s responds to a change in P

Price Elasticity of Supply: Formulation

$$E_p = \text{Price Elasticity of Supply} = \frac{\text{Percentage change in } Q^s}{\text{Percentage change in } P}$$

It measures the price-sensitivity of quantity supplied to a change in the price of the good.

The slope of the supply curve is closely related to price elasticity of supply. The flatter the curve, the bigger the elasticity. The steeper the curve, the smaller the elasticity. There are 5 different classifications of supply curves:

- **Perfectly Inelastic Supply (extreme case 1)**

“Perfectly inelastic” (one extreme)

$$\text{Price elasticity of supply} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{0\%}{10\%} = 0$$

S curve:

vertical

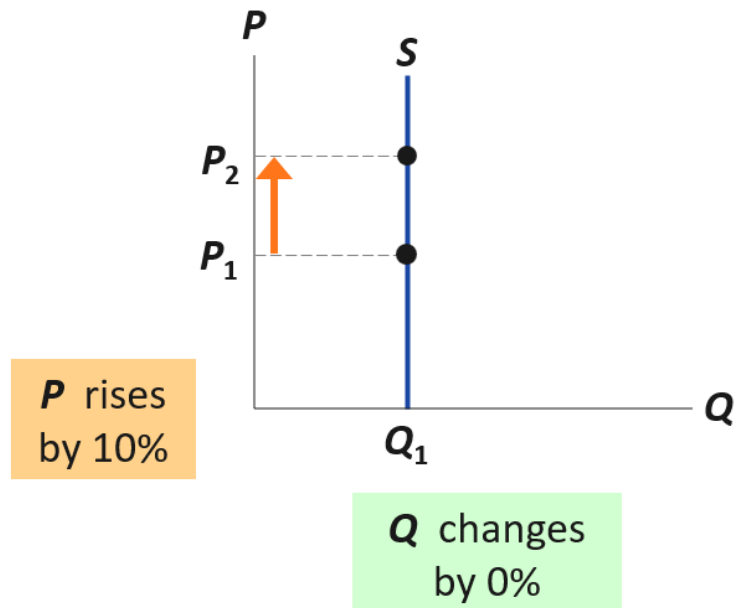
Sellers’

price sensitivity:

none

Elasticity:

0



- **Inelastic Supply**

“Inelastic”

$$\text{Price elasticity of supply} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{< 10\%}{10\%} < 1$$

S curve:

relatively steep

Sellers’

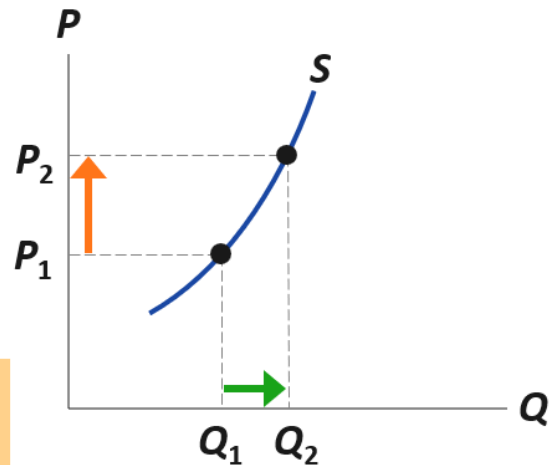
price sensitivity:

relatively low

Elasticity:

< 1

P rises
by 10%



Q rises less
than 10%

- **Unit Elastic Supply**

“Unit elastic”

$$\text{Price elasticity of supply} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{10\%}{10\%} = 1$$

S curve:

intermediate slope

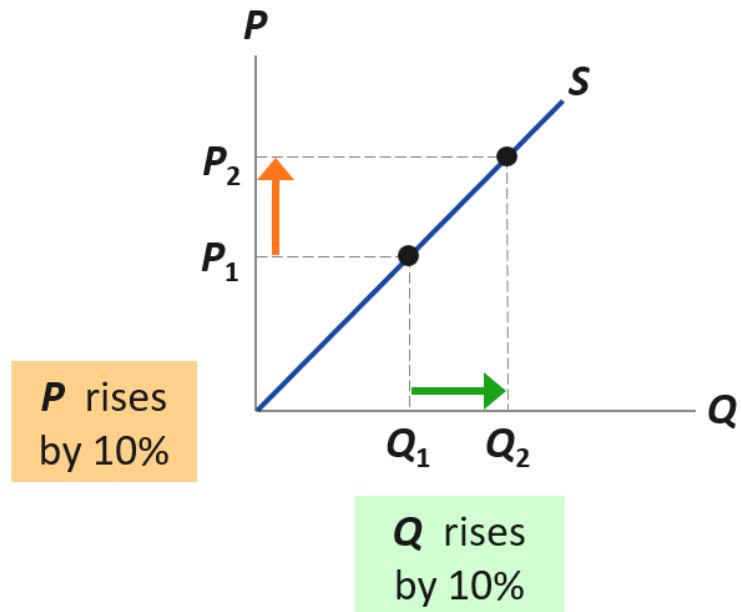
Sellers’

price sensitivity:

intermediate

Elasticity:

= 1



- Elastic Supply

“Unit elastic”

$$\text{Price elasticity of supply} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{10\%}{10\%} = 1$$

S curve:

intermediate slope

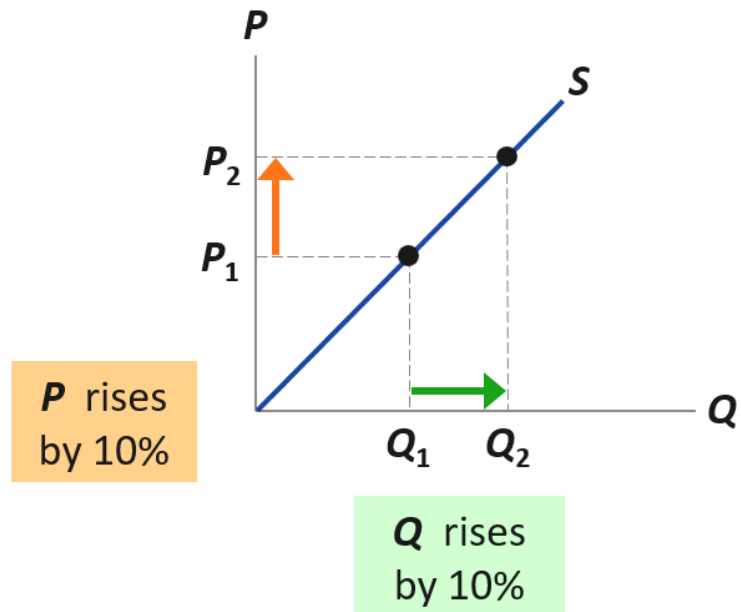
Sellers’

price sensitivity:

intermediate

Elasticity:

= 1



- Perfectly Elastic Supply (extreme case 2)

“Perfectly elastic” (the other extreme)

$$\text{Price elasticity of supply} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{\text{any } \%}{0\%} = \text{infinity}$$

S curve:

horizontal

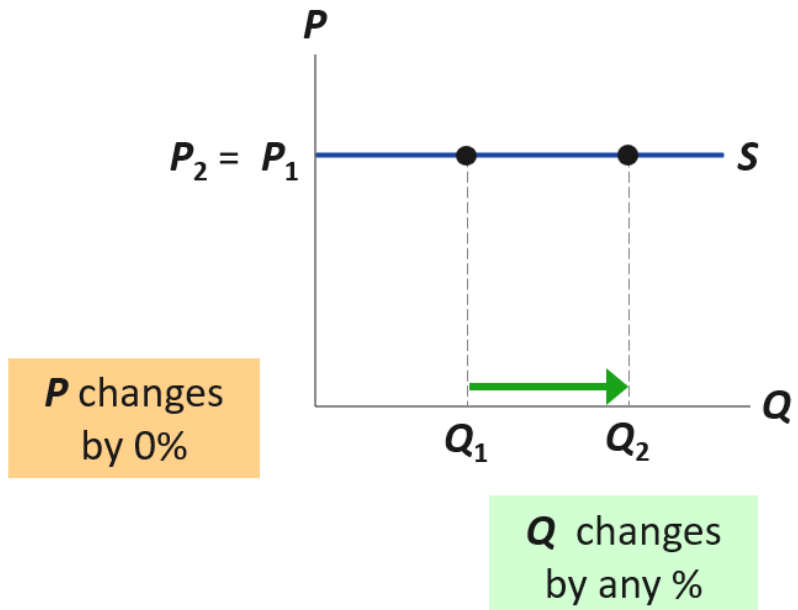
Sellers’

price sensitivity:

extreme

Elasticity:

infinity



Example

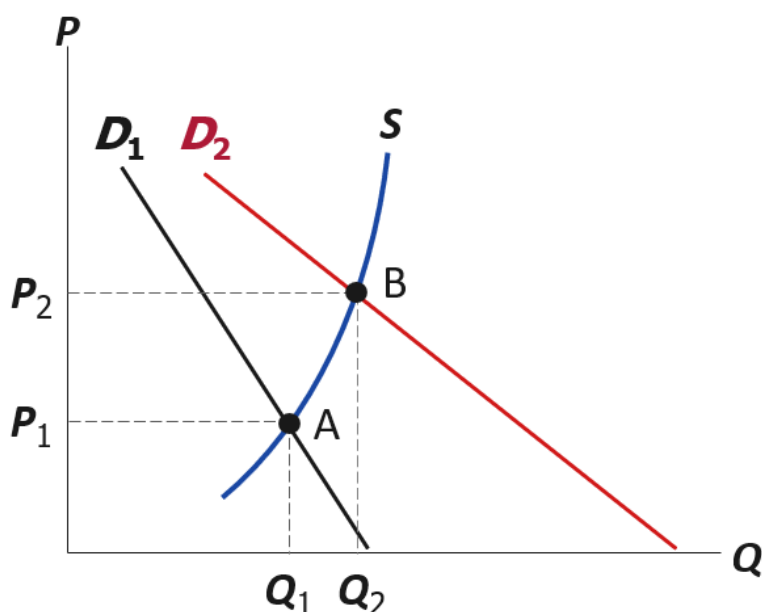
Example:

Elasticity and changes in equilibrium

- The supply of beachfront property is inelastic. The supply of new cars is elastic.
- Suppose population growth causes demand for both goods to double (at each price, Q^d doubles).
- For which product will P change the most?
- For which product will Q change the most?

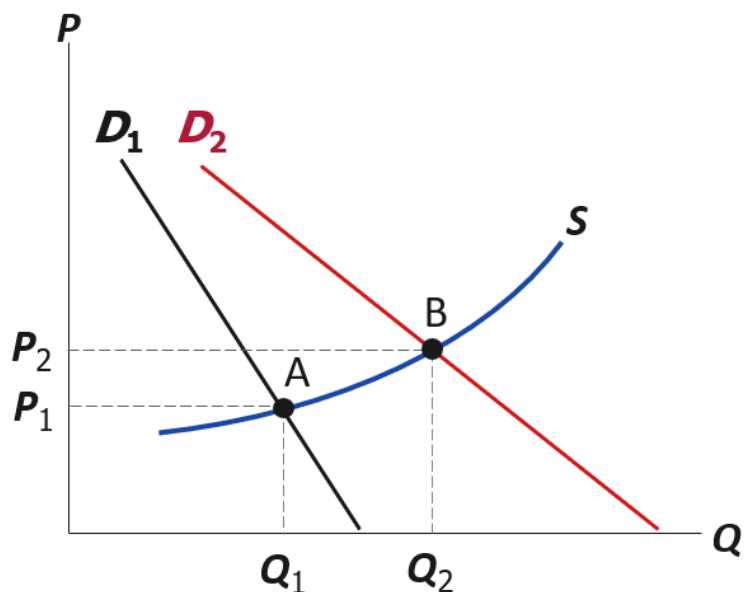
When supply is *inelastic*, an increase in demand has a bigger impact on price than on quantity.

Beachfront property
(inelastic supply):

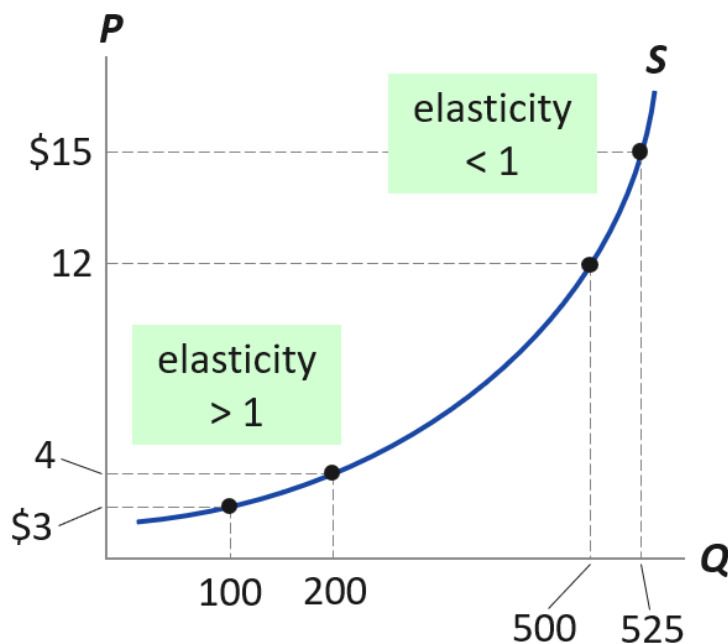


When supply is *elastic*, an increase in demand has a bigger impact on quantity than on price.

New cars
(elastic supply):



How the Price Elasticity of Supply Can Vary



Supply often becomes less elastic as Q rises, due to capacity limits.

Other Demand Elasticities

The **income elasticity of demand** measures the response of Q^d to a change in consumer income.

$$\text{Income elasticity of demand} = \frac{\text{Percent change in } Q^d}{\text{Percent change in income}}$$

For a normal good, an increase in income causes an increase in demand (a larger quantity demanded for any price of the good).

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For an inferior good, an increase in income causes a decrease in demand (a smaller quantity demanded for any price of the good).

- For inferior goods, income elasticity < 0 .

The **cross-price elasticity of demand** measures the response of Q^d for one good to changes in the price of another good.

$$\text{Cross-price elasticity of demand} = \frac{\% \text{ change in } Q^d \text{ for good 1}}{\% \text{ change in price of good 2}}$$

For substitute goods (beef - chicken) the cross-price elasticity > 0 .

- *Example:* An increase in price of beef causes an increase in demand for chicken.

For complement goods (cars - gasoline) the cross-price elasticity < 0 .

- *Example:* An increase in price of gasoline causes a decrease in demand for cars.



10. Markets and Welfare: Maximizing Economic Well-Being

Markets and Welfare

Welfare Economics studies how the allocation of resources affects economic well-being. In other words, Welfare Economics studies how the distribution of resources and goods impacts the **well-being** of individuals and society. It seeks to understand how to achieve **efficient** and **fair** allocations that maximize overall utility, and it evaluates how different economic policies affect social welfare.

Do competitive markets give us a desirable allocation of resources?

Yes, the competitive market give us desirable allocation of resources in the sense that the competitive equilibrium maximized the total welfare of buyers and seller (gains from trade are maximized).

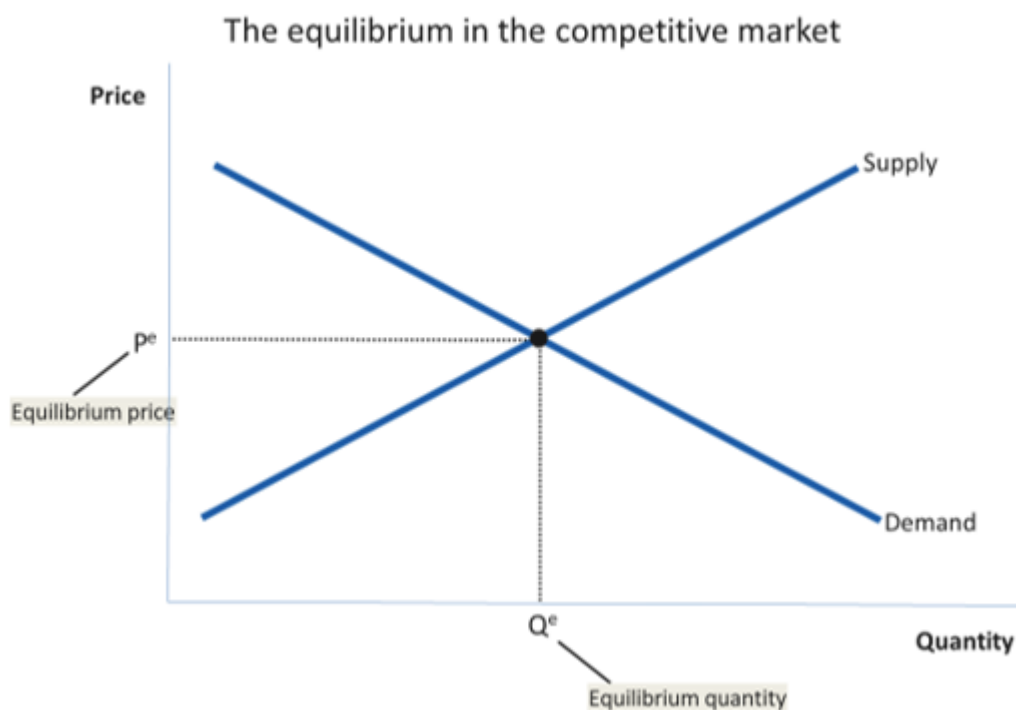
Can we improve upon the competitive equilibrium?

No, we cannot improve upon competitive equilibrium. (if by improvement we mean: more welfare/net benefit).

What do we mean by “allocation of resources”?

The allocation of resources in market refer to:

- how much of the good is produced
- which producer produce it
- which consumer consume it



How do we measure the welfare of individual market participant (buyers and sellers), and then how do we go from there to total welfare? How do we aggregate (add up)?

First, we look at the welfare of consumers. A buyer's willingness to pay (WTP) for the good is the maximum amount the buyer is willing to pay to obtain that good. According to Mr. Greg Mankiw WTP measures how much the buyer values the good. But Mr. Michael Sandel objects. He states, "The willingness to pay may not always show who values a good most highly!". For example let's take tickets to sporting events. Those who pay for the most expensive seats at the stadium often show up late and leave early. Do they really care about the game? Their ability to afford the best seats has more to do with the depth of their pockets than their passion for the game. This casts doubt on the claim that the price mechanism is the best way of getting goods to those who value them most highly.

WTP and the Demand Schedule

Derive the demand schedule

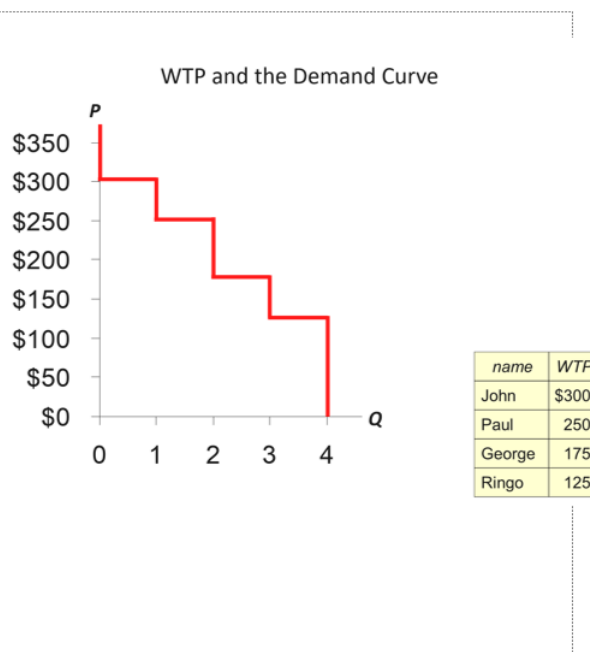
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John	\$300
Paul	250
George	175
Ringo	125

<i>P</i> (price of iPod)	who buys	<i>Q^d</i>
\$301 & up	nobody	0
251 – 300	John	1
176 – 250	Paul, John	2
126 – 175	George, Paul, John	3
0 – 125	Ringo, George, Paul, John	4

If $P = \$250$, two units are demanded.
If $P = \$250^+$ only one unit is demanded.

So, there is a buyer whose WTP is \$250.

When $P = \$225$ two units are demanded, buys that second unit at $P = \$250$ has a



Now, finally, here is how we measure the welfare of the consumers!

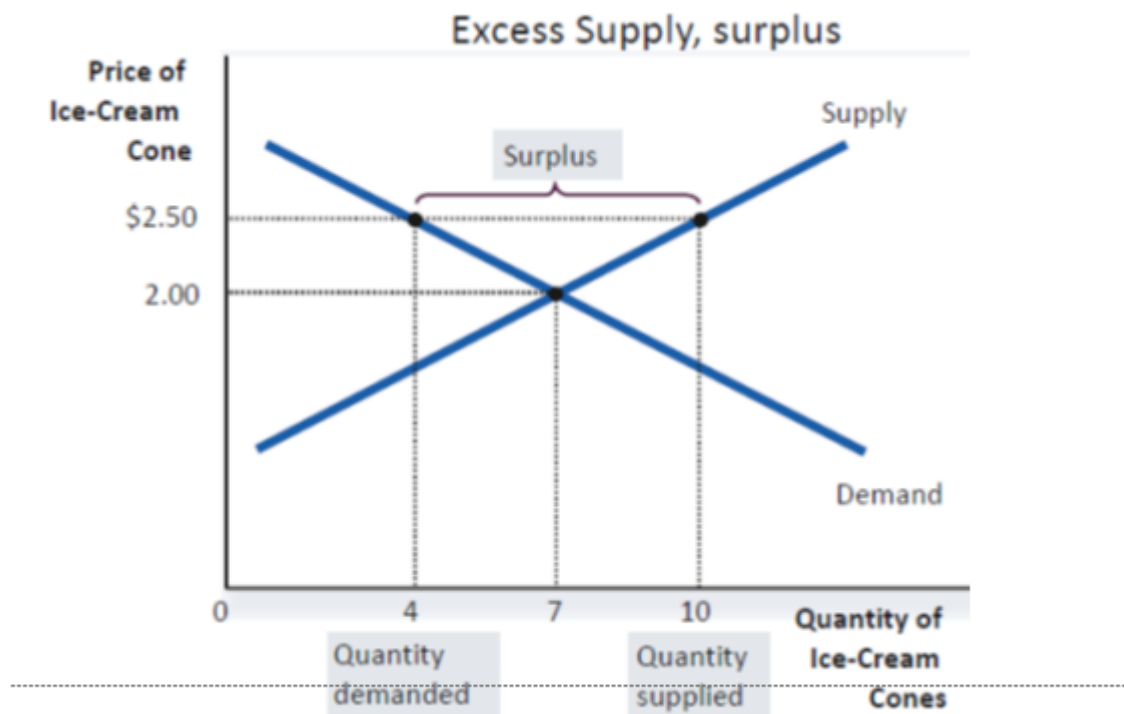
The Consumer Surplus

The Consumer Surplus (CS) is a monetary measure of the net benefit enjoyed by the buyers from being able to purchase a product at the going market price. The welfare of the consumer is measured by the consumer surplus, CS. Consumer surplus is the amount a buyer is willing to pay minus the amount the buyer actually pays:

$$CS = WTP - P$$

WARNING!

The term “surplus” in the “consumer surplus” is completely different than the term “surplus” we used to describe an excess supply situation (quantity supplied > quantity demanded)



Let's compute the CS for $P = \$260$

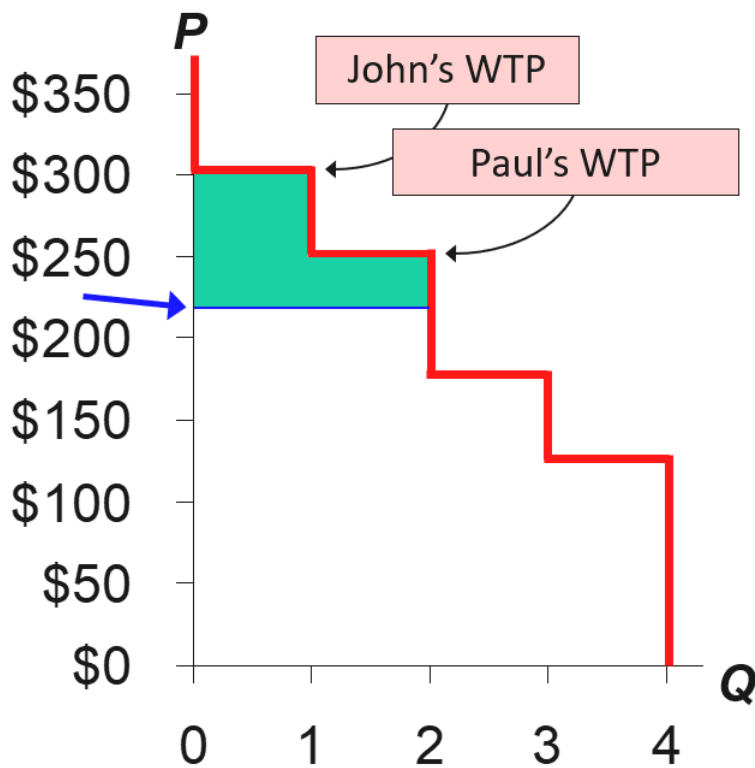
<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

John's CS = $\$300 - 260 = \40 .

The others get no CS because they do not buy an iPod at this price.

Total CS = \$40.

CS and the Demand Curve



Now, suppose $P = \$220$

What will be the CS now?

John's CS =

$$\$300 - 220 = \underline{\$80}$$

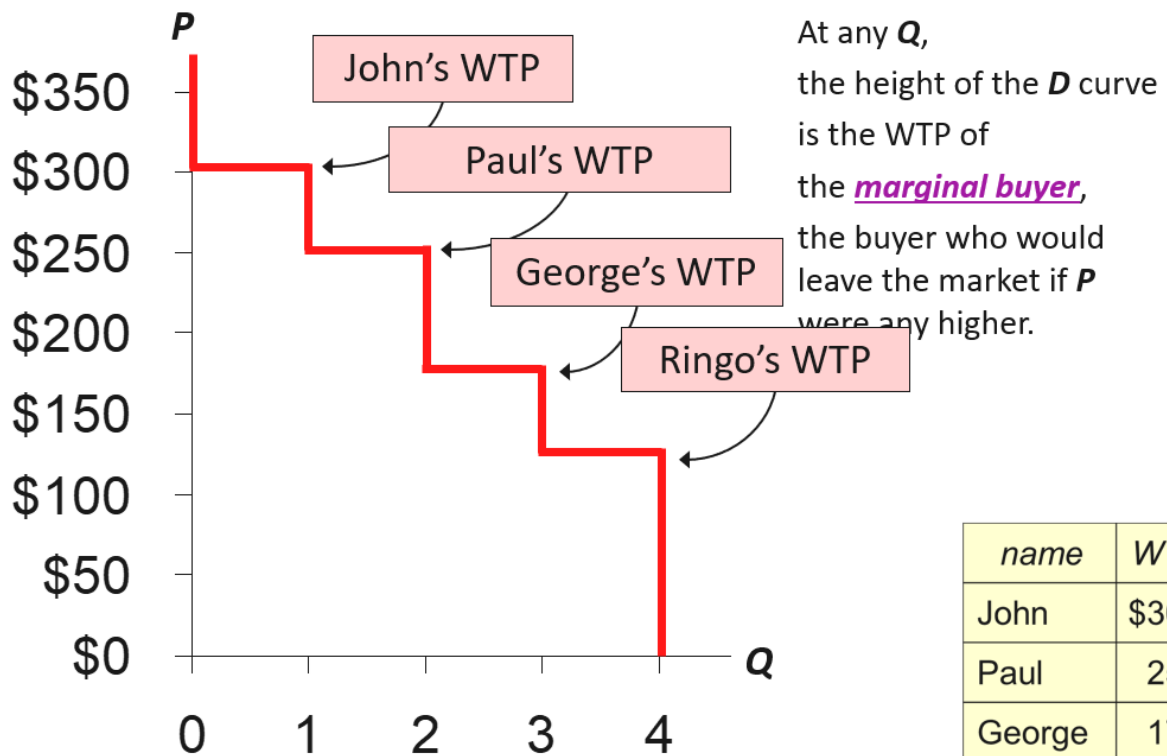
Paul's CS =

$$\$250 - 220 = \underline{\$30}$$

$$\text{Total CS} = \underline{\$110}$$

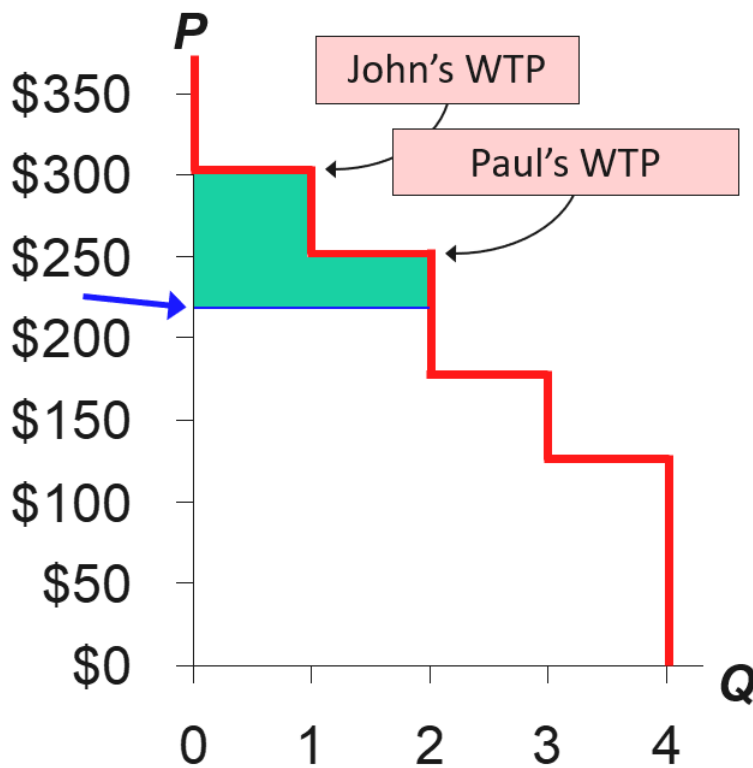
<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

WTP and the Demand Curve



Total CS equals the area under the demand curve above the price, from 0 to Q .

CS and the Demand Curve



Now, suppose $P = \$220$

What will be the CS now?

John's CS =

$$\$300 - 220 = \underline{\$80}$$

Paul's CS =

$$\$250 - 220 = \underline{\$30}$$

Total CS = \$110

<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

Allocating a limited supply of IPODs

<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

At what price do we have quantity demanded = 2?

Any price between \$175+ and \$250

Which of these four consumers gets an IPOD when price is, say, \$200?

Suppose only 2 IPODS can be supplied.

John and Paul.

Let's use the price mechanism to allocate these two IPODS to these four consumers.

The price mechanism allocates the limited supply of goods to those consumers who value them most. (who are willing to pay the most for the goods.)

The price mechanism allocates the limited supply of goods to consumers who are willing to pay the most. Is this good or bad?

Price Mechanism: A Necessary Evil?

Allocating the limited supply of goods to consumers who are willing to pay the most for the goods is **an attractive result when individuals have similar incomes**.

When income distribution is unequal (large differences in incomes across individuals), then one can

- redistribute income from high income individuals to low income individuals
- subsidize the consumption of goods by low income individuals

The Producer Surplus

Producer Surplus is the difference between the amount that a firm actually receives from selling a good in the marketplace and the minimum amount the firm must receive in order to be willing to supply the good in the marketplace.

What is meant by “the minimum amount the firm *must receive* in order to be willing to supply the good in the marketplace”? **Costs!** A few remarks on cost:

- Cost is the value of everything a seller must give up to produce a good.
- Includes cost of resources used to produce the good, like labor costs, cost of raw materials, etc.
- It also includes the opportunity cost of these resources, like the value of seller’s time.

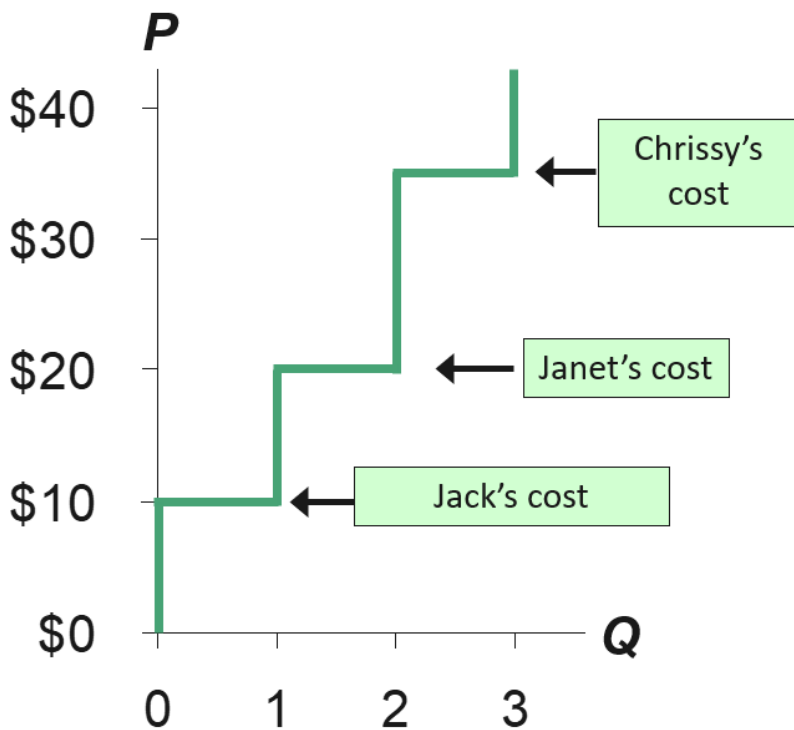
Cost and the Supply Curve

Costs of 3 sellers in the lawn-cutting business.

<i>name</i>	<i>cost</i>
Jack	\$10
Janet	20
Chrissy	35

A seller will supply the service only if the price $\geq$ his or her cost.

Cost and the Supply Curve



P	Q^s
\$0 – 9	0
10 – 19	1
20 – 34	2
35 & up	3

<i>name</i>	<i>cost</i>
Jack	\$10
Janet	20
Chrissy	35

Allocating a limited demand for lawn cutting services

<i>name</i>	<i>cost</i>
Jack	\$10
Janet	20
Chrissy	35

Suppose only 2 units are needed/demanded.

Suppose we use the price mechanism to choose the sellers.

At what price is quantity supplied = 2 units?

Any price between 20 and 35-

Let's say $P = 25$.

Which of the three sellers will provide lawn cutting services when $P = 25$?

Jack and Janet.

The price mechanism ensures that the required quantity is produced by those sellers with the lowest cost.

Formulation:

$$PS = P - \text{COST}$$

Producer Surplus (PS): The amount a seller is paid for a good minus the seller's cost.

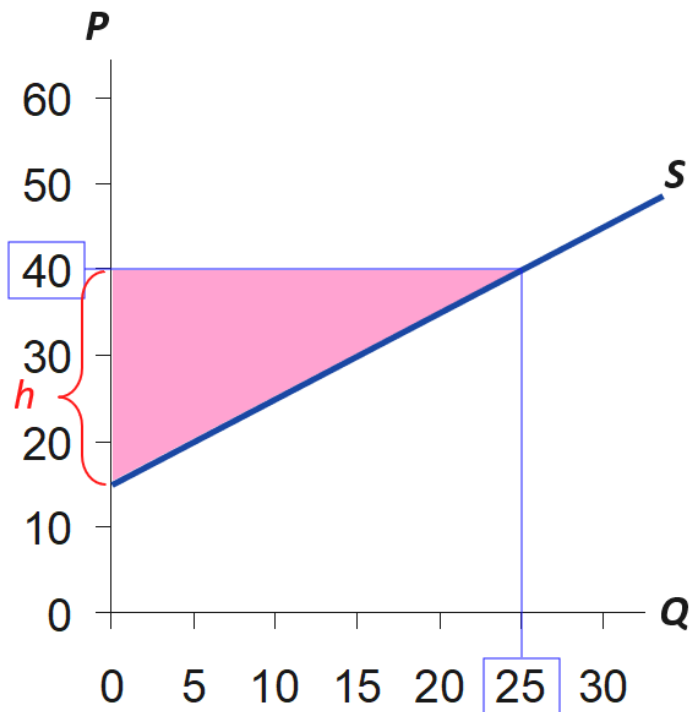
Producer Surplus with a smooth supply curve

Producer Surplus is the area under the price line and above the supply curve, from 0 to Q .

height =
 $\$40 - 15 = \25

Base = 25,000 units

$$\begin{aligned} PS &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 25,000 \times \$25 \\ &= \underline{\underline{\$312,500}} \end{aligned}$$



Producer Surplus is the area under the price line and above the supply curve, from 0 to Q .

Total Surplus

Consumer Surplus and Producer Surplus, and Total Surplus

CS = (value to buyers) – (amount paid by buyers)
= buyers' gains from participating in the market

PS = (amount received by sellers) – (cost to sellers)
= sellers' gains from participating in the market

Total surplus = CS + PS
= (value to buyers) – (cost to sellers)
= total gains from trade in the market

Total Surplus

Total Surplus = CS + PS = (value to buyers) - (cost to sellers)

Total Surplus = Total Gains from Trade in the Market

To **maximize the welfare of society**, **total surplus** should be as **large as possible**, which typically happens when the market is **allocatively efficient** and the allocation of goods and services reflects both consumer and producer needs without market distortions.

An allocation of resources is **efficient** if it maximizes total surplus. Efficiency means:

- The goods are consumed by the buyers who value them most highly.
- The goods are produced by the producers with lowest costs.
- Raising or lowering the quantity of a good would not increase total surplus.

ALL three conditions are satisfied in the **competitive equilibrium**.

Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #1:

Produce one more unit: $Q = 15,000 + 1$

What is the value of that unit to consumers?

There is no buyer with $WTP \geq 30$, all buyers with $WTP \geq 30$ already bought the good

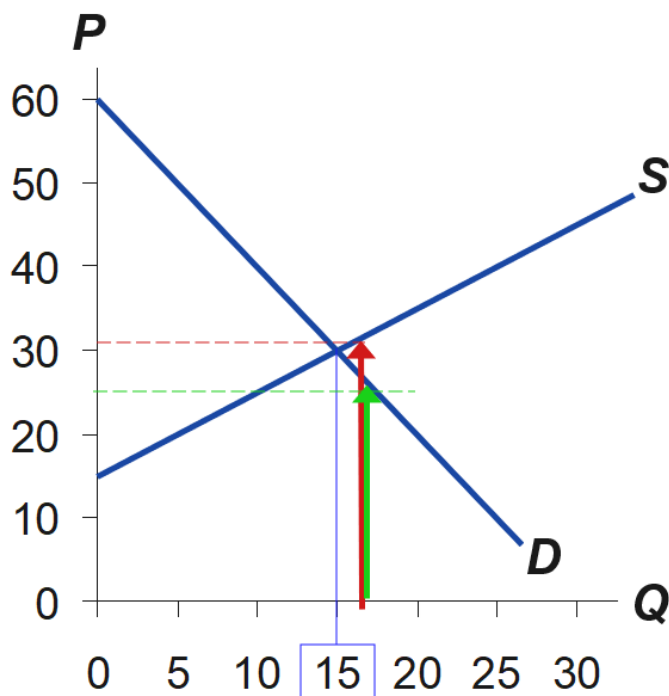
Remaining buyers have **$WTP < 30$**

What is the cost of the additional unit to sellers?

There is no seller with $\text{cost} \leq 30$, they all produced their units

All remaining sellers have **$\text{cost} > 30$** .

The value of the additional unit is less than its cost → producing it will reduce total surplus



Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #2

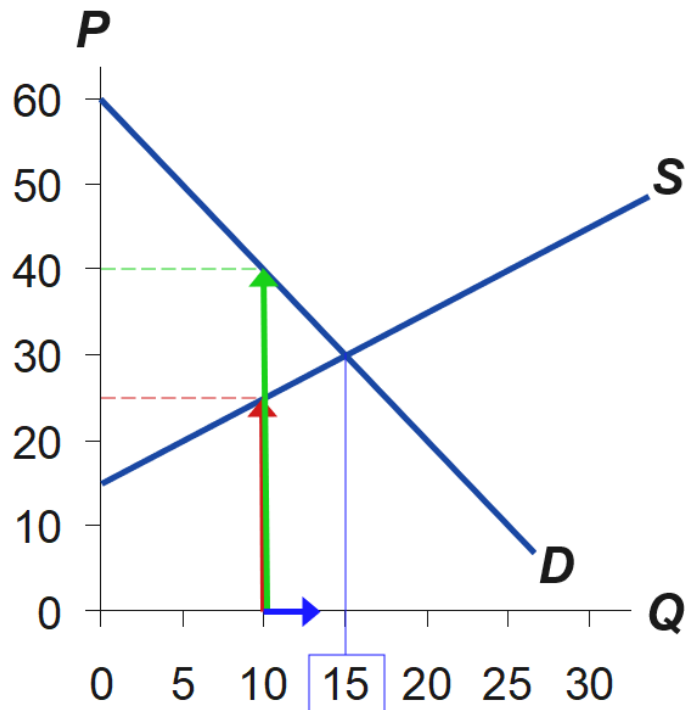
Produce only 10,000 units.

At this level, the

- cost of producing an additional unit is \$25
- value to consumers of this additional unit is \$40

Hence, we can increase total surplus by increasing Q .

This is true at any Q less than 15,000.



Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #2

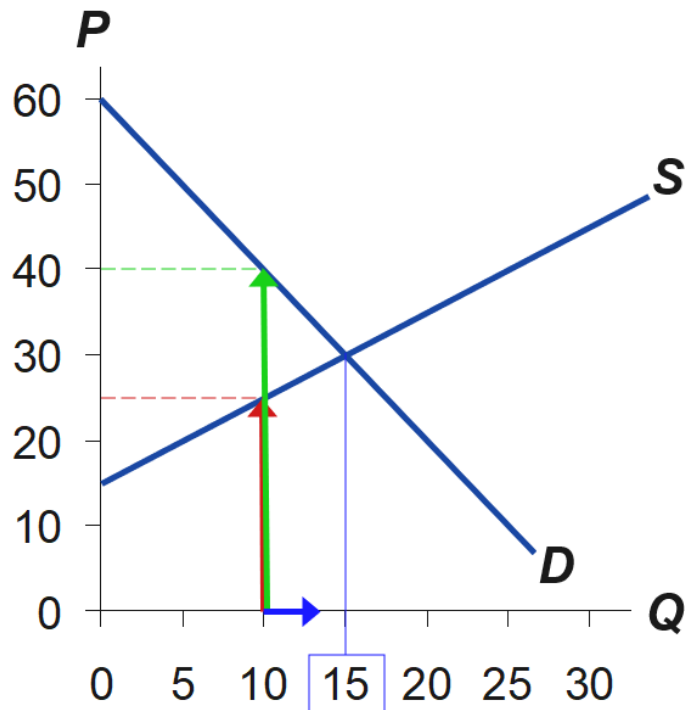
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At this level, the

- cost of producing an additional unit is \$25
- value to consumers of this additional unit is \$40

Hence, we can increase total surplus by increasing Q .

This is true at any Q less than 15,000.



Conclusion

The equilibrium quantity maximizes total surplus. At any other quantity, we can increase total surplus by moving toward the equilibrium quantity.

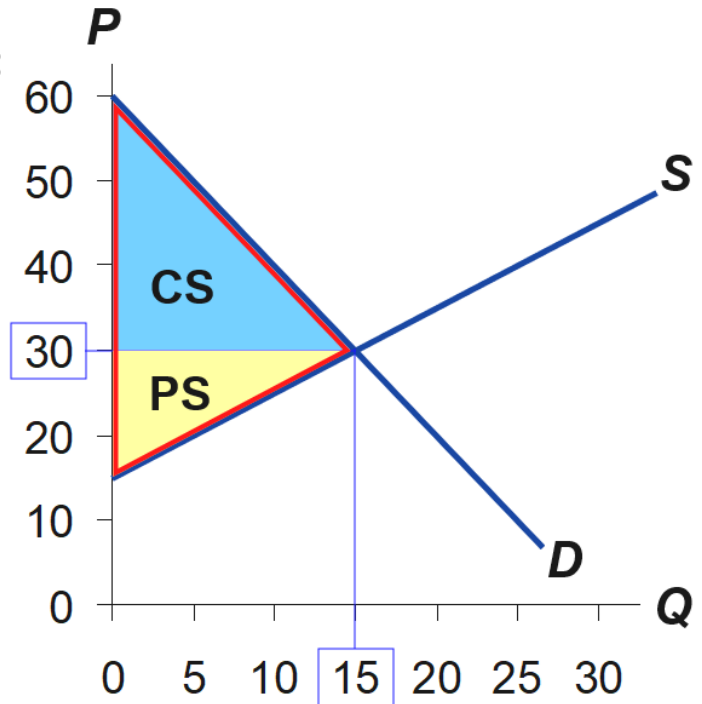
Evaluating the competitive equilibrium

The competitive equilibrium:

$P = \$30$; $Q = 15,000$

Total surplus is $CS + PS$

The competitive equilibrium
is efficient.





11. Price Mechanism: When Resource Allocation Meets Fairness and Efficiency

| **Note:** This page contains content extracted from [Lecture 9](#) and [Lecture 10](#).

Other Demand Elasticities

The **income elasticity of demand** measures the response of Q^d to a change in consumer income.

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The **cross-price elasticity of demand** measures the response of Q^d for one good to changes in the price of another good.

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For substitute goods (beef - chicken) the cross-price elasticity > 0 .

- *Example:* An increase in price of beef causes an increase in demand for chicken.

For complement goods (cars - gasoline) the cross-price elasticity < 0 .

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Markets and Welfare

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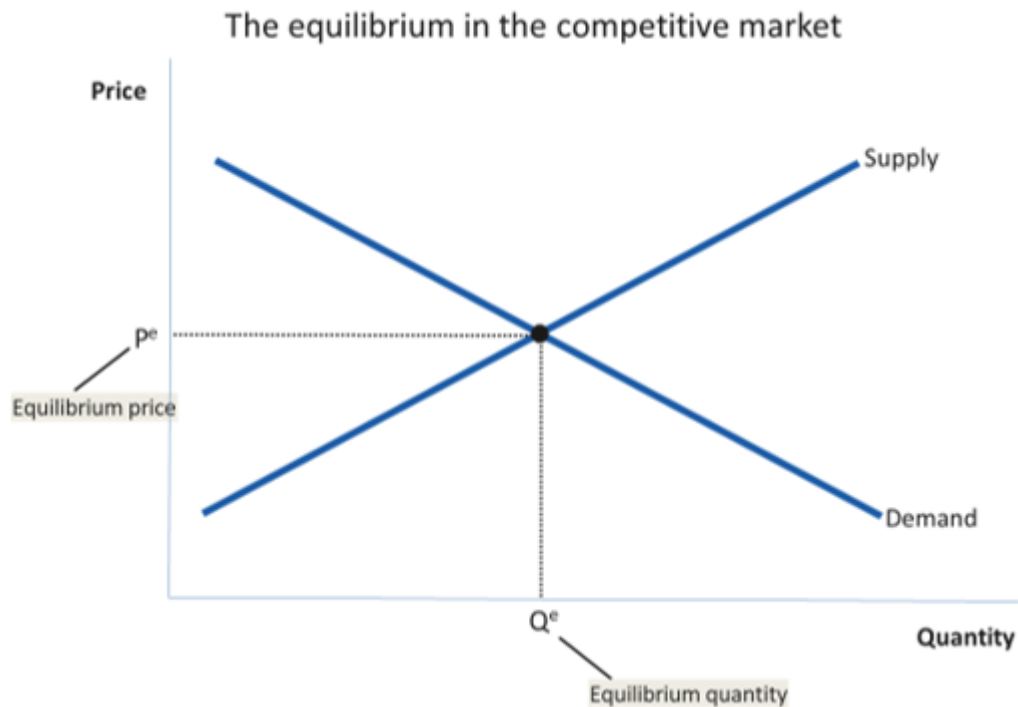
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What do we mean by “allocation of resources”?

The allocation of resources in market refer to:

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WTP and the Demand Schedule

Derive the demand schedule

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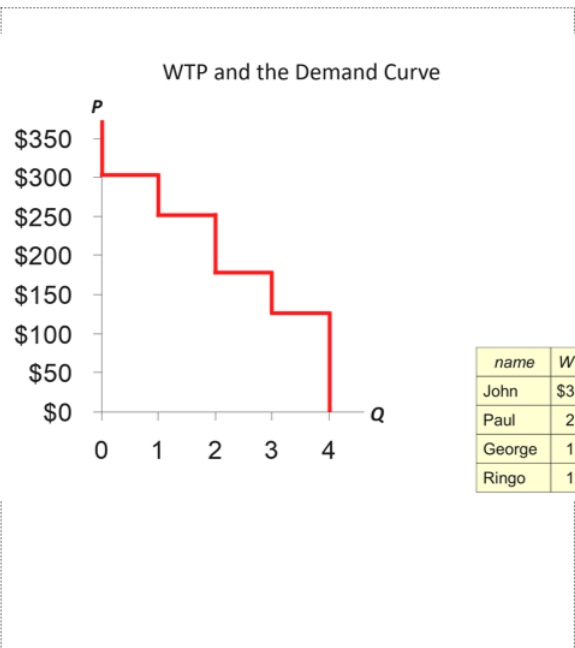
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If $P = \$250$, two units are demanded.

If $P = \$250^+$ only one unit is demanded.

So, there is a buyer whose WTP is \$250.

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Now, finally, here is how we measure the welfare of the consumers!

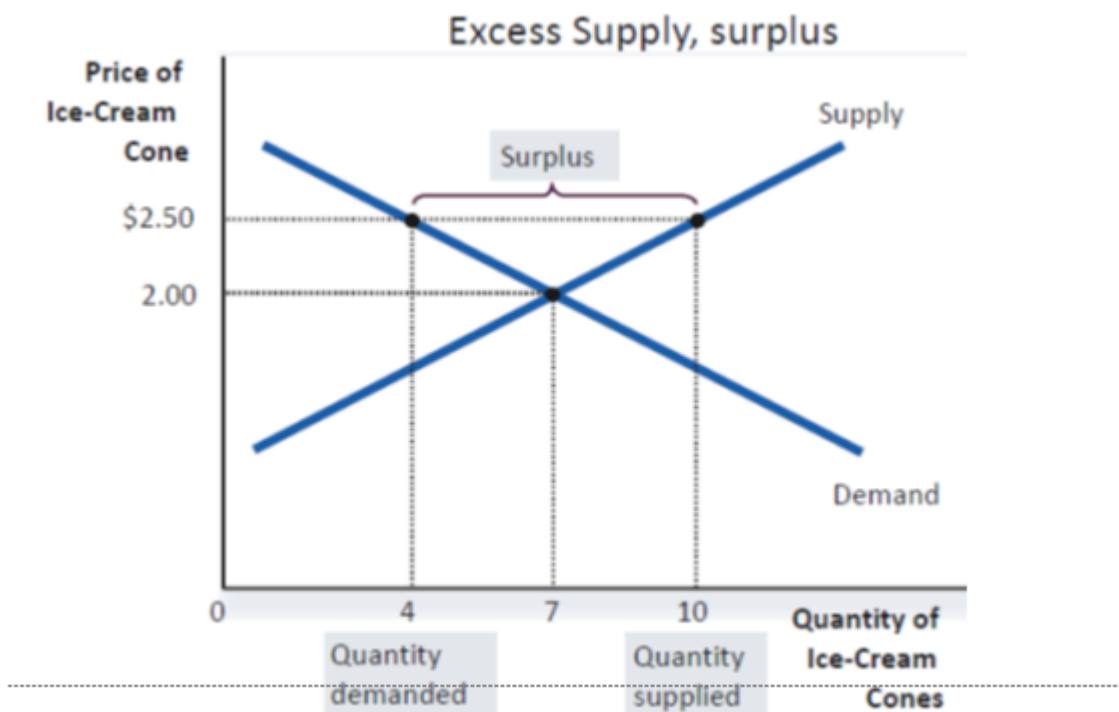
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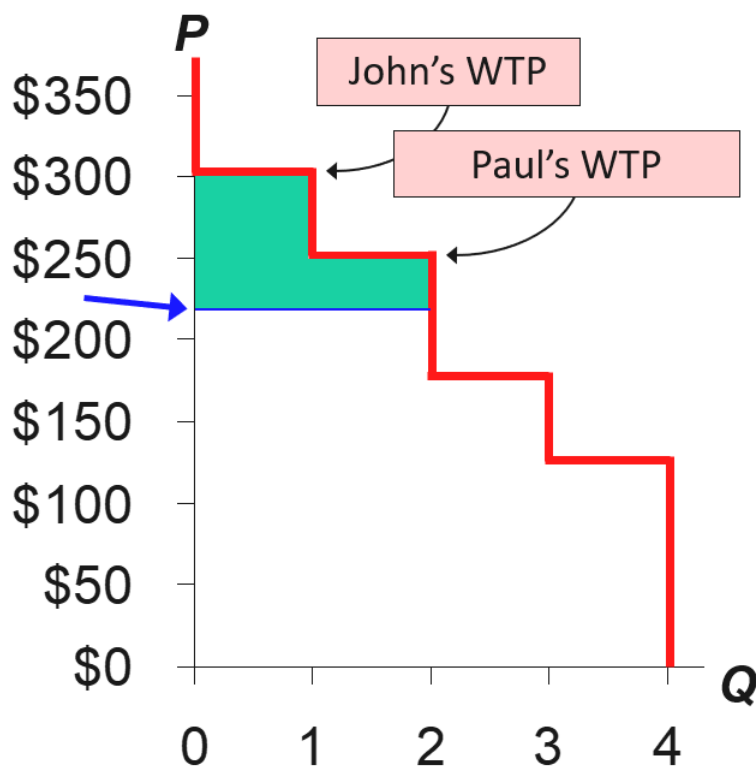
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CS and the Demand Curve



Now, suppose $P = \$220$

What will be the CS now?

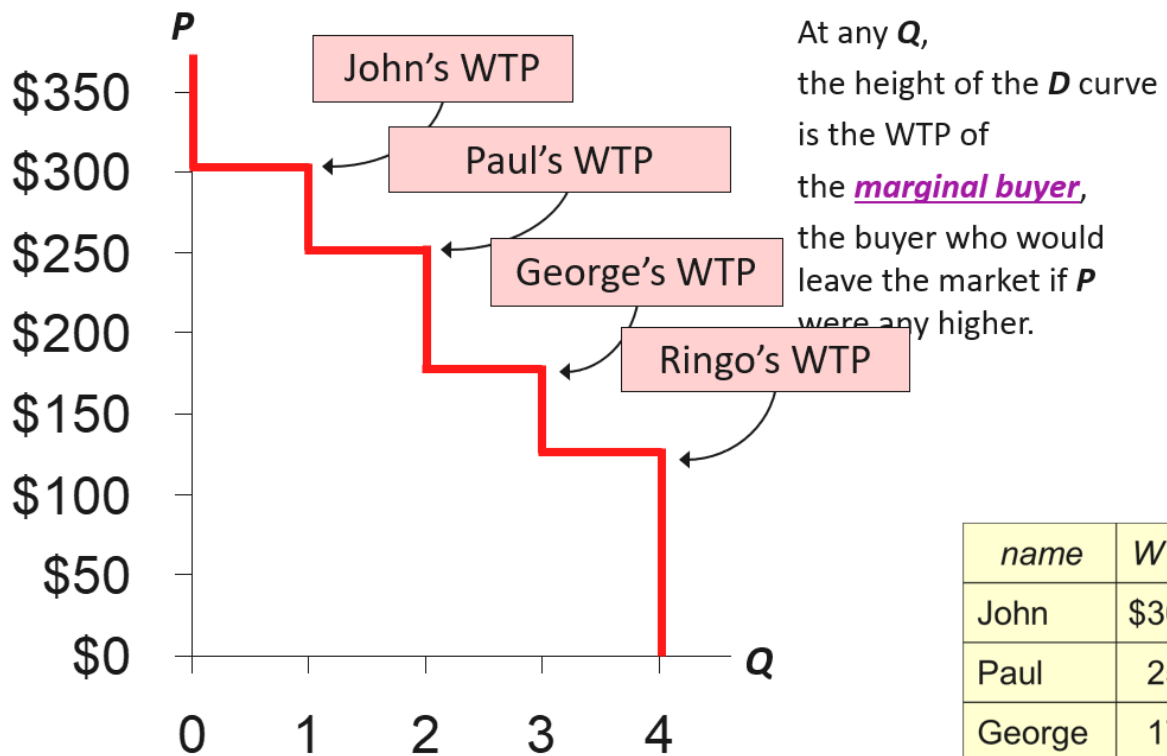
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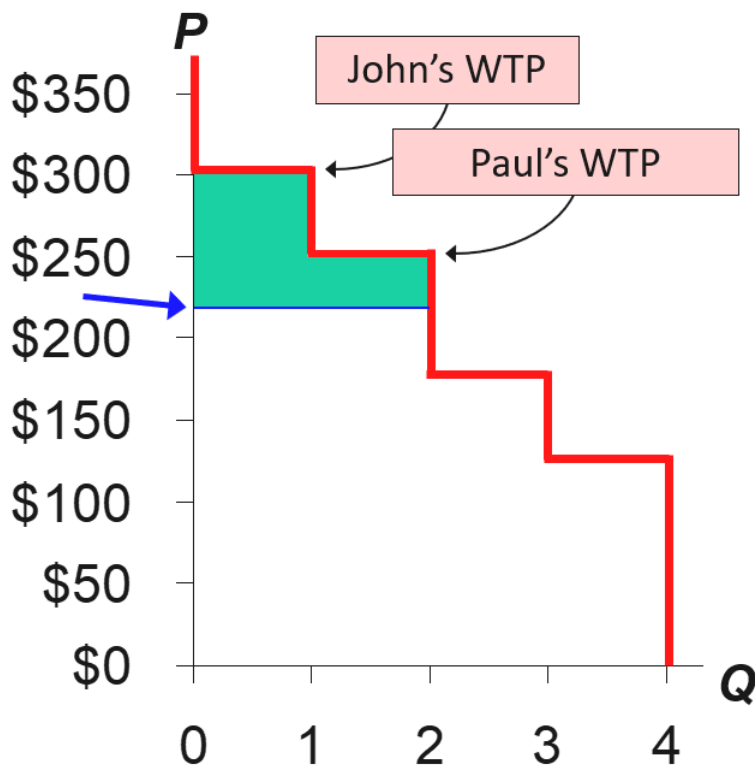
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Allocating a limited supply of IPODs

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George	175
Ringo	125

At what price do we have quantity demanded = 2?

Any price between \$175+ and \$250

Which of these four consumers gets an IPOD when price is, say, \$200?

Suppose only 2 IPODS can be supplied.

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Let's use the price mechanism to allocate these two IPODS to these four consumers.

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The price mechanism allocates the limited supply of goods to consumers who are willing to pay the most. Is this good or bad?

Price Mechanism: A Necessary Evil?

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12. Market Efficiency: How Competitive Equilibrium Maximizes Total Welfare

Note: This page contains content extracted from [Lecture 10](#).

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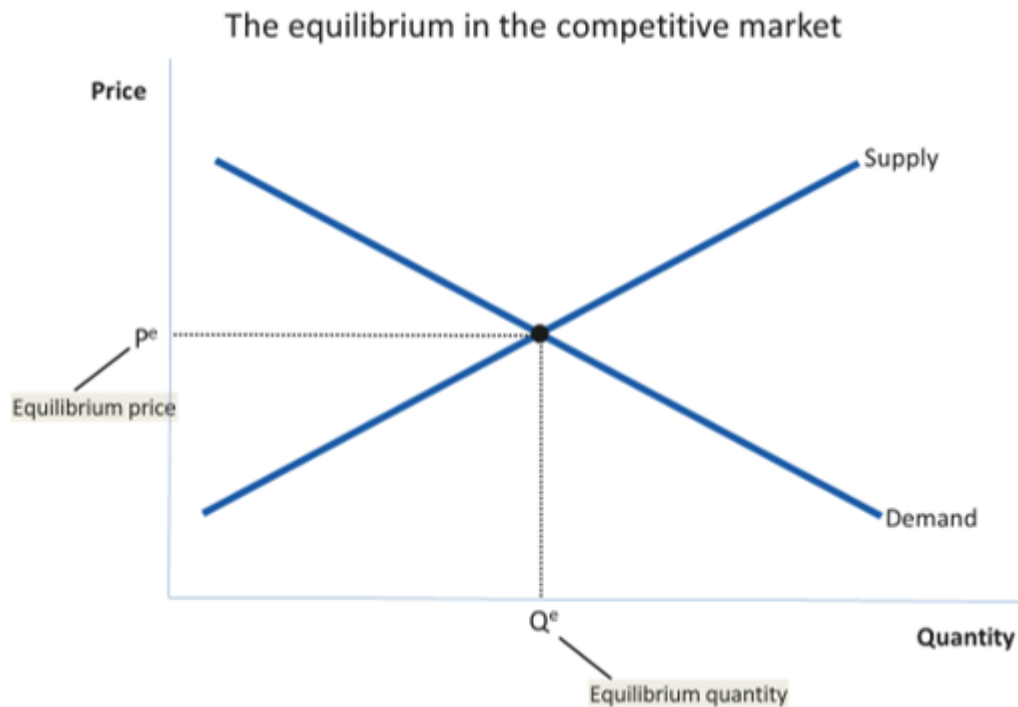
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WTP and the Demand Schedule

Derive the demand schedule

<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

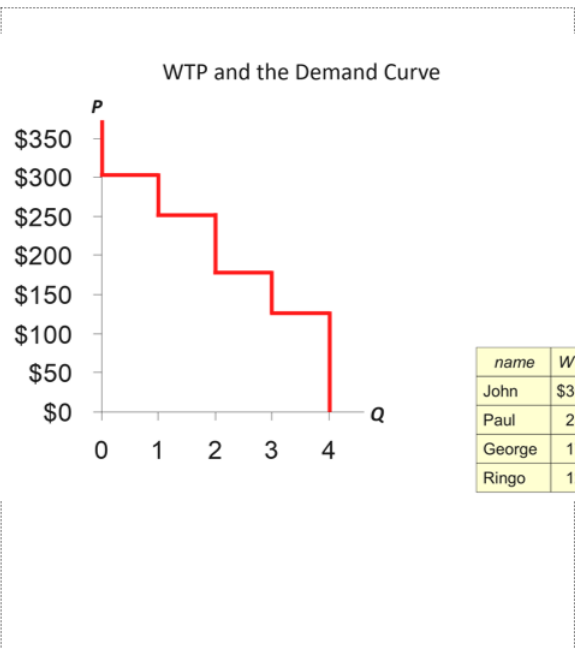
<i>P</i> (price of iPod)	who buys	<i>Q^d</i>
\$301 & up	nobody	0
251 – 300	John	1
176 – 250	Paul, John	2
126 – 175	George, Paul, John	3
0 – 125	Ringo, George, Paul, John	4

If $P = \$250$, two units are demanded.

If $P = \$250^+$ only one unit is demanded.

So, there is a buyer whose WTP is \$250.

When $P = \$225$ two units are demanded, buys that second unit at $P = \$250$ has a



Now, finally, here is how we measure the welfare of the consumers!

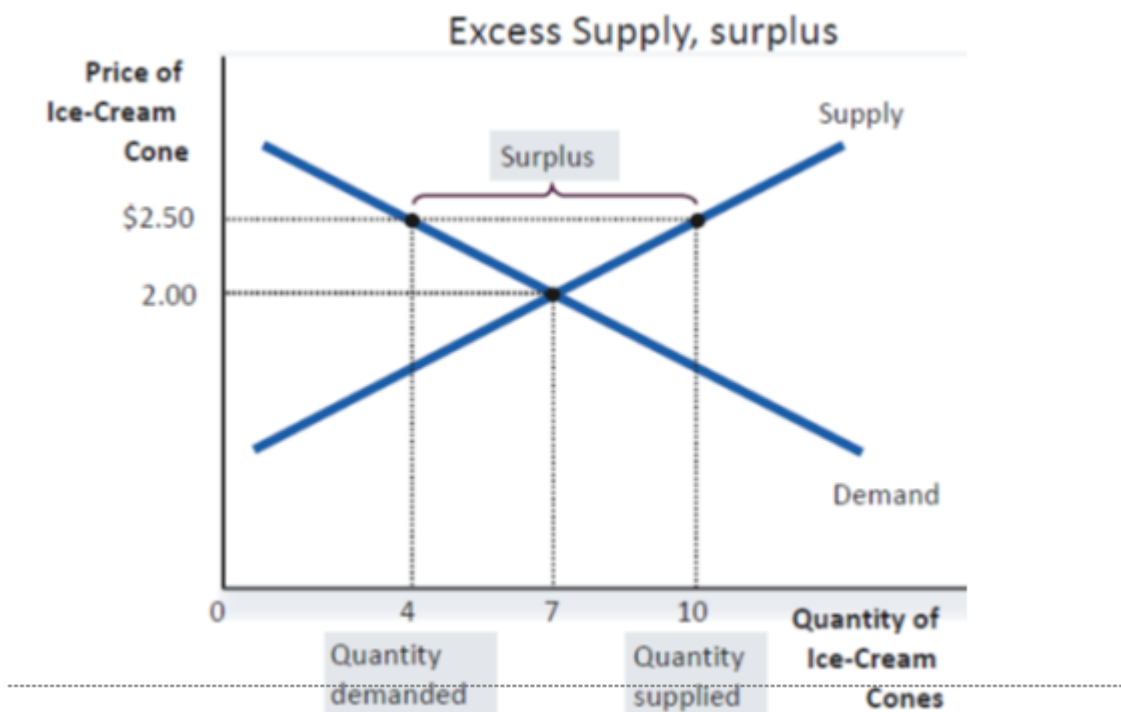
The Consumer Surplus

The Consumer Surplus (CS) is a monetary measure of the net benefit enjoyed by the buyers from being able to purchase a product at the going market price. The welfare of the consumer is measured by the consumer surplus, CS. Consumer surplus is the amount a buyer is willing to pay minus the amount the buyer actually pays:

$$CS = WTP - P$$

WARNING!

The term “surplus” in the “consumer surplus” is completely different than the term “surplus” we used to describe an excess supply situation (quantity supplied > quantity demanded)



Let's compute the CS for $P = \$260$

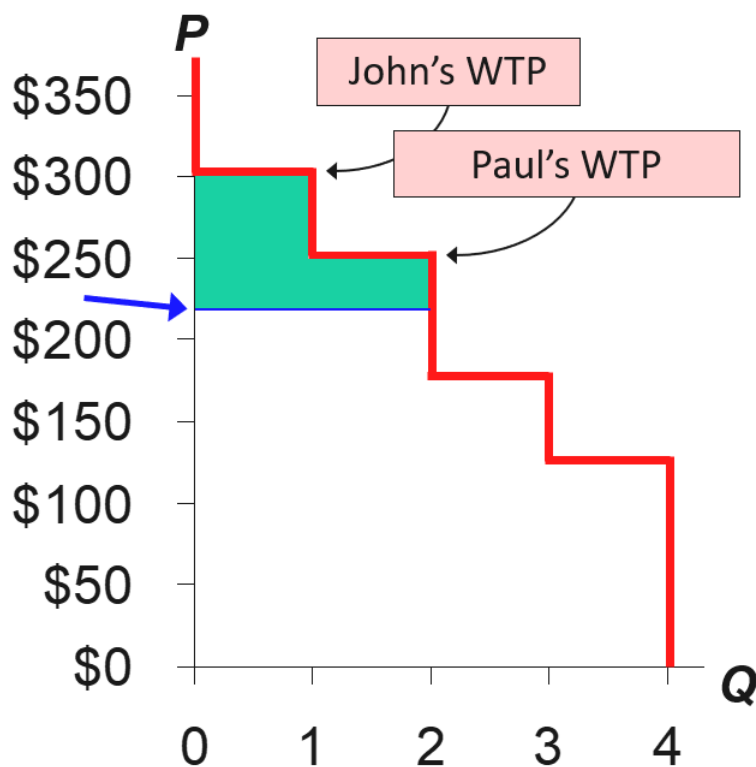
<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

John's CS = $\$300 - 260 = \40 .

The others get no CS because they do not buy an iPod at this price.

Total CS = $\$40$.

CS and the Demand Curve



Now, suppose $P = \$220$

What will be the CS now?

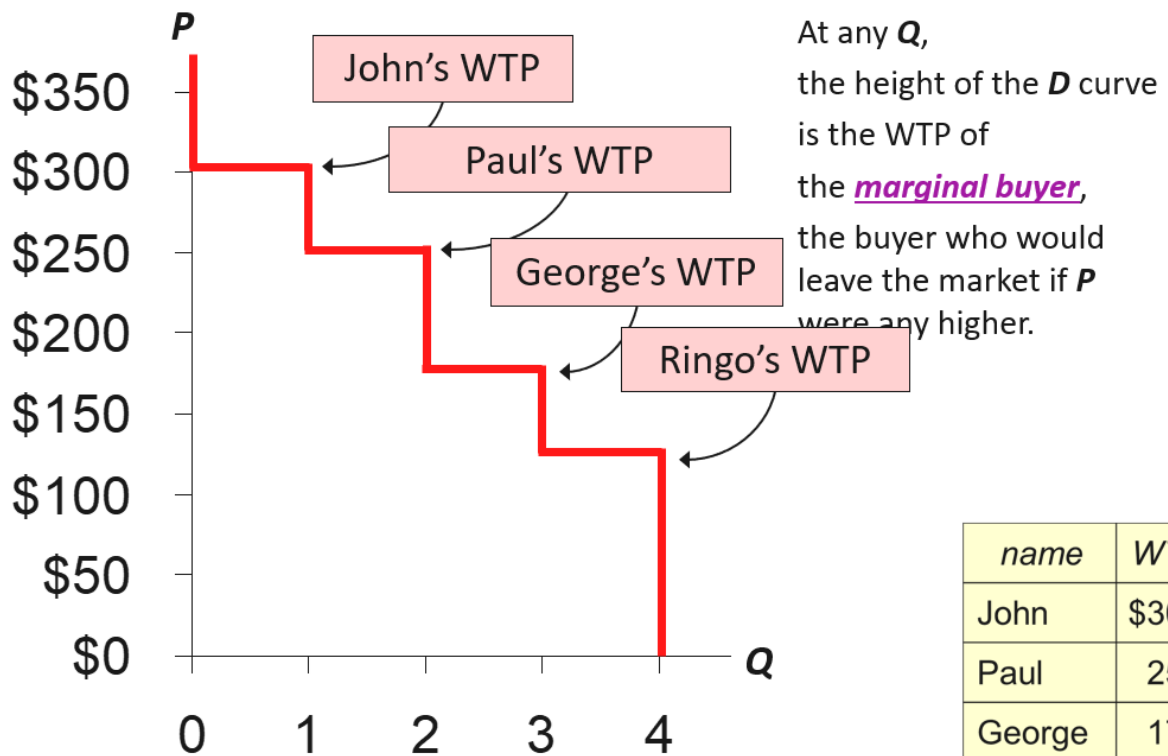
John's CS = $\$300 - 220 = \underline{\$80}$

Paul's CS = $\$250 - 220 = \underline{\$30}$

Total CS = $\underline{\$110}$

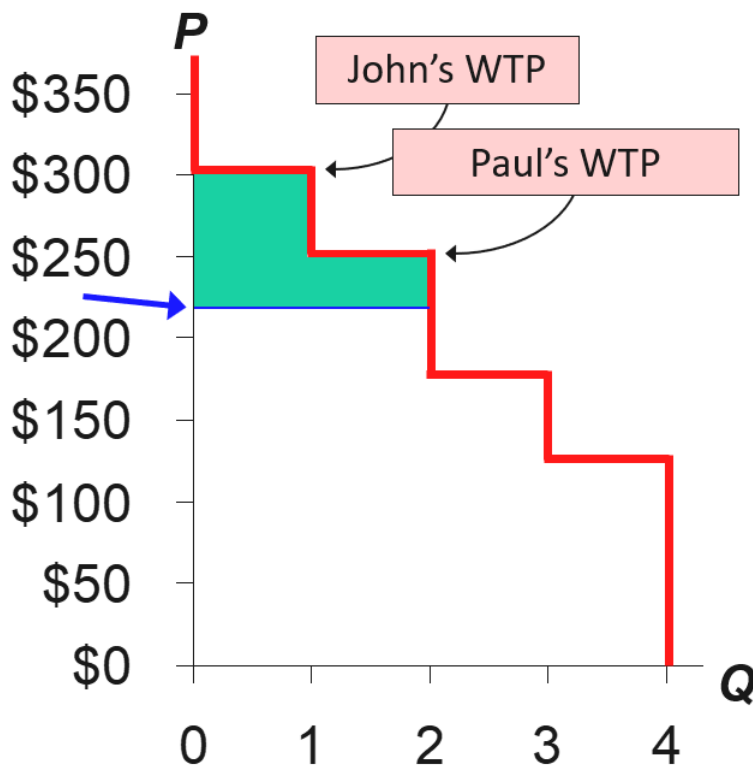
<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

WTP and the Demand Curve



Total CS equals the area under the demand curve above the price, from 0 to Q .

CS and the Demand Curve



Now, suppose $P = \$220$

What will be the CS now?

John's CS =

$$\$300 - 220 = \underline{\$80}$$

Paul's CS =

$$\$250 - 220 = \underline{\$30}$$

$$\text{Total CS} = \underline{\$110}$$

<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

Allocating a limited supply of IPODs

<i>name</i>	<i>WTP</i>
John	\$300
Paul	250
George	175
Ringo	125

At what price do we have quantity demanded = 2?

Any price between \$175+ and \$250

Which of these four consumers gets an IPOD when price is, say, \$200?

Suppose only 2 IPODS can be supplied.

John and Paul.

Let's use the price mechanism to allocate these two IPODS to these four consumers.

The price mechanism allocates the limited supply of goods to those consumers who value them most. (who are willing to pay the most for the goods.)

The price mechanism allocates the limited supply of goods to consumers who are willing to pay the most. Is this good or bad?

Price Mechanism: A Necessary Evil?

Allocating the limited supply of goods to consumers who are willing to pay the most for the goods is **an attractive result when individuals have similar incomes**.

When income distribution is unequal (large differences in incomes across individuals), then one can

- redistribute income from high income individuals to low income individuals
- subsidize the consumption of goods by low income individuals

The Producer Surplus

Producer Surplus is the difference between the amount that a firm actually receives from selling a good in the marketplace and the minimum amount the firm must receive in order to be willing to supply the good in the marketplace.

What is meant by “the minimum amount the firm *must receive* in order to be willing to supply the good in the marketplace”? **Costs!** A few remarks on cost:

- Cost is the value of everything a seller must give up to produce a good.
- Includes cost of resources used to produce the good, like labor costs, cost of raw materials, etc.
- It also includes the opportunity cost of these resources, like the value of seller’s time.

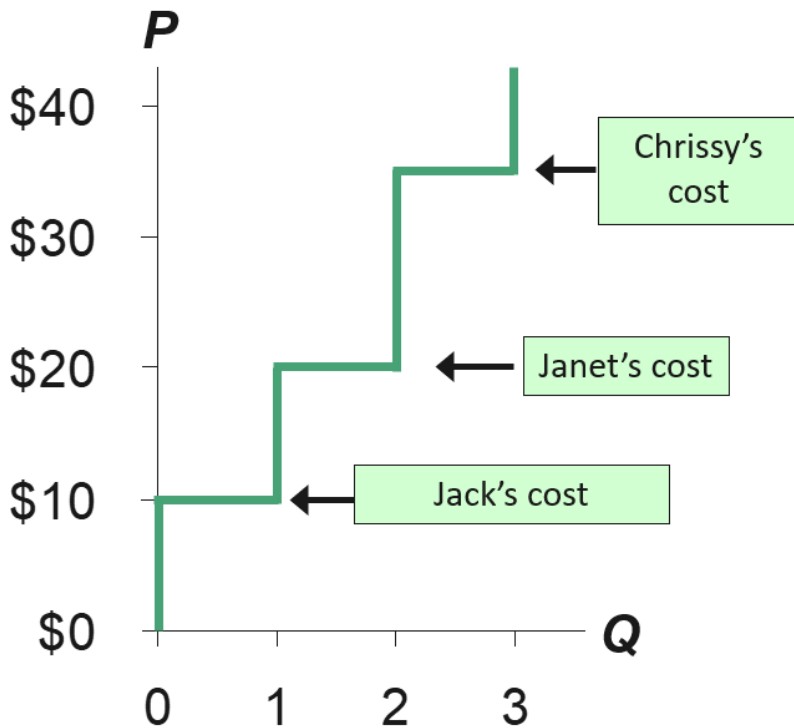
Cost and the Supply Curve

Costs of 3 sellers in the lawn-cutting business.

<i>name</i>	<i>cost</i>
Jack	\$10
Janet	20
Chrissy	35

A seller will supply the service only if the price $\geq$ his or her cost.

Cost and the Supply Curve



P	Q^s
\$0 – 9	0
10 – 19	1
20 – 34	2
35 & up	3

<i>name</i>	<i>cost</i>
Jack	\$10
Janet	20
Chrissy	35

Allocating a limited demand for lawn cutting services

<i>name</i>	<i>cost</i>
Jack	\$10
Janet	20
Chrissy	35

Suppose only 2 units are needed/demanded.

Suppose we use the price mechanism to choose the sellers.

At what price is quantity supplied = 2 units?

Any price between 20 and 35-

Let's say $P = 25$.

Which of the three sellers will provide lawn cutting services when $P = 25$?

Jack and Janet.

The price mechanism ensures that the required quantity is produced by those sellers with the lowest cost.

Formulation:

$$PS = P - \text{COST}$$

Producer Surplus (PS): The amount a seller is paid for a good minus the seller's cost.

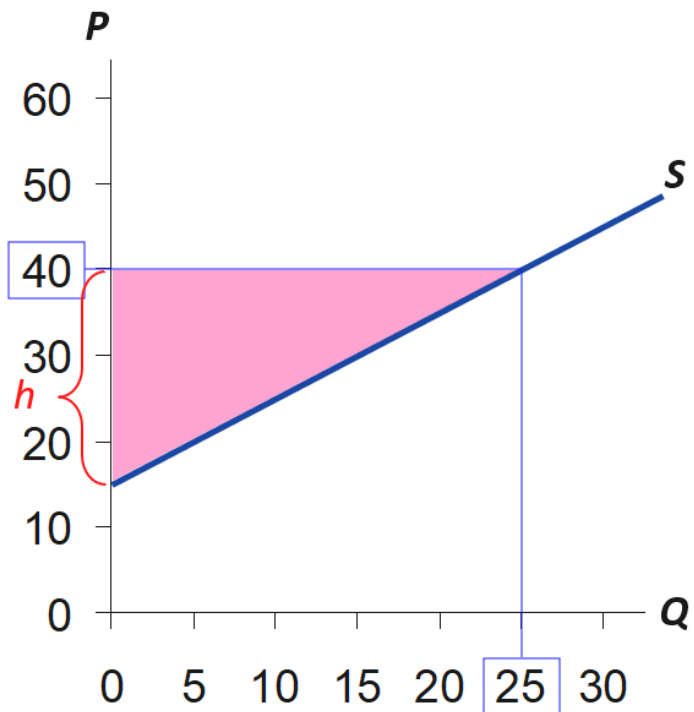
Producer Surplus with a smooth supply curve

Producer Surplus is the area under the price line and above the supply curve, from 0 to Q .

height =
 $\$40 - 15 = \25

Base = 25,000 units

$$\begin{aligned} PS &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 25,000 \times \$25 \\ &= \underline{\underline{\$312,500}} \end{aligned}$$



Producer Surplus is the area under the price line and above the supply curve, from 0 to Q .

Total Surplus

Consumer Surplus and Producer Surplus, and Total Surplus

CS = (value to buyers) – (amount paid by buyers)
= buyers' gains from participating in the market

PS = (amount received by sellers) – (cost to sellers)
= sellers' gains from participating in the market

Total surplus = CS + PS
= (value to buyers) – (cost to sellers)
= total gains from trade in the market

Total Surplus

Total Surplus = CS + PS = (value to buyers) - (cost to sellers)

Total Surplus = Total Gains from Trade in the Market

To **maximize the welfare of society**, **total surplus** should be as **large as possible**, which typically happens when the market is **allocatively efficient** and the allocation of goods and services reflects both consumer and producer needs without market distortions.

An allocation of resources is **efficient** if it maximizes total surplus. Efficiency means:

- The goods are consumed by the buyers who value them most highly.
- The goods are produced by the producers with lowest costs.
- Raising or lowering the quantity of a good would not increase total surplus.

ALL three conditions are satisfied in the **competitive equilibrium**.

Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #1:

Produce one more unit: $Q = 15,000 + 1$

What is the value of that unit to consumers?

There is no buyer with $WTP \geq 30$, all buyers with $WTP \geq 30$ already bought the good

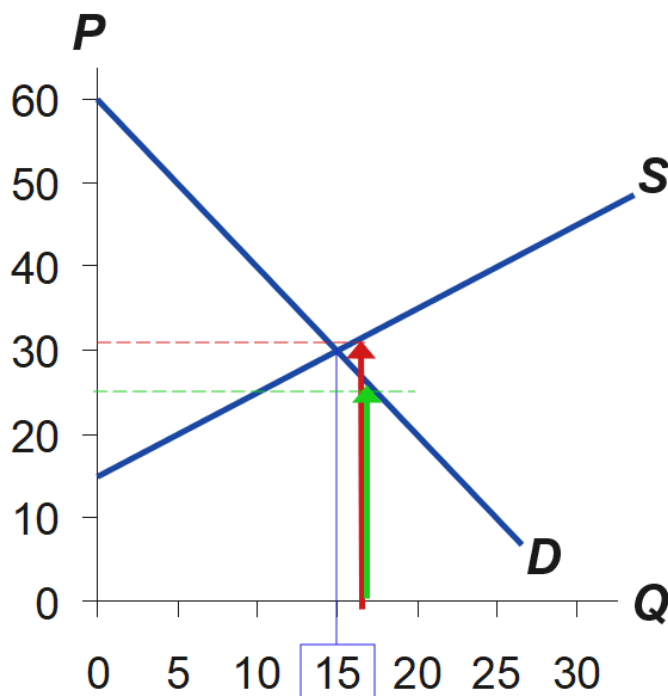
Remaining buyers have **$WTP < 30$**

What is the cost of the additional unit to sellers?

There is no seller with $\text{cost} \leq 30$, they all produced their units

All remaining sellers have **$\text{cost} > 30$** .

The value of the additional unit is less than its cost → producing it will reduce total surplus



Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #2

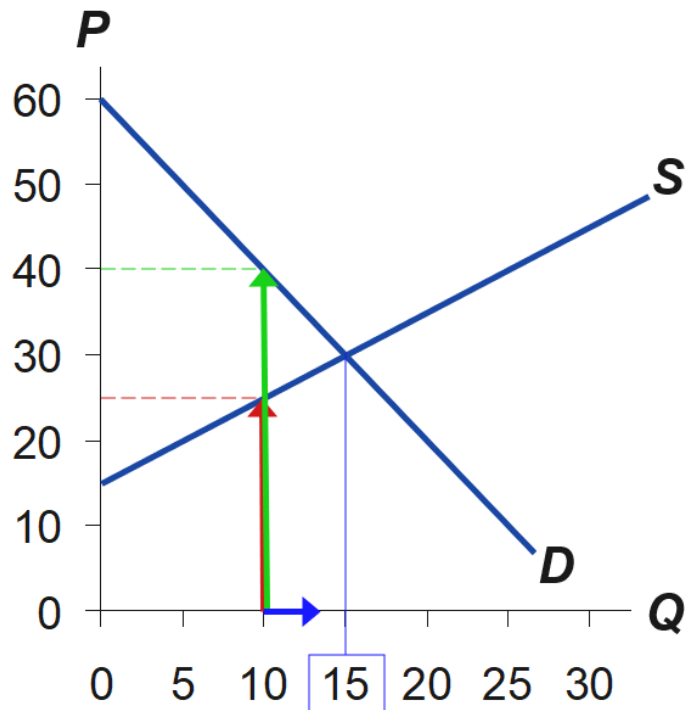
Produce only 10,000 units.

At this level, the

- cost of producing an additional unit is \$25
- value to consumers of this additional unit is \$40

Hence, we can increase total surplus by increasing Q .

This is true at any Q less than 15,000.



Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #2

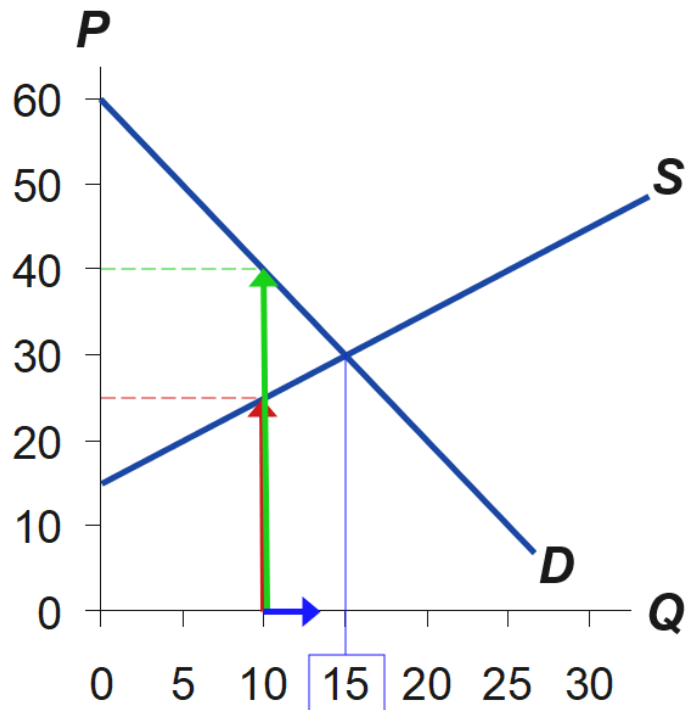
Produce only 10,000 units.

At this level, the

- cost of producing an additional unit is \$25
- value to consumers of this additional unit is \$40

Hence, we can increase total surplus by increasing Q .

This is true at any Q less than 15,000.



Conclusion

The equilibrium quantity maximizes total surplus. At any other quantity, we can increase total surplus by moving toward the equilibrium quantity.

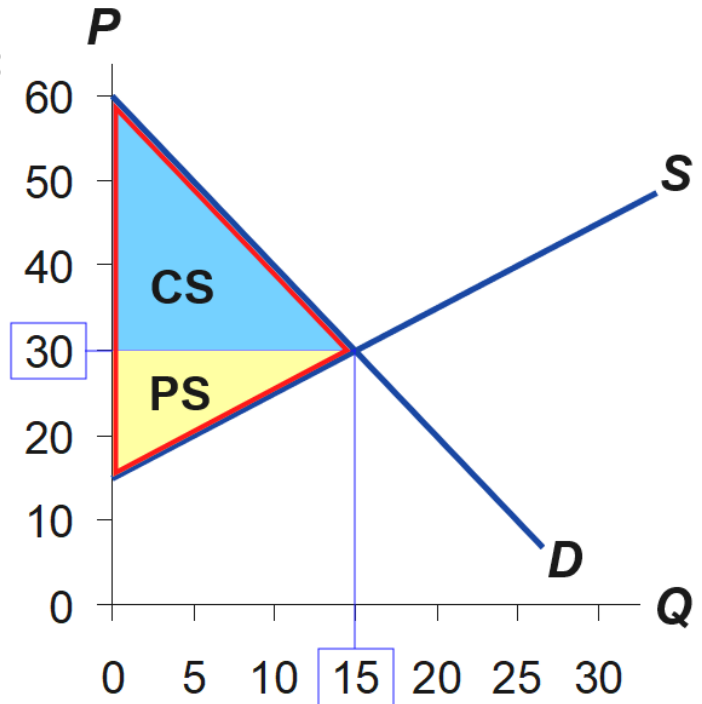
Evaluating the competitive equilibrium

The competitive equilibrium:

$P = \$30$; $Q = 15,000$

Total surplus is $CS + PS$

The competitive equilibrium
is efficient.





13. Tariffs: A Trade Restriction that Distorts Market Efficiency

| Note: This page contains content extracted from [Lecture 10](#).

Total Surplus

Consumer Surplus and Producer Surplus, and Total Surplus

CS = (value to buyers) – (amount paid by buyers)
= buyers' gains from participating in the market

PS = (amount received by sellers) – (cost to sellers)
= sellers' gains from participating in the market

Total surplus = CS + PS
= (value to buyers) – (cost to sellers)
= total gains from trade in the market

Total Surplus

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Total Surplus = Total Gains from Trade in the Market

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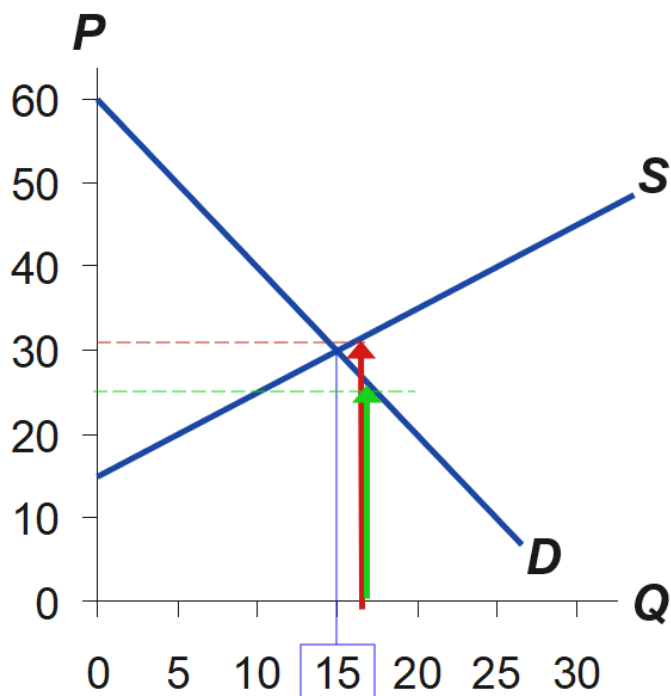
Remaining buyers have **$WTP < 30$**

What is the cost of the additional unit to sellers?

There is no seller with $\text{cost} \leq 30$, they all produced their units

All remaining sellers have **$\text{cost} > 30$** .

The value of the additional unit is less than its cost → producing it will reduce total surplus



Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #2

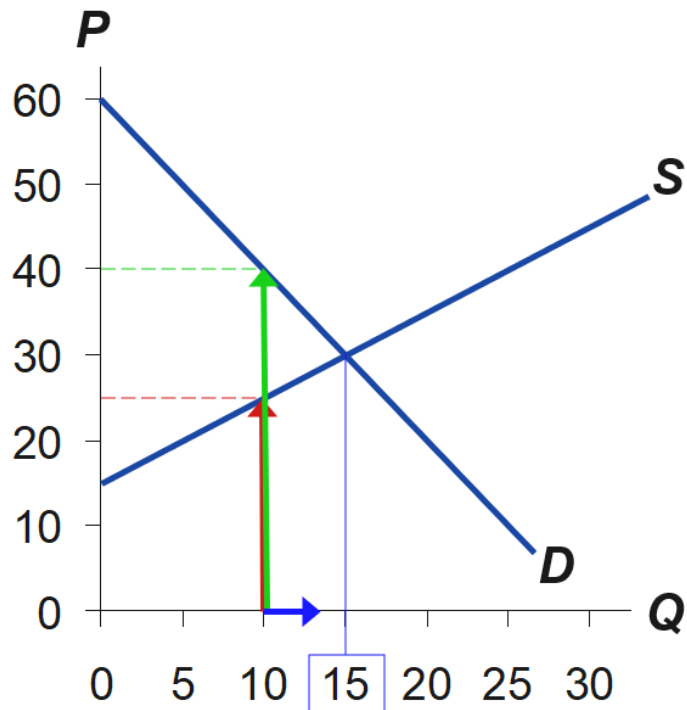
Produce only 10,000 units.

At this level, the

- cost of producing an additional unit is \$25
- value to consumers of this additional unit is \$40

Hence, we can increase total surplus by increasing Q .

This is true at any Q less than 15,000.



Does the competitive equilibrium quantity maximize Total Surplus?

Thought experiment #2

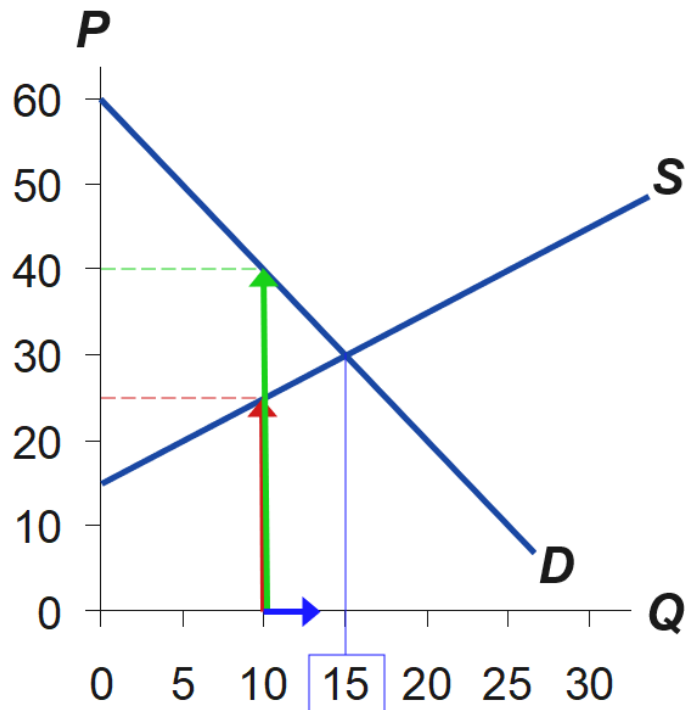
Produce only 10,000 units.

At this level, the

- cost of producing an additional unit is \$25
- value to consumers of this additional unit is \$40

Hence, we can increase total surplus by increasing Q .

This is true at any Q less than 15,000.



Conclusion

The equilibrium quantity maximizes total surplus. At any other quantity, we can increase total surplus by moving toward the equilibrium quantity.

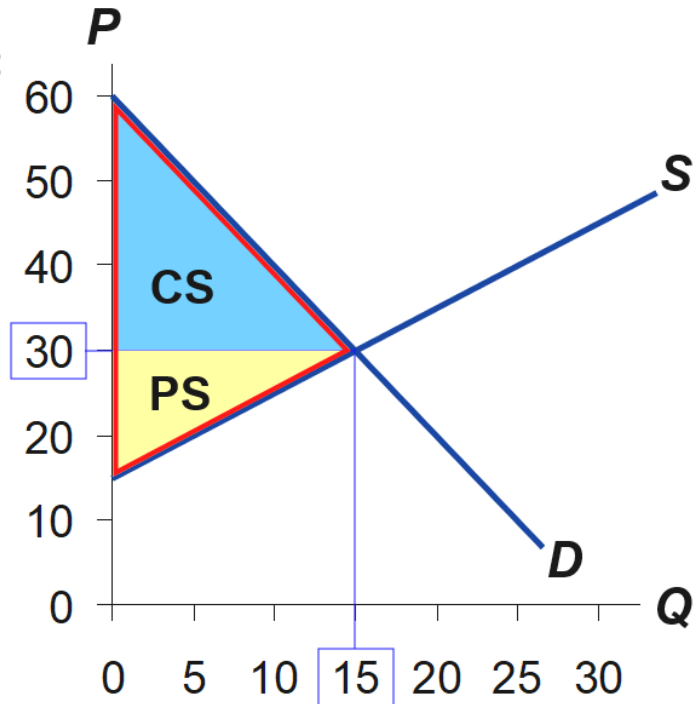
Evaluating the competitive equilibrium

The competitive equilibrium:

$P = \$30$; $Q = 15,000$

Total surplus is CS + PS

The competitive equilibrium is efficient.



Adam Smith and the Invisible Hand

People acting in their own best interests, in a free market, often end up contributing to the collective good without intending to. This is how the **"invisible hand"** guides the market and leads to positive societal outcomes. The system works well because individuals are motivated by personal gain, but the result is an overall improvement for society.

Free Market and Government Intervention

The market equilibrium is efficient. No other outcome achieves higher total surplus. Government cannot raise total surplus by changing the market's allocation of resources. ***Laissez faire*** (French for "allow them to do") is the notion that govt should not interfere with the market.

Free Market versus Central Planning

Suppose resources were allocated not by the market, but by a central planner who cares about society's well-being. To allocate resources efficiently and maximize total surplus, the planner would need to know every seller's cost and every buyer's WTP for every good in the entire economy. This is impossible, and why centrally-planned economies are never very efficient.

Conclusion

Conclusion is one of the **10 Principles of Economy: *Markets are usually a good way to organize economic activity.***

Note: We derived these lessons assuming perfectly competitive markets.

Market failures may occur when:

- a buyer or seller has *market power* — the ability to affect the market price.
- transactions have side effects, called *externalities*, that affect bystanders. (example: pollution)

An Application to International Trade

Recall: A country has a comparative advantage in a good if it produces the good at lower opportunity cost than other countries. Countries can gain from trade if each exports the goods in which it has a comparative advantage.

The World Price and Comparative Advantage

P_W = the world price of a good, the price that prevails in world markets.

P_D = domestic price without trade.

If ($P_D < P_W$), then

- country has comparative advantage in the good.
- under free trade, country exports the good.

Else if ($P_D > P_W$), then

- country does not have a comparative advantage.

- under free trade, country imports the good.

The Small Economy Assumption

A small economy is a **price taker** in world markets: Its action have no effect on P_W . Now always true - especially for the U.S. - but simplifies the analysis without changing its lessons.

When a small economy engages in free trade, P_W is the only relevant price:

- No seller would accept less than P_W , since she could sell the good for P_W in world markets.
- No buyer would pay more than P_W , since he could buy the good for P_W in world markets.

A Country That Exports Soybeans

Without trade,

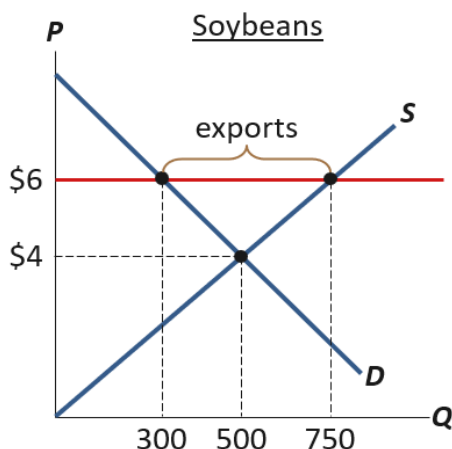
$$P_D = \$4$$

$$Q = 500$$

$$P_W = \$6$$

Under free trade,

- domestic consumers demand 300
- domestic producers supply 750
- exports = 450



A Country That Exports Soybeans

Without trade,

$$CS = A + B$$

$$PS = C$$

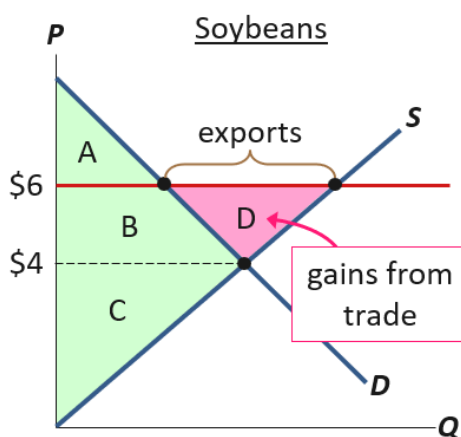
$$\begin{aligned} \text{Total surplus} \\ = A + B + C \end{aligned}$$

With trade,

$$CS = A$$

$$PS = B + C + D$$

$$\begin{aligned} \text{Total surplus} \\ = A + B + C + D \end{aligned}$$



The Welfare Effects of Trade

Summary: The Welfare Effects of Trade

	$P_D < P_W$	$P_D > P_W$
direction of trade	exports	imports
consumer surplus	falls	rises
producer surplus	rises	falls
total surplus	rises	rises

*Whether a good is imported or exported,
trade creates winners and losers.
But the gains exceed the losses.*

Other Benefits of International Trade

- Consumers enjoy increase variety of goods.
- Producers sell to a large market, may achieve lower costs by producing on a larger scale.
- Competition from abroad may reduce market power of domestic firms, which would increase total welfare.
- Trade enhances the flow of ideas, facilitates the spread of technology around the world.

Then Why All the Opposition to Trade?

- Recall one of the Ten Principles from Chapter 1:
Trade can make everyone better off.
- The winners from trade could compensate the losers and still be better off.
- Yet, such compensation rarely occurs.
- The losses are often highly concentrated among a small group of people, who feel them acutely.
The gains are often spread thinly over many people, who may not see how trade benefits them.
- Hence, the losers have more incentive to organize and lobby for restrictions on trade.

Tariff: An Example of a Trade Restriction

Tariff is a tax on imports.

- Example: Cotton shirts

$$P_W = \$20$$

Tariff: $T = \$10/\text{shirt}$

Consumers must pay \$30 for an imported shirt.

So, domestic producers can charge \$30 per shirt.

- In general, the price facing domestic buyers & sellers equals $(P_W + T)$.

Analysis of a Tariff on Cotton Shirts

Analysis of a Tariff on Cotton Shirts

Free trade

$$CS = A + B + C + D + E + F$$

$$PS = G$$

$$\text{Total surplus} = A + B + C + D + E + F + G$$

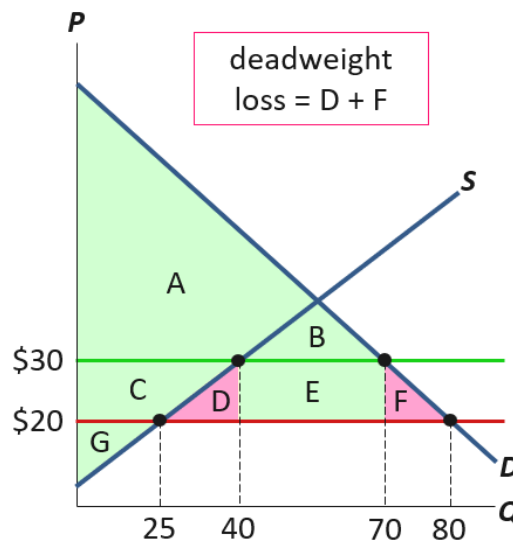
Tariff

$$CS = A + B$$

$$PS = C + G$$

$$\text{Revenue} = E$$

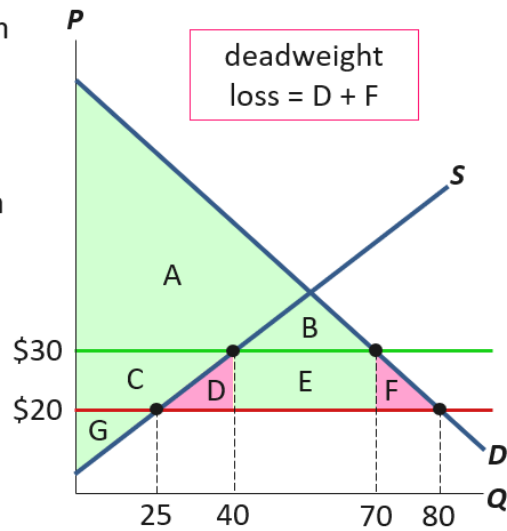
$$\text{Total surplus} = A + B + C + E + G$$



Analysis of a Tariff on Cotton Shirts

D = deadweight loss from the overproduction of shirts

F = deadweight loss from the under-consumption of shirts





14. Quotas and Tariffs: Analyzing the Welfare Effects of Trade Restrictions

| **Note:** This page contains content extracted from [Lecture 13](#).

Analysis of a Tariff on Cotton Shirts

Analysis of a Tariff on Cotton Shirts

Free trade

$$CS = A + B + C + D + E + F$$

$$PS = G$$

$$\text{Total surplus} = A + B + C + D + E + F + G$$

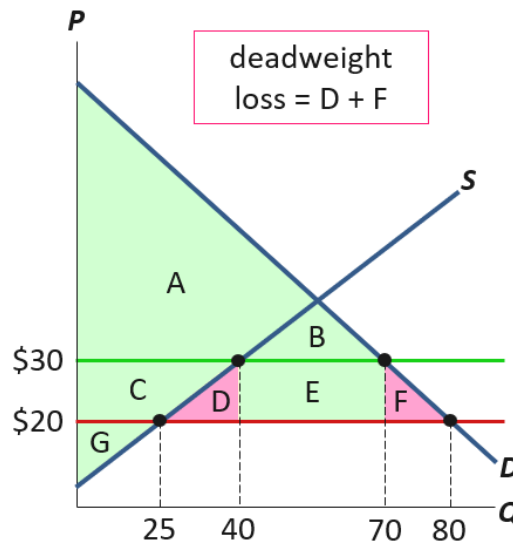
Tariff

$$CS = A + B$$

$$PS = C + G$$

$$\text{Revenue} = E$$

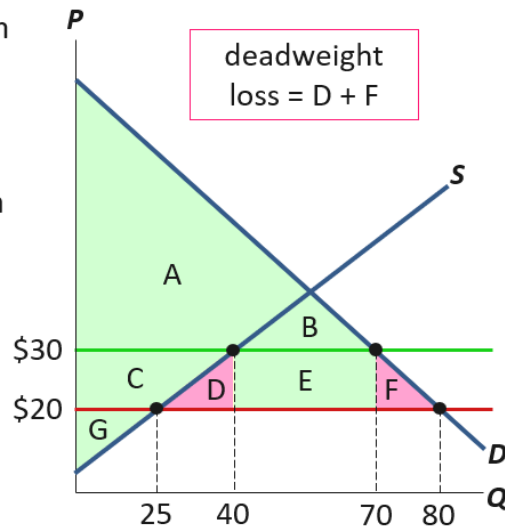
$$\text{Total surplus} = A + B + C + E + G$$



Analysis of a Tariff on Cotton Shirts

D = deadweight loss from the overproduction of shirts

F = deadweight loss from the under-consumption of shirts



Deadweight loss occurs when the **market equilibrium** is not reached, typically due to government interventions (like taxes, price ceilings, or price floors), resulting in a **loss of economic welfare**. This loss represents transactions that could have been mutually beneficial but don't happen due to the market distortion.

Import Quota

An **import quota** is a quantitative limit on imports of a good. It mostly has the same effects as a tariff:

- Raises price, reduces quantity of imports.
- Reduces buyers' welfare.
- Increases sellers' welfare.

A tariff creates revenue for the government. A quota creates profits for the foreign producers of the imported goods, who can sell them at higher price. Or, government could auction licenses to import to capture this profit as revenue. Usually it does not.

Arguments for Restricting Trade

1. The Jobs Argument

Trade destroys jobs in the industries that compete against imports.

Economists' response:

- Total unemployment does not rise as imports rise, because job losses from imports are offset by job gains in export industries.
- Even if all goods could be produced more cheaply abroad, the country need only have a comparative advantage to have a viable export industry and to gain from trade.

2. The National Security Argument

An industry vital to national security — such as defense, energy, or critical infrastructure — should be protected from foreign competition, to prevent dependence on import that could be disrupted during wartime.

Economists' response:

- As long as policy is based on true security needs. But producers may exaggerate their own importance to national security to obtain protection from foreign competition.

In other words, economists agree that industries critical to national security should be protected to ensure a country's independence in times of crisis. However, there is a concern that producers might falsely claim national security importance to get

government protection from competition, which could harm the economy and consumers.

3. **The Infant-Industry Argument**

A new industry argues for temporary protection until it is mature and can compete with foreign firms.

Economists' response:

- Difficult for government to determine which industries will eventually be able to compete and whether benefits of establishing these industries exceed cost to consumers of restricting imports. Besides, if a firm will be profitable in the long run, it should be willing to incur (become subject to) temporary losses.

4. **The Unfair-Competition Argument**

Producers argue their competitors in another country have an unfair advantage, e.g. due to government subsidies.

Economists' response:

- Extra-cheap products subsidized by the other country's taxpayers can be imported. The gains to our consumers will exceed the losses to the producers.

5. **The Protection-As-Bargaining-Chip Argument**

Example: The U.S. can threaten to limit imports of French wine unless France lifts their quotas on American beef.

Economists' response:

- Suppose France refuses. Then the U.S. must choose between two bad options:
 - Restrict imports from France, which reduces welfare in the U.S.
 - Don't restrict imports, which reduces U.S. credibility.

Trade Agreements

A country can liberalize trade with

- unilateral reductions in trade restrictions.
- multilateral agreements with other nations.

Unilateral reductions mean one country independently lowers trade barriers, which can stimulate economic activity but may not have as broad an impact as multilateral agreements. **Multilateral agreements** involve multiple countries negotiating trade terms together, leading to larger, more efficient markets and often more balanced trade relationships. However, they are typically more complex and time-consuming to negotiate.

Summary

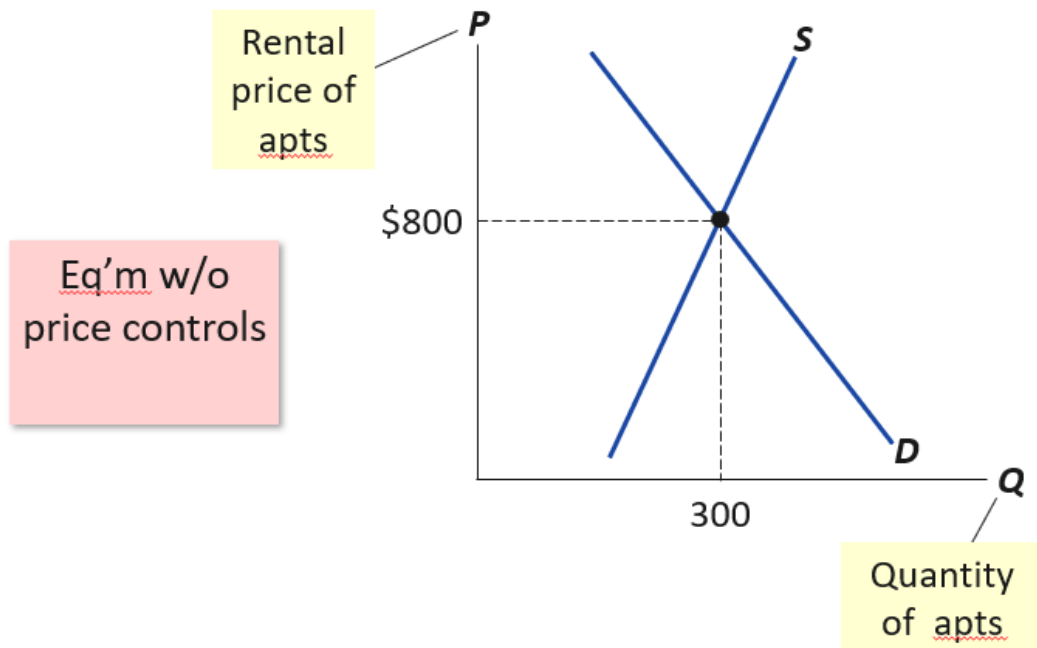
- A country will export a good if the world price of the good is higher than the domestic price without trade. Trade raises producers surplus, reduces consumer surplus, and raises total surplus.
- A country will import a good if the world price is lower than the domestic price without trade. Trade lower producer surplus, but raises consumer surplus and total surplus.
- A tariff benefits producers and generates revenue for the government, but the losses to consumers exceed these gains.
- Common arguments for restricting trade include: protecting jobs, defending national security, helping infant industries, preventing unfair competition, and responding to foreign trade restrictions. Some of these arguments have merit (excellence) in some cases, but economists believe free trade is usually the better policy.

Government Policies That Alter the Private Market Outcome

- **Price Control**
 - **Price Ceiling:** a legal maximum on the price of a good or service. Example: rent control.
 - **Price Floor:** a legal minimum on the price of a good or service.
Example: Minimum Wage.
- **Taxes:**
 - The government can make buyers or sellers pay a specific amount on each unit.

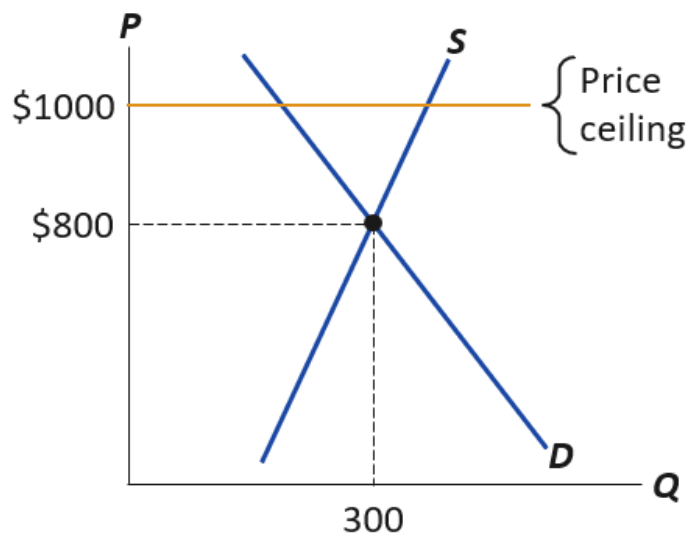
Example

EXAMPLE 1: The Market for Apartments



How Price Ceilings Affect Market Outcomes

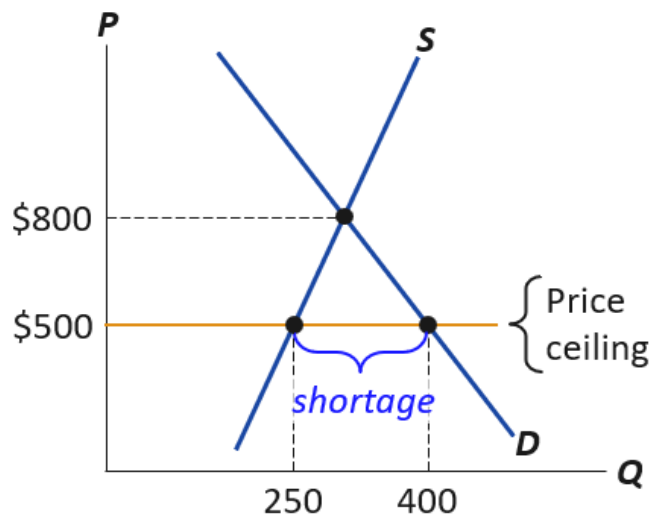
A price ceiling above the eq'm price is **not binding**—has no effect on the market outcome.



How Price Ceilings Affect Market Outcomes

The eq'm price (\$800) is above the ceiling and therefore illegal.

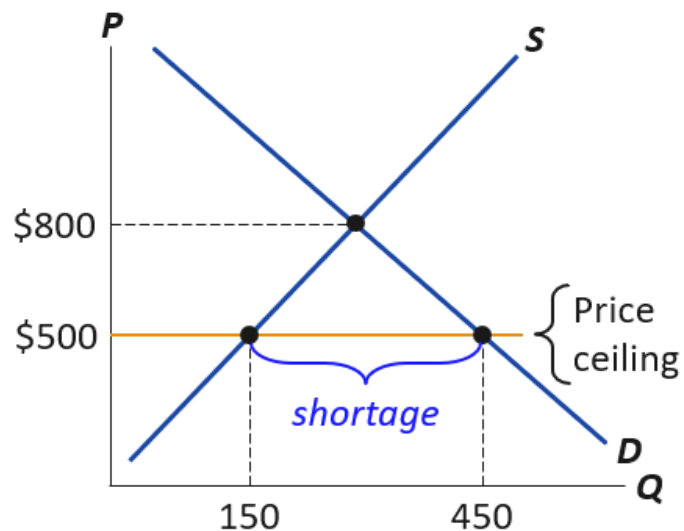
The ceiling is a **binding constraint** on the price, causes a shortage.



How Price Ceilings Affect Market Outcomes

In the long run, supply and demand are more price-elastic.

So, the shortage is larger.



Shortages and Rationing

Ration: allow each person to have only a fixed amount of (commodity).

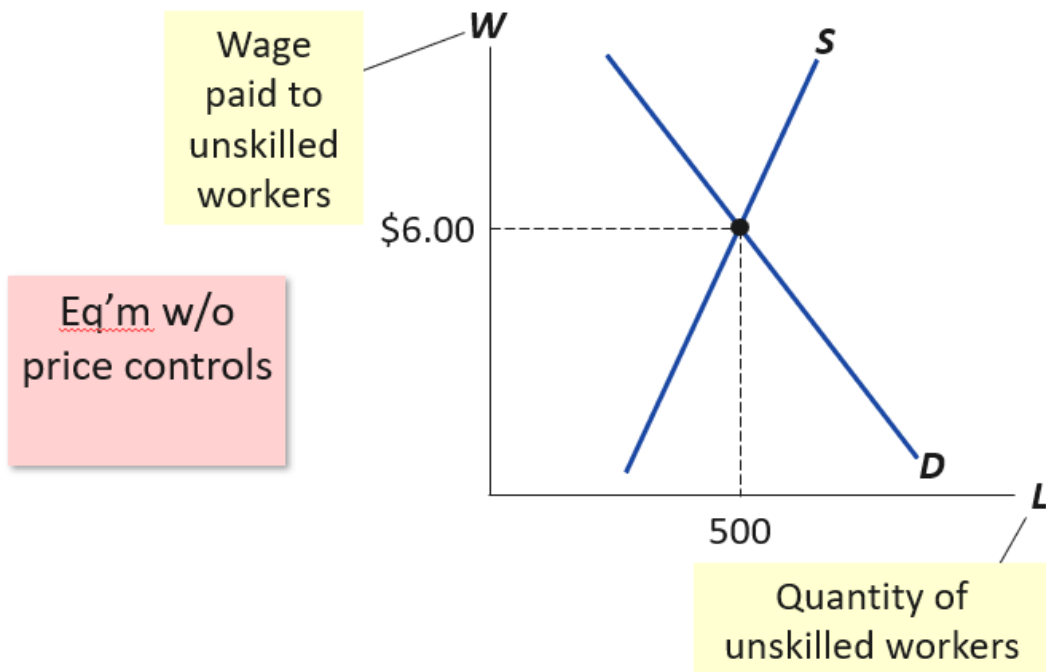
- With a shortage, sellers must ration the goods among buyers.
- Some rationing mechanisms: (1) **Long Lines** (2) **Discrimination according to sellers' biases**.
- These mechanisms are often unfair, and inefficient: the goods do not necessarily go to the buyers who value them most highly.
- In contrast, when prices are not controlled, the rationing mechanism is efficient (the goods go to the buyers that value them most highly) and impersonal (and thus fair).

Some Rationing Mechanisms

- **Long lines** are a form of rationing where people wait their turn to buy limited goods, often in a queue.
- **Discrimination according to seller's biases** occurs when sellers choose who gets to buy the limited goods based on personal preferences or biases, rather than an objective or fair process.

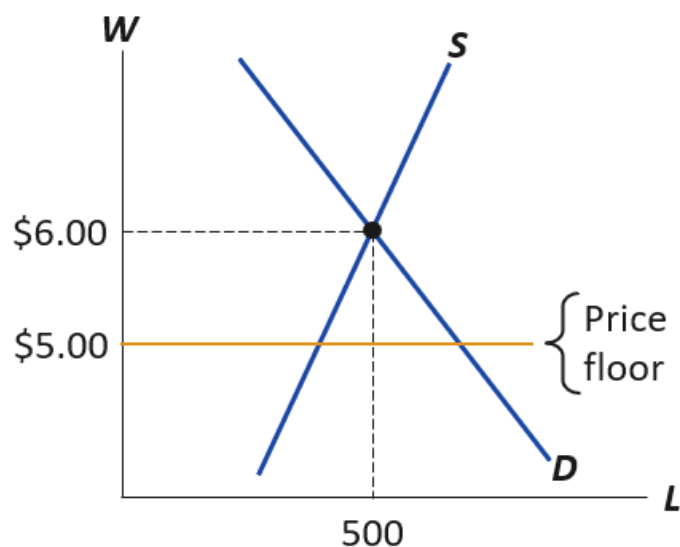
Example

EXAMPLE 2: The Market for Unskilled Labor



How Price Floors Affect Market Outcomes

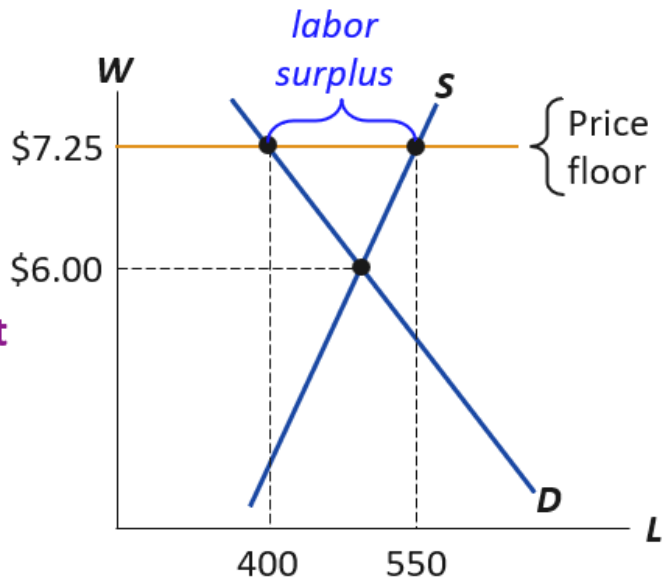
A price floor below the eq'm price is **not binding** – has no effect on the market outcome.



How Price Floors Affect Market Outcomes

The eq'm wage (\$6) is below the floor and therefore illegal.

The floor is a **binding constraint** on the wage, causes a surplus (i.e., unemployment).



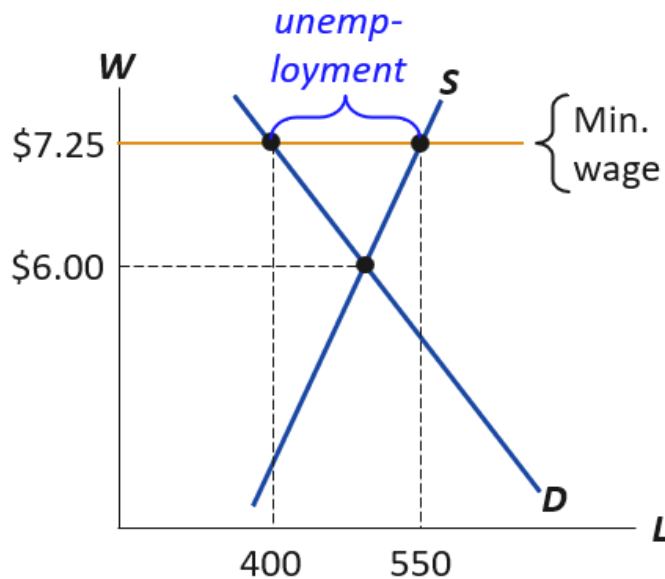
The Minimum Wage

The Minimum Wage

Min wage laws do not affect highly skilled workers.

They do affect teen workers.

Studies:
A 10% increase in the min wage raises teen unemployment by 1–3%.



Markets are usually a good way to organize economic activity. Prices are the signals that guide the allocation of society's resources. This allocation is altered when policymakers restrict prices. Price controls are often intended to help the poor, but often hurt more than help.



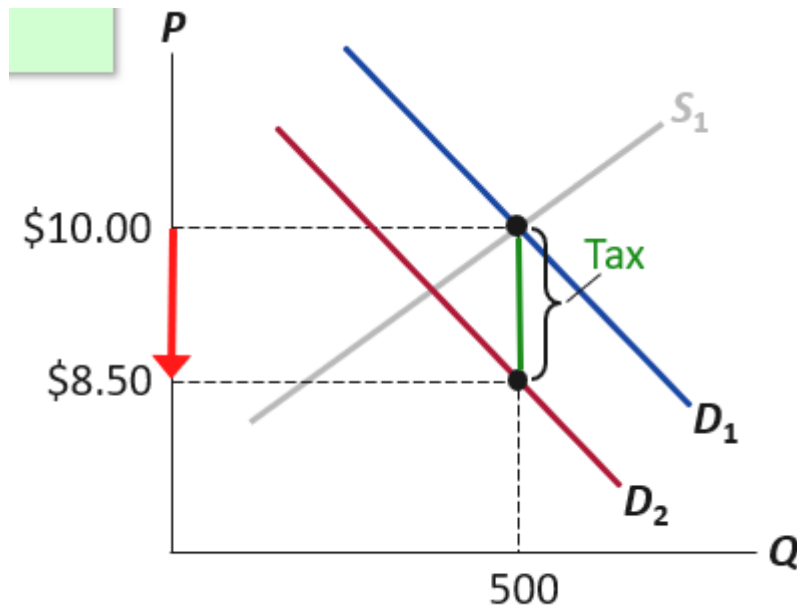
15. Taxes and Macroeconomic Foundations

Taxes

Government levies taxes on goods and services in order to raise revenue for defense, education etc. It makes buyers and sellers pay the tax. The tax can be calculated as some percentage of a good or a specific amount for each unit sold.

Tax on Buyers

A tax on buyers shift the demand curve down by the amount of the tax.



Here we can see the effects of a 1.50\$ tax on price and demand. Price (P) would have to fall by 1.50\$ to make buyers willing to buy the same quantity (Q) as before.

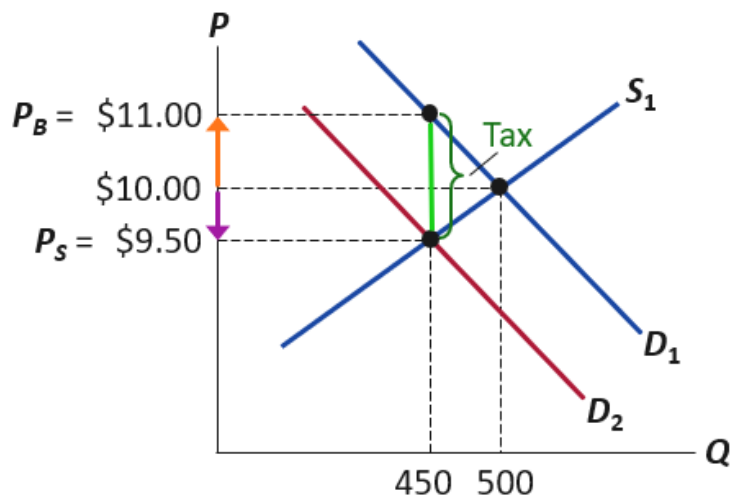
The Incidence of A Tax

The Incidence of A Tax is how the burden of a tax is shared among market participants.

In our example,

buyers pay
\$1.00 more,

sellers get
\$0.50 less.



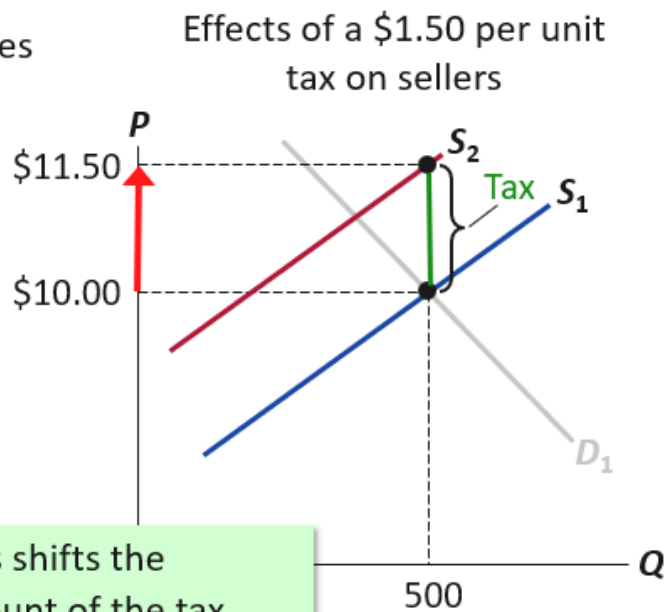
Tax on Sellers

A tax on sellers shifts the supply curve (S) up by the amount of the tax.

The tax effectively raises sellers' costs by \$1.50 per pizza.

Sellers will supply 500 pizzas only if P rises to \$11.50, to compensate for this cost increase.

Hence, a tax on sellers shifts the S curve up by the amount of the tax.

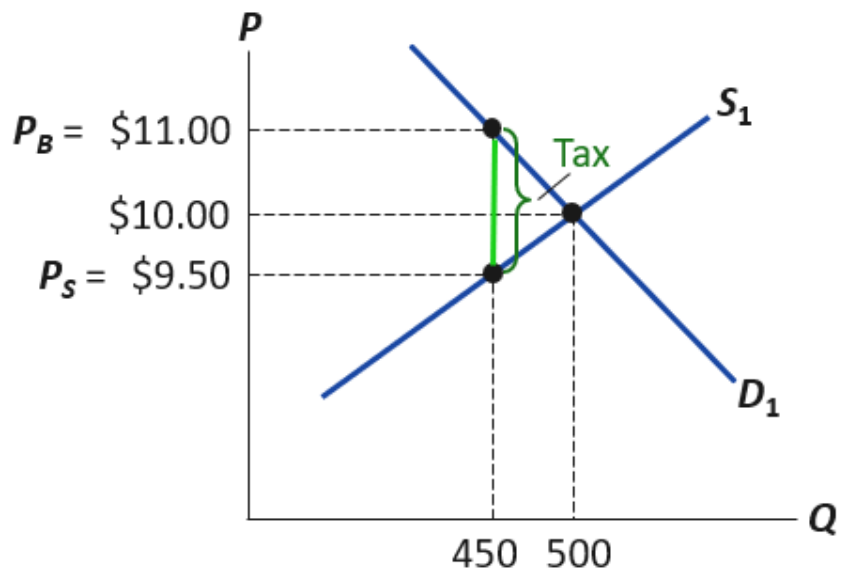


The Outcome is the Same in Both Cases!

The effects on P and Q , and the tax incidence are the same whether the tax is imposed on buyers or sellers!

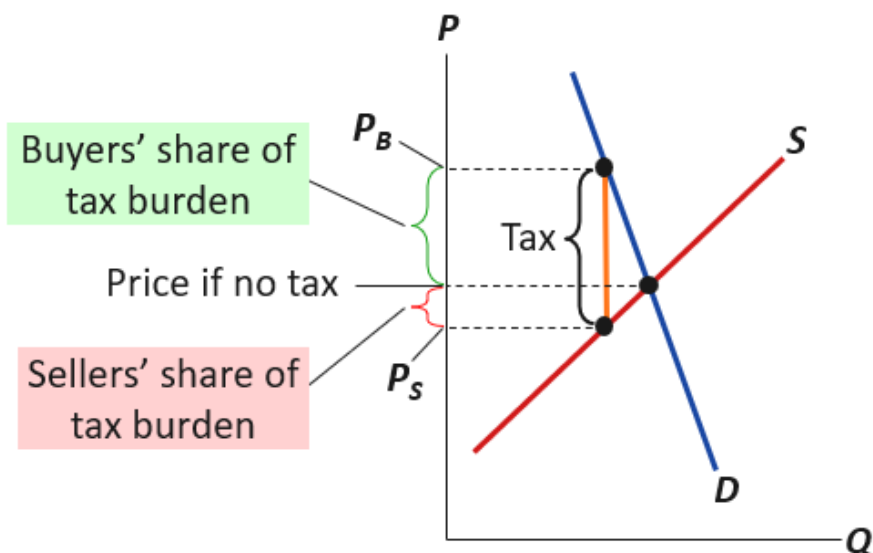
What matters is this:

A tax drives a wedge between the price buyers pay and the price sellers receive.



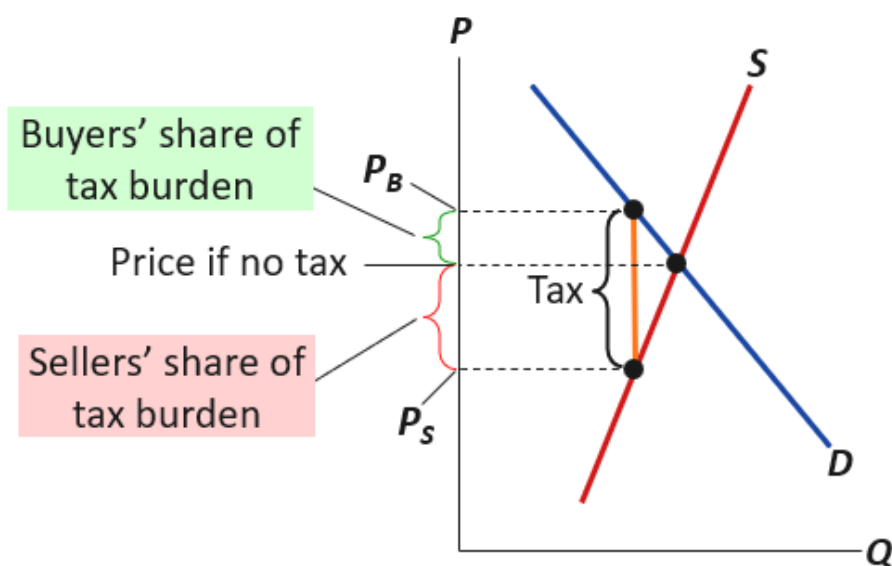
Elasticity and Tax Incidence

CASE 1: Supply is more elastic than demand



It's easier for sellers than buyers to leave the market. So buyers bear most of the burden of the tax.

CASE 2: Demand is more elastic than supply



It's easier for buyers than sellers to leave the market. Sellers bear most of the burden of the tax.

Summary

- A price ceiling is the legal maximum price a good can have. If the price ceiling is below the equilibrium price, it is binding and causes shortage.
- A price floor is the legal minimum price a good can have. If the price floor is above the equilibrium price, then it is binding and causes a surplus.
- A tax on a good places a wedge between the price buyers pay and the price sellers receive and causes the equilibrium quantity falls, whether the tax is imposed on buyers or sellers.
- The incidence of a tax is the division of the burden caused by the tax between buyers and sellers. It does not depend on whether the tax is imposed on buyers or sellers. It depends on the price elasticities of supply and demand.

Macroeconomics

Macroeconomics is the study of economy as a whole. It studies the forces and trends that affect the economy as a whole.

Macroeconomics describes and studies the behavior of economic aggregates. (aggregate means whole formed by combining several separate elements)

The 3 most important economic aggregates are:

- GDP (gross domestic product)
- Inflation (overall price level rises)
- Unemployment rate (people out of work)

GDP (Gross Domestic Product)

The GDP of a country is the market value of all final goods and services produced in that country in a given period of time, usually a year or a quarter.



16. Measuring GDP and Understanding PPP

Nominal GDP versus Real GDP

Nominal GDP measures the total value of all goods and services produced in a country at current market prices. It reflects changes in both the quantity of goods and services and their prices. As a result, nominal GDP can be influenced by inflation or deflation, making it less reliable for comparing economic performance over time. For example, if the price level rises, nominal GDP will increase even if the actual production remains unchanged.

Real GDP, on the other hand, measures the total value of all goods and services produced in a country, adjusted for inflation. It uses constant prices from a base year to focus solely on the changes in the quantity of goods and services produced. This adjustment allows real GDP to provide a more accurate representation of a country's economic growth. For instance, real GDP increases only when the economy produces more goods and services, regardless of price changes.

The key difference between nominal and real GDP lies in how they handle price changes. While nominal GDP includes price level changes, real GDP removes the effect of these changes to highlight actual production. Real GDP is preferred for analyzing economic growth and comparing economic performance across different time periods. Nominal GDP, however, is useful for assessing the current size of an economy in monetary terms.

The relationship between the two is expressed by the formula:

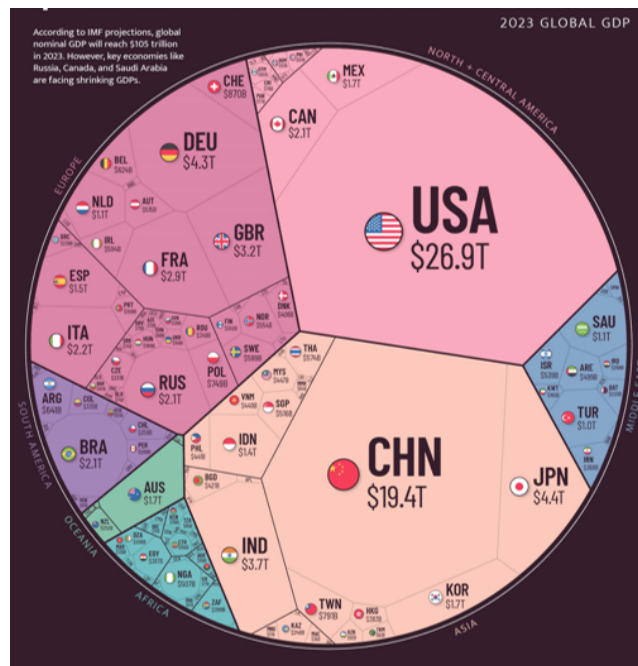
$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{Price Index}} \times 100$$

This formula helps convert nominal GDP into real terms by adjusting for price level changes.

In summary, nominal GDP reflects the economy's output in terms of current prices, while real GDP provides a clearer and more reliable measure of economic growth by accounting for inflation.

Real GDP growth rate is the number that economists are interested in.

Visualizing the \$105 Trillion World Economy in One Chart



New Measurement of GDP: GDP per purchasing power parity (PPP)

GDP per purchasing power parity (PPP) adjusts nominal GDP to account for differences in price levels and the cost of living across countries. This ensures a fairer comparison of economic output and living standards. Using PPP, the same product, such as a Big Mac, is valued equivalently in different countries. For example, in the UK, a Big Mac priced at £5.10 contributes £5.10 to GDP. In Türkiye, a Big Mac priced at 165 TRY contributes only £4.00 to GDP using the market exchange rate (1 GBP = 40.76 TRY). This undervalues Türkiye's economic output.

To calculate the PPP exchange rate based on Big Mac prices:

$$\text{PPP Exchange Rate} = \frac{\text{Price in Türkiye (TRY)}}{\text{Price in UK (GBP)}} = \frac{165}{5.10} = 32.35 \text{ TRY per GBP}$$

This PPP-adjusted rate (1 GBP = 32.35 TRY) provides a more accurate reflection of economic output.



17. Understanding GDP, Expenditure Components, and PPP

GDP

GDP is the market value of all final goods and services produced in the country in a given period of time. GDP is also equal to total expenditure on final goods and services produced in country. GDP is also equal to total income earned by individuals in the country. It means expenditure = income. But why expenditure = income. Because in every transaction buyer's expenditure becomes seller's income. Thus, the sum of all expenditures (on final goods and services) equals the sum of all income.

Let's go carefully over the definition of GDP: GDP is the market value of all final goods and services produced in the country in a given period of time.

What does it mean by market value? It means goods and services that have market prices. Things that do not have market value are excluded. For example, let's say Maria grows potatoes in her garden and feeds her family. Those potatoes are not counted in GDP because they were not produced for the marketplace.

What are final goods? Final goods are goods that are intended for the end user. There are also intermediate goods that are used in the production of final goods. (Flour → Bread).

GDP only includes the value of the final goods, because this already includes the value of the intermediate goods used in their production. GDP includes tangible (perceptible by touch) goods (like DVDs, mountain bikes, milk) and intangible services (dry cleaning, concert, cell phone service).

GDP measure the value of production that occurs withing a country's borders, whether done by its own citizens or by foreigners located there.

GDP included currently produced goods, not goods produced in the past (usually a year or a quarter (3 months)).

Remember that GDP is also equal to total expenditure on final goods and services produced in the country.

GDP Formula and Components:

$$GDP = C + I + G + (X - M)$$

Where:

- **C = Consumption expenditures** (spending by households on goods and services).
- **I = Investment expenditures** (spending on goods for future production, e.g., machinery, buildings, inventories).
- **G = Government expenditures** (spending by the government on goods and services).
- **(X - M) = Net exports** (the value of exports minus the value of imports).

Consumption Expenditure (C)

Spending on all final goods and services by households (not firms, companies, government). For example, goods such as cars, home appliances, food, clothing, and services such as dry cleaning, air travel, hair cuts, doctor visits.

Investment Expenditure (I)

Investment Expenditure is spending on goods that will be used in the future to produce more goods (or services). It include spending on capital equipment (machines, tools,

equipment and structures (factories, office buildings)), inventories (goods produced but not yet sold), housing (spending on residential housing units).

Unsold output goes into inventory. This is counted as “inventory investment” whether the inventory buildup was intentional or not. In effect, we are assuming that firms purchase their unsold output.

Government Expenditure (G)

It includes all government spending on goods and services, such as military equipment, school supplies, salaries of government workers. But government expenditures does not include transfer payments: social security benefits or unemployment benefits.

Net Export Expenditure (NX)

$NX = \text{exports} - \text{imports}$. Exports are foreign spending on the economy's goods and services. Imports are the portions of C , I , and G that are spend on goods and services produced abroad.



18. GDP Components, Nominal vs. Real GDP, and Economic Well-being

Inflation can distort economic variables like GDP. We have two versions of GDP: One is corrected for inflation (real GDP), the other is not (nominal GDP).

Nominal GDP values output using current prices. Nominal GDP is not corrected for inflation. Real GDP values output using the prices of a base year. Real GDP is corrected for inflation.

Computing Nominal GDP and Real GDP Example

EXAMPLE:

	Pizza		Latte	
<i>year</i>	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
2011	\$10	400	\$2.00	1000
2012	\$11	500	\$2.50	1100
2013	\$12	600	\$3.00	1200

Compute nominal GDP in each year:

2011:	$\$10 \times 400 + \2×1000	= \$6,000	} <u>Increase:</u> 37.5%
2012:	$\$11 \times 500 + \2.50×1100	= \$8,250	
2013:	$\$12 \times 600 + \3×1200	= \$10,800	} 30.9%

EXAMPLE:

	Pizza		Latte	
<i>year</i>	<i>P</i>	<i>Q</i>	<i>P</i>	<i>Q</i>
→ 2011	\$10	400	\$2.00	1000
2012	\$11	500	\$2.50	1100
2013	\$12	600	\$3.00	1200

Compute real GDP in each year,
using 2011 as the base year:

2011:	$\$10 \times 400 + \2×1000	= \$6,000	} <u>Increase:</u> 20.0%
2012:	$\$10 \times 500 + \2×1100	= \$7,200	
2013:	$\$10 \times 600 + \2×1200	= \$8,400	} 16.7%

EXAMPLE:

<i>year</i>	<i>Nominal GDP</i>		<i>Real GDP</i>	
2011	\$6000	} 37.5%	\$6000	} 20.0%
2012	\$8250		\$7200	
2013	\$10,800		\$8400	

- The change in nominal GDP reflects both prices and quantities.
- The change in real GDP is the amount that GDP would change if prices were constant (i.e., if zero inflation).

Hence, real GDP is corrected for inflation.

The GDP Deflator

- The GDP deflator is a measure of the overall level of prices.
- Definition

$$\text{GDP deflator} = 100 \times \frac{\text{nominal GDP}}{\text{real GDP}}$$

- One way to measure the economy's **inflation rate** is to compute the percentage increase in the GDP deflator from one year to the next.

EXAMPLE:

<i>year</i>	<i>Nominal GDP</i>	<i>Real GDP</i>	<i>GDP Deflator</i>
2011	\$6000	\$6000	100.0
2012	\$8250	\$7200	114.6
2013	\$10,800	\$8400	128.6

14.6%
12.2%

Compute the GDP deflator in each year:

$$2011: \quad 100 \times (6000/6000) = \quad 100.0$$

$$2012: \quad 100 \times (8250/7200) = \quad 114.6$$

$$2013: \quad 100 \times (10,800/8400) = \quad 128.6$$

GDP and Economic Well-Being

GDP is the most closely watched economic statistics because it is thought to be the best single measure of a society's economic well-being. GDP per person tell us the average income of the people in the economy. Because most people would prefer to receive higher income, GDP per person seem a natural measure of the economic well-being of the average individual. Higher GDP per person indicated a higher standard of living. However, GDP is not a perfect measure of the happiness or quality of life. Perhaps the most powerful and moving critique of GDP came from Senator Robert Kennedy (Kansas March 18 1968): "Too much and for too long, we seem to have surrendered personal excellence and community value in the mere accumulation of material things."

GDP does not value the quality of the environment, leisure time, home production, and other non-market activities, such as the child-care parents provide their child at home.

Quality of life

- Material well-being
- Health
- Education and learning
- Job security
- Gender equality
- Income equality
- Freedom and security

Measuring the Cost of Living: Inflation

Inflation refers to a situation in which the economy's overall price level is rising.

The inflation rate is the percentage change in the overall price level from the previous period.

How do we define/measure/compute the "overall price level" in the economy?

We use CPI (The Consumer Price Index)

The consumer price index (CPI) is a measure of the overall cost of the goods and services bought by a typical consumer.



19. Measuring Cost of Living, CPI, and Inflation Analysis

How the consumer price index (CPI) is calculated?

1. Fix the basket: Determine what goods and services` are most important to the typical consumer. (TUIK conducts regular consumer surveys to identify the basket of goods and services "they typical consumer" buys)
2. Find the Prices: Find the prices of each of the goods and services in the basket **for each month**.
3. Compute the Basket's Cost: Use the data on prices to calculate the cost of the basket of goods and services at different times.
4. Compute the Index: Choose a year as the base year. To compute the index for a given year, divide the cost of the basket in that year by the cost of the basket in the base year, then multiply by 100.

$$\text{CPI in 2020} = \frac{\text{Cost of the basket in year 2020}}{\text{Cost of the basket in the base year}} \times 100$$

The inflation rate in a given period is computed as the percentage change in the consumer price index (CPI) from the one period before.

$$\text{Inflation Rate} = \frac{\text{CPI in period 2} - \text{CPI in period 1}}{\text{CPI in period 1}} \times 100$$

Problems with CPI

1. Substitution Bias

- Over time, some prices rise faster than other.
- Consumers substitute toward goods that become relatively cheaper, mitigating the effects of price increases.
- The CPI misses this substitution because it uses a fixed basket of goods.
- Thus, the CPI overstates increase in the cost of living.

2. Introduction of New Goods

- The introduction of new goods increases variety, allow consumers to find products that more closely meet their needs.
- In effect, dollar become more valuable.
- The CPI misses this effect because it uses a fixed basket of goods.
- Thus, the CPI overstates increase in the cost of living.

3. Unmeasured Quality Change

- The below usually holds for the advanced economies:
 - Improvements in the quality of goods in the basket increase the value of each dollar.
 - Thus, the CPI overstates increases in the cost of living.

How do we compare prices from the past?

EXAMPLE: The High Price of Gasoline

date	Price of gasoline	CPI	Gasoline price in 2024 liras
01/2003	TL 1.77/liter	94.8	TL 49.61/liter
11/2024	TL 43.50/liter	2657,2	TL 43.50/liter

2003 gasoline price in 2024 liras

$$= \text{TL } 1.77 \times 2657,2 / 94.8$$

$$= \text{TL } 1.77 \times 28,03 = \text{TL } 49.61$$

After correcting for inflation, we see that gasoline is cheaper in November 2024 compared to January 2003.



20. Real vs. Nominal Wages, Interest Rates, and Labor Force Participation

Wages and Inflation (Real vs. Nominal Wages)

The Nominal Wage is how much money you get paid.

The Real Wage is how much stuff you can buy with your nominal wage.

Imagine a worker whose nominal wage is \$10 per hour. Nominal wage is measured in money terms. Suppose this worker only buys apples and the price of apple is \$2. The worker can buy 5 apples with one hour of work. The real wage is given by the ratio of the nominal wage to the price of apples. In this case, it is $\$10 / \$2 = 5$.

If the wage rate and prices of goods and services change, then we should look at how the real wage has changed to understand how the worker's welfare is affected. What matters for the worker/consumer is the real wage, because it measures the rate at which the economy exchanges goods and services for each unit of labor. Wage earners don't consume a single good like apples, but a basket of goods and services, so we need to use the CPI to compute real wages. CPI is a measure of the overall cost of goods and services purchased by a typical consumer in the economy.

Example

Exercise

January 2003

Minimum wage: 226 lira

CPI = 94.8

November 2024

Minimum wage: 17,002 lira

CPI = 2657.2

Are minimum wage earners better off now (April 2024) than in Jan 2003?

date	Minimum wage	CPI	Minimum wage in 2024 liras
Jan 2003	TL 226	94.8	TL 6334
Nov 2024	TL 17,002	2657.2	TL 17,002

Jan 2003 minimum wage in November 2024 liras

$$= \text{TL } 226 \times 2657.2 / 94.8$$

$$= \text{TL } 226 \times 28.03 = \text{TL } \mathbf{6334}$$

After correcting for inflation, we see that the real minimum wage is higher now than it was in Jan 2003.

Nominal vs. Real Interest Rates

The Nominal Interest Rate is the growth of your money in the bank.

The Real Interest Rate is the growth rate of the purchasing power of your money in the bank.

Fisher's Equation

$$\text{Real Interest Rate} = (\text{Nominal Interest Rate}) - (\text{Inflation Rate})$$

This is approximation of the real equation, but works for small rate of interest and inflation.

Real and Nominal Interest Rates: AN EXAMPLE

Nominal interest rate is 5.0%.

Yearly inflation is 3.5%.

Real interest rate

$$= \text{Nominal interest rate} - \text{rate of Inflation}$$

$$= 5.0\% - 3.5\% = 1.5\%$$

The purchasing power of your money (savings) in the bank has increased by 1.5%.

Unemployment

Labor Force Statistics

The adult population (15 or older) is divided into 3 groups:

1. Employed: paid employee, employer, self-employed, and unpaid family worker.
2. Unemployed: not working now but have look for work during the last 4 weeks (same in EU and US)
3. Not in the labor force: everyone else in the adult population.

Labor Force is **1 + 2**: The sum of the employed and unemployed individuals (Labor Force: Employed + Job Searchers)

$$\text{Labor Force} = \text{Employed} + \text{Unemployed}$$

The two important labor force statistics are:

1. The Unemployment Rate (u-rate)

Percentage (%) of the labor force that is unemployed:

$$\text{u-rate} = 100 \times \frac{\text{Number of Unemployed}}{\text{Labor Force}}$$

2. The Labor Force Participation Rate (LFPR)

Percentage (%) of the adult population that is in the labor force:

$$\text{LFPR} = 100 \times \frac{\text{Labor Force}}{\text{Adult Population}}$$



21. Definitions and Dynamics of Employment, Unemployment, and Labor Force Statistics

Employed

Employed: Working age population included in the group of persons at work and persons not at work specified below are employed population.

Persons at work: Persons engaged in any activity during the reference period for at least an hour as a regular employee, casual employee, employer, self employed or unpaid family worker.

What is reference period? Reference period is the first week of each month starting with Monday and ending with Sunday is used as the reference point.

Employment: regular employee, casual employee, employer, self employed, or unpaid family worker,

Persons not at work: All self-employed and employers who had a job but not at work in the reference week for various reasons are considered as employed. The members of producer cooperatives and apprentices/interns who are working to gain any kind of

benefit (income in cash or in kind, social security, traveling cost, pocket money, etc.) are considered to be employed.

Unemployed

Unemployed: All persons 15 years of age and over who are not employed during the reference period, and used at least one channel for seeking a job during the last four week, and are available to start work within two weeks are counted as unemployed.

Who else is counted as unemployed? Persons who have already found a job and will start within 3 months, or established his/her own job but were waiting to complete necessary documents to start work are also counted as unemployed.

Anyone else is counted as “not in the labor force”.

Why do people without a job do not look for work?

1. Reason 1: They don't want/need to work.
2. Reason 2: They want/need to work for but for some reason haven't looked for work recently.

Discouraged workers

These are people who want to work but have given up their job search after a period of unsuccessful search.

These people **are not recorded as “unemployed”** in the statistics.

These people **are recorded as “not in the labor force”** in the statistics.

Remember: You are counted as “employed” if you have worked at least 1 hour to gain any material benefit.

Time-related underemployment: Persons employed in the reference week who worked less than 40 hours and were willing to work additional hours and were available to do so.

The formulas

Combined rate of time-related underemployment and unemployment

$$\frac{\text{Persons in time-related underemployment} + \text{persons in unemployment}}{\text{Labor Force}} \times 100$$

Combined rate of unemployment and potential labor force

$$\frac{\text{Persons in unemployment} + \text{Potential Labor Force}}{\text{Labor Force} + \text{Potential Labor Force}} \times 100$$

Composite measure of labor underutilization

$$\frac{\text{Persons in time-related underemployment} + \text{Persons in unemployment} + \text{Potential Labor Force}}{\text{Labor Force} + \text{Potential Labor Force}} \times 100$$

Two observations

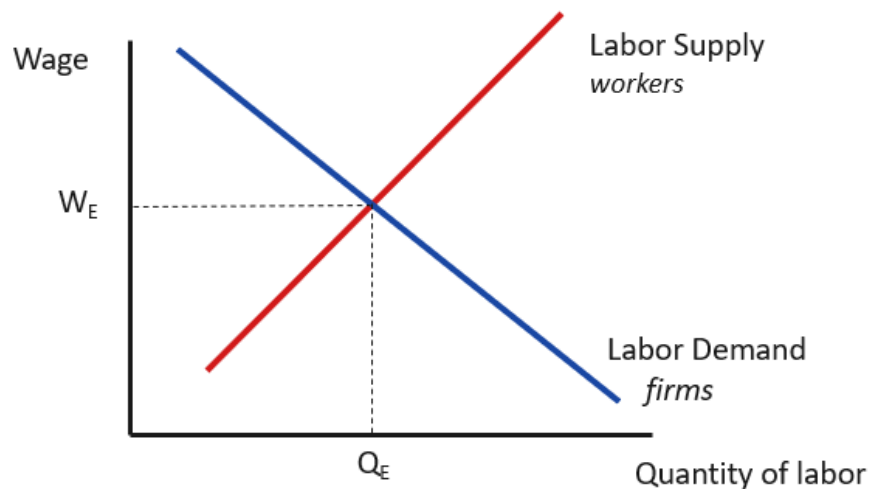
1. All countries always experience some unemployment.
2. The unemployment rate fluctuates from year to year.

Why are there always some people unemployed?

In an ideal labor market, there shouldn't be any!

In an ideal labor market, the wage rate adjusts to balance the supply and demand for labor.

In equilibrium all workers who are willing to work at the existing wage rate w_E are employed. → 0 unemployment!



Cyclical Unemployment vs. the Natural Rate of Unemployment

The **natural rate of unemployment** is defined as the normal rate of unemployment around which the actual unemployment rate fluctuates.

The **cyclical unemployment** is the deviation of the actual unemployment from its natural rate.

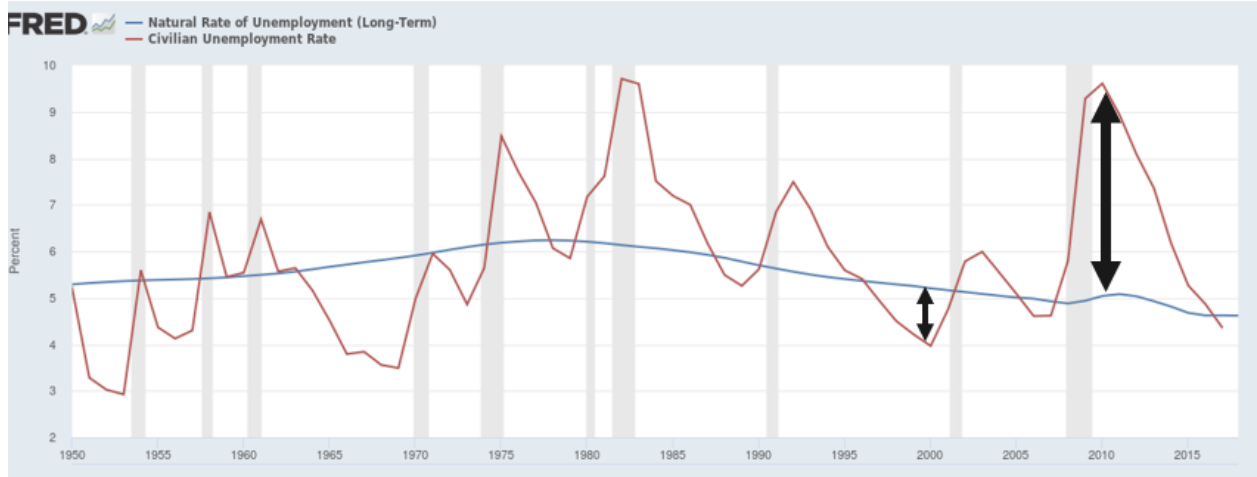
The actual rate of unemployment (u_A) can be thought of as the sum of the natural rate of unemployment (u_N) and rate of cyclical unemployment (u_C):

$$u_A = u_N + u_C$$

Cyclical Unemployment

When the economy is in recession (shaded areas in the graph) the actual unemployment rate is higher than the natural rate, and cyclical unemployment is positive.

When the economy is in the fast growth phase, the actual unemployment rate is lower than the natural rate, and cyclical unemployment is negative.





22. Unemployment, Natural and Cyclical Rates, and Labor Productivity Analysis

Natural Rate

Even when the economy is doing well, there is always some unemployment.

1. **Frictional Unemployment** is unemployment that results from the time that it takes to match workers with jobs. It takes time for workers to search for the jobs that best suit their tastes and skills.
2. **Structural Unemployment** is unemployment that occurs when there are fewer jobs that worker at the current wage. (minimum wage laws, trade unions, efficiency wages...)

Frictional Unemployment

Workers have different skills, and jobs have different requirements. Job search is the process by which workers find appropriate jobs given their skills and preferences. Job search causes frictional unemployment. Workers spend time for searching for the "right"

job / firms spend time for searching for the right worker. It takes time for qualified individuals to be matched with appropriate jobs.

Sectoral shifts: changes in the composition of demand across industries or regions of the country. Such changes displace workers in the declining industries, who must search for new jobs appropriate for their skills & tastes. The economy is always changing, so some frictional unemployment is inevitable. Here are some examples for changes in the composition of demand among industries or regions. Example #1: Technological change - more jobs repairing computers, fewer jobs repairing typewriters. Example #2: A new international trade agreement - labor demand increases in export sectors, decreases in import-competing sectors.

Government employment agencies provide information about job vacancies to speed up the matching of workers with jobs.

Public training programs can help workers who are displaced from declining industries acquire the skills needed in growing industries.

Structural Unemployment

Structural unemployment occurs when there are not enough jobs to go around. This happens when the wage rate is kept above equilibrium

Minimum Wage Laws

When the minimum wage is set above the level that balances supply and demand, it creates unemployment.

Labor Unions

Union: a worker association that bargains with employers over wages, benefits, and working conditions. Unions use their market power to negotiate higher wages for workers. In the US, the typical union worker earns 20% higher wages and gets more benefits than a nonunion worker for the same type of work. When unions raise the wage above equilibrium, quantity demanded of labor falls and unemployment results.

The Theory of Efficiency Wages

Firms voluntarily pay above-equilibrium wages to boost worker productivity.

Workers can work hard or shirk. Shirkers are fired if caught. Is being fired a good deterrent?

Depends on how hard it is to find another job. If market wage is above equilibrium wage, there aren't enough jobs to go around, so workers have more incentive to work not shirk.

Production and Growth

Since growth rates vary, the country rankings can change over time:

- Poor countries are not necessarily doomed to poverty forever, e.g. Singapore income were low in 1960 and are quite high now.
- Rich countries can't take their status for granted: They may be overtaken by poorer but faster-growing countries.

When a nation's workers are very productive, real GDP is large and incomes are high.

When productivity grows rapidly, so do living standards. What, then, determines productivity and its growth rate?

How is labor productivity calculated?

GDP per hour worked is a measure of labor productivity. GDP is measured in USD (current prices, and PPPs). Labor input is defined as total hours worked of all persons engaged in production.

Labor productivity only partially reflects the productivity of labor in terms of the personal capacities of workers or the intensity of their effort.

Labor productivity depends on the use of other inputs (e.g. capital, intermediate inputs, technical, organizational efficiency, economies of scale).

Labor productivity in agriculture

Defined as value added per worker in agriculture. (Total agricultural value added) divided by (the number of people employed in agriculture).

Total factor productivity

The total factor productivity represents a country's ability to produce significantly more output with the same amount of physical and human capital. The most fundamental

reasons for this are the efficiency of the allocation of productive resources and technological differences between countries.

Simple Math of Growth Accounting: The Solow Residual

$$Y = A \times K^{\alpha} \times L^{1-\alpha}$$

- Y : Output
- K : Physical capital
- L : Labor
- A : "Productivity"
- α : A positive number less than 1

Growth Rates and the Solow Residual

$$Y = A \times K^{\alpha} \times L^{1-\alpha}$$

Let:

- g_Y : The % increase in output
- g_K : The % increase in capital input
- g_L : The % increase in labor input
- g_A : The % increase in technology (total factor productivity)

Using simple math, we can write:

$$g_Y = g_A + \alpha g_K + (1 - \alpha)g_L$$

Example:

If from last year to this year:

- Capital input increased by 5% ($g_K = 5\%$),
- Labor input increased by 5% ($g_L = 5\%$),
- Output increased by 6% ($g_Y = 6\%$),

Then, the extra 1% increase ($6\% - 5\%$) is due to the increase in total factor productivity (g_A).



23. Productivity, Growth Accounting, and Determinants of Economic Growth

Productivity and Its Importance

- Productivity is the **average output per unit of labor input** and is the key driver of a country's standard of living and long-term economic growth.
- **Formula:**

$$\text{Productivity} = \frac{Y}{L}$$

Where Y = Real GDP (output) and L = Quantity of labor.

Determinants of Productivity

1. **Physical Capital per Worker (K/L):**

- The tools, machines, and infrastructure used in production.
- An increase in K/L raises productivity.

2. **Human Capital per Worker** (H/L):

- Knowledge and skills workers acquire through education, training, and experience.
- An increase in H/L improves productivity.

3. **Natural Resources per Worker** (N/L):

- Inputs from nature, like land and minerals.
- Rich natural resources can boost productivity, but they are not essential (e.g., Japan).

4. **Technological Knowledge** (A):

- Society's understanding of the best ways to produce goods and services.
- Advances in technology allow for more output with the same resources.

The Production Function

- A mathematical representation of how inputs combine to produce output:

$$Y = A \cdot F(L, K, H, N)$$

Where A represents technology and F is a function showing how inputs are combined.

- **Constant Returns to Scale:** Doubling all inputs doubles output:

$$2Y = A \cdot F(2L, 2K, 2H, 2N)$$

Growth Accounting: The Solow Residual

- Growth in output (g_Y) can be attributed to:
 - Growth in technology (g_A)
 - Growth in capital (g_K)
 - Growth in labor (g_L)

$$g_Y = g_A + \alpha g_K + (1 - \alpha)g_L$$

Where α is the share of capital in production.

Policies to Boost Productivity

1. Encourage Saving and Investment:

- Increases K/L (capital per worker).

2. Investment from Abroad:

- Foreign direct investment and portfolio investment bring technology and capital.

3. Promote Education:

- Enhances H/L (human capital per worker).

4. Protect Property Rights and Political Stability:

- Ensures efficient resource allocation and encourages investment.

5. Free Trade:

- Promotes technological transfer and access to resources.

6. Research and Development (R&D):

- Drives technological progress and productivity growth.

Key Insights

- **Catch-Up Effect:** Poor countries grow faster than rich ones due to lower initial capital levels.
 - **Diminishing Returns:** Additional capital has diminishing effects on productivity when K/L is already high.
 - **Trade-Offs:** Policies like saving and education require short-term sacrifices for long-term gains.
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