

ISTANBUL BILGI UNIVERSITY

Lecture Notes for EC151

Introduction to Microeconomics

Delivered by

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based on

N.G.Mankiw: *Principles of Economics (3th ed)*

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TEN PRINCIPLES OF ECONOMICS

Chapter 1

The word *Economy* . . .

- Comes from a Greek word for “one who manages a household.”
- Here are some questions that need answers
 - Who will work?
 - What goods and how many of them should be produced?
 - What resources should be used in their production?
 - At what price should the goods be sold?
 - Who should get the goods produced?
- We shall see the answers during this year

Scarcity . . .

- Scarcity is a key word to understand economics
- It means that society has less to offer than people wish to have
- Managing the resources of society is important because resources are scarce
- Economics is the study of how society manages its scarce resources
 - How people make decisions
 - How people interact with each other
 - The forces and trends that affect the economy as a whole

Ten Principles of Economics

- The first group of principles look at the *individuals* in the society
- Our aim is to understand how people make decisions of economic nature
- We divide this group into four principles
 1. People face tradeoffs
 2. The cost of something is what you give up to get it
 3. Rational people think at the margin
 4. People respond to incentives

Ten Principles of Economics (continued)

- The second group of principles look at the *interaction of individuals* in the society
- Our aim is to show the effects of the way people interact with one another
 5. Trade can make everyone better off
 6. Markets are usually a good way to organize economic activity
 7. Governments can sometimes improve economic outcomes

Ten Principles of Economics (continued)

- The third group of principles look at the behaviour of the *whole society*
- What happens at the whole economy has an effect on individuals and their interaction
- How the Economy as a Whole Works
 8. The standard of living depends on a country's production
 9. Prices rise when the government prints too much money
 10. Society faces a short-run tradeoff between inflation and unemployment

1. People face tradeoffs

- To get one thing, we usually have to give up another thing
 - Guns vs. butter
 - Food vs. clothing
 - Leisure time vs. work
 - Efficiency vs. equity
- Efficiency means society gets the most it can from its scarce resources
- Equity means the benefits of those resources are distributed fairly among the members of society

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

- Decisions require comparing costs and benefits of alternatives
 - College vs. work
 - Sleeping vs. studying
 - Cinema vs. football game
- *Opportunity cost* is what you give up to obtain some item
- The final real cost of everything is its opportunity cost

3. Rational people think at the margin

- Marginal thinking plays a crucial role in economic actions
- By “marginal” we mean small changes to an existing plan of action
- The word “incremental” is also used
- Individuals make decisions by comparing the costs and benefits at the margin
- The last item therefore becomes very important
- An airline may sell the last ticket below average cost but still make money

4. People respond to incentives.

- Marginal changes in costs or benefits motivate people to respond
- The decision to choose one alternative over another occurs when $MB > MC$
 - MB = Marginal Benefits
 - MC = Marginal Costs
- When they realise that the incentives have changed, economic actors take different decisions
- Safety belts for drivers reduce injury per accident but also increase the accident rate

5. Trade can make everyone better off

- People gain from their ability to trade with one another
- If there is competition in trading, then every party gains from trade
- Trade allows people to specialize in what they do best
- *Specialisation* is the key to modern society
- It makes possible higher levels of productivity leading to the high levels of income that modern societies enjoy

6. Markets are usually a good way to organize economic activity

- Specialisation requires the exchange of products of specialised producers
- One way of doing it is called the *market economy*
- In a market economy
 - Households decide what to buy and who to work for
 - Firms decide who to hire and what to produce
- Households and firms interact as if guided by an “invisible hand”
- More can be found in the *FYI* (p.10): “Adam Smith and the Invisible Hand”

7. Governments can sometimes improve market outcomes

- If markets fail (break down), government can intervene to promote efficiency and equity
- *Market failure* occurs when the market can not allocate resources efficiently
- Market failure may be caused by an *externality*, which is the impact of one person or firm’s actions on the well-being of a bystander
- Market failure may also be caused by *market power*, which is the ability of a single person or firm to unduly influence market prices

8. The standard of living depends on a country’s production

- Standard of living may be measured in different ways:
 - By comparing personal incomes
 - By comparing the total market value of a nation’s production
- Almost all variations in living standards are explained by *differences in the productivity level* of different countries
- *Productivity* is the amount of goods and services produced from each hour of a worker’s time

9. Prices rise when the government prints too much money

- *Inflation* is an increase in the overall level of prices in the economy
- Some countries in some periods have high levels of inflation
- Turkey had one of the highest inflation rates among comparable countries in the world
- Usually the growth in the *quantity of money* is the major cause of inflation
- In other words inflation happens because government prints too much money

10. Society faces a short-run tradeoff between inflation and unemployment

- For many economies there exists a strong relation between the change in the level of unemployment and change in inflation
- *The Phillips Curve* summarises the relation
 - ⇓ Inflation ⇔ ⇑ Unemployment
- It’s a short-run tradeoff that applies to normal situations
- Higher inflation becomes the *opportunity cost* of lower unemployment
- At other times the relationship may break down

Conclusion

- When individuals make decisions, they face tradeoffs and opportunity costs
- Rational people make decisions by comparing marginal costs and marginal benefits
- People can benefit by trading with each other
- Markets are usually a good way of coordinating trade
- Government can potentially improve market outcomes
- Inflation results from increases in the quantity of money
- Study carefully *FYI* (p.14): “How to Read This Book”

THINKING LIKE AN ECONOMIST

Chapter 2

Learning economics

- Economists have a special way of thinking
- Learning economics will allow you to understand it
- You will begin
 - To think in terms of alternatives
 - To understand the cost of individual and social choices
 - To see how certain events and issues are related with one another
- The economic way of thinking involves thinking *analytically* and *objectively* like the scientific method

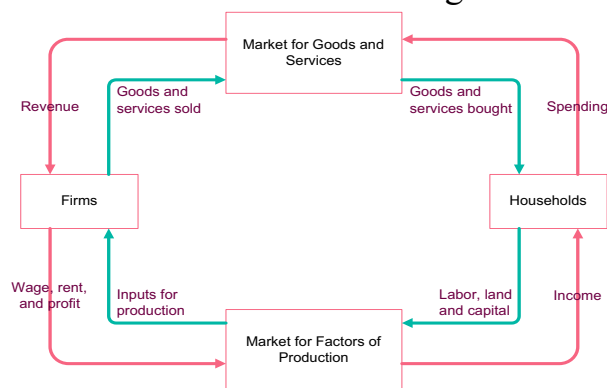
The Scientific Method

- Science develops by using abstract models to help explain how a complex, real world operates
- Theories are proposed, data is collected and analysed to prove or disprove the theories
- Theories always include abstract models
- Models permit to analyse a complex real world event in a simple manner
- Science uses two approaches:
 - *Descriptive* (reporting facts, etc.)
 - *Analytical* (abstract reasoning)

The Circular-Flow Model

- The *circular-flow model* is a simple way to show visually the economic transactions that occur in the economy
- It is simple because we assume that there is no government, no financial system, no outside world (foreign trade), etc.
- And concentrate on two categories of major economic actors in the economy
 - Households as consumers and owners of factors of production
 - Firms as producers

The Circular-Flow Diagram



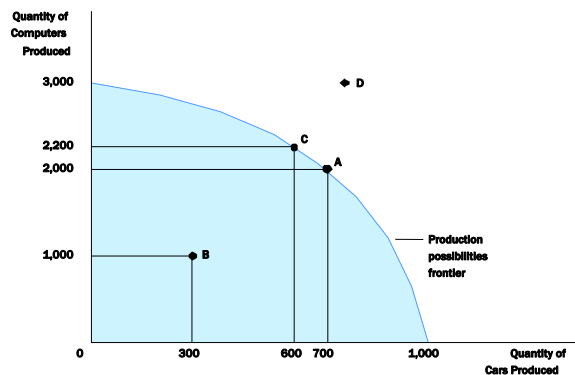
Microeconomics and Macroeconomics

- An important distinction exist between micro (from Greek word small) and macro (from Greek word big) economics
- *Microeconomics* focuses on the individual parts of the economy
- It corresponds to the first two groups among the Ten Principles
- *Macroeconomics* looks at the economy as a whole
- It corresponds to the last group among the Ten Principles

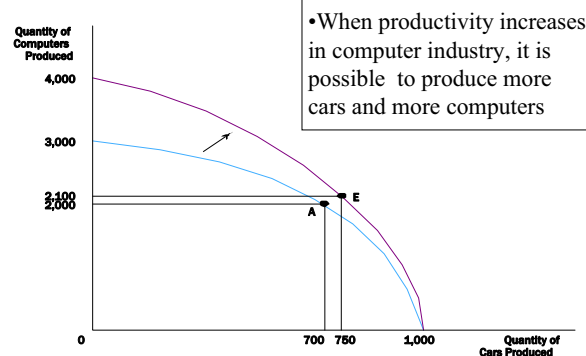
The Production Possibilities Frontier

- The *production possibilities frontier* is another example using a simple model to understand complex reality
- It is presented by a graph showing various combinations of output of two products that the economy can possibly produce given the available factors of production and technology
- It illustrates
 - Efficiency
 - Tradeoffs
 - Opportunity Cost
 - Economic Growth

Production Possibilities Frontier



Production Possibilities Frontier



Two Roles for Economists

- Social reality imposes additional constraints on the economics as a discipline
- Economics as a science requires economists to understand and explain the world
- As such they are *scientists*
- But governments also ask economists to apply their knowledge to change the world
- As such they become *policymakers*
- Policymaking always involves politics
- The responsibilities of the economist as scientist and policymaker may easily be in conflict

Positive versus Normative Analysis

- The potential conflict between science and policy leads to an important distinction in economics
- *Positive statements* are statements that describe the world as it is
- Positive economics is also called descriptive analysis
- *Normative statements* are statements about how the world should be
- Normative economics is also called prescriptive analysis

Positive and Normative Statements

- Here are some examples of positive and normative statements by economists
- An increase in the minimum wage will cause a *decrease* in employment among the least-skilled
- Higher budget deficits will cause interest rates to *increase*
- The income gains from a higher minimum wage are *worth more* than any slight reductions in employment

Why Economists Disagree

- Economists are well known to disagree among themselves
- There are *many jokes* about economists
- They may disagree on theories about how the world works due to *analytical* premises
- At the same time usually they may hold different values and thus, different *normative* views
- Unfortunately many *charlatans and cranks* also pose as economists and often obscure the consensus among economists

Examples of What Most Economists Agree On

- *A ceiling on rents* reduces the quantity and quality of housing available
- *Tariffs and import quotas* usually reduce general economic welfare
- *Flexible and floating exchange rates* offer an effective international monetary framework
- *Printing too much money* always causes inflation

Conclusion

- Economics uses the scientific method
- Abstract models simplify otherwise very complex real world
- Economics is divided into microeconomics and macroeconomics
- Economics relies on both positive and normative analysis
- Economists often disagree among themselves

GRAPHING: A BRIEF REVIEW

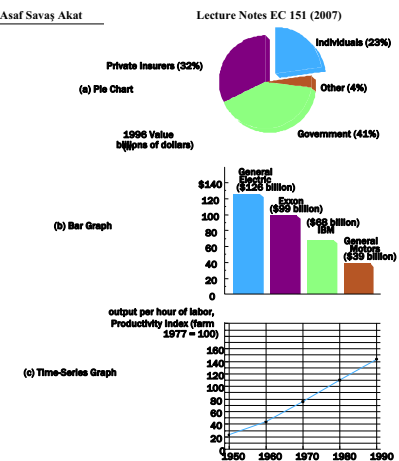
Appendix to Chapter 2

Use of graphs

- Economists make extensive use of graphs
- Graphs are used in economic theories to express ideas that are more difficult to understand only in words
- Graphs also provide a convenient way of representing data about the real world
- Graphs permit to show
 - The breakdown into its constituent parts of a single variable
 - The relation between two or more variables
- The latter are used more commonly in economic theory

Single variable graphs

- There are three common single variable graphs
- *Pie charts* permit to show the distribution of a magnitude among its constituent items
- Example: distribution of income among wages, salaries, profits and rents
- *Bar graphs* help compare the same category from for different units
- Example: income per head in four different countries
- *Time-series graphs* trace the behaviour of a variable over a time period
- Example: rising productivity in the private sector



Two variable graphs

- Single variable graphs have only limited use
- Often we try to establish a relation between two factors
- An ordered pair makes it possible to show two characteristic on the same graph
- Two dimensions require coordinates for graphs
- Vertical coordinate usually represents the nominal variable; horizontal coordinate the quantity variable
- Curves are relations between two variables
- Their slope and what makes them shift is very important in economic analysis

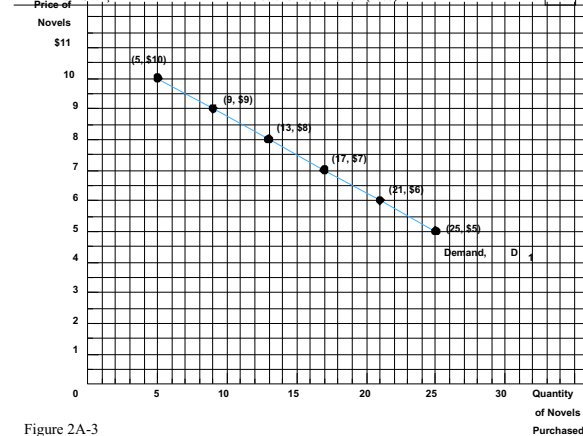
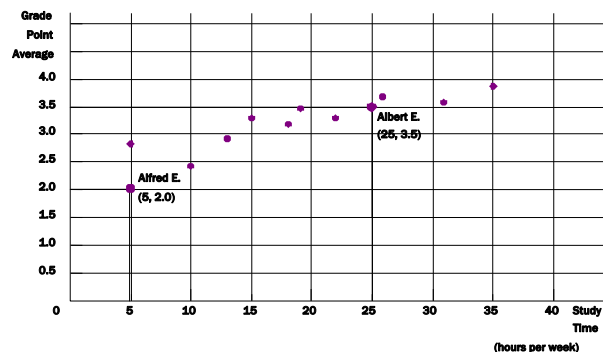


Figure 2A-3

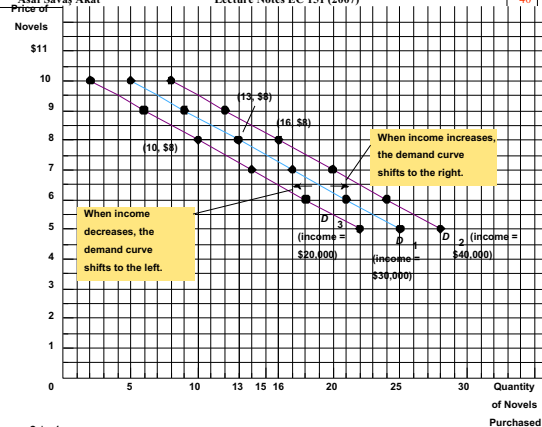


Figure 2A-4

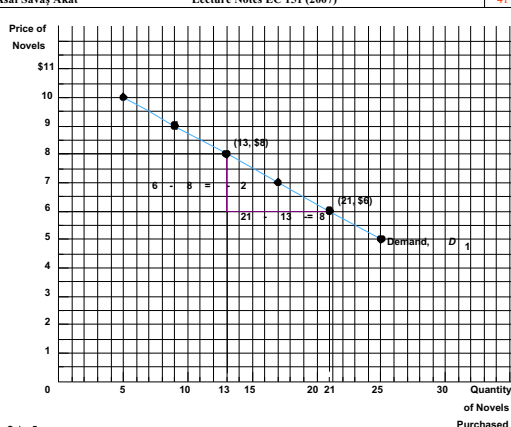


Figure 2A-5

INTERDEPENDENCE AND THE GAINS FROM TRADE

Chapter 3

What did we learn so far?

- In the two previous chapters we introduced some basic concepts of economics
- *Ten basic principles* of economics were organised in three groups: decisions by individual, the interaction of individuals and the economy as a whole
- Then we looked into the *methods* used by economics as a science
- Two models were developed as examples of macro and micro analysis
 - The circular flow of income and expenditure
 - The production possibilities frontier
- Now we will look at the meaning of trade

What we learn in this chapter?

- In this chapter we look in detail into trade
- Remember Principle Five: *trade can make everybody better off*
- Common sense tells us that specialisation for individuals means more knowhow and therefore more production
- However, specialised individuals must *exchange* their products
- Trading is selling something to buy something else
- We try to establish how and why specialisation and trade is beneficial to individuals and nations

Self sufficiency or interdependence

- Economics studies how societies produce and distribute goods and services in an attempt to satisfy the wants and needs of its members
- One alternative would be for individuals and nations to produce everything they need themselves
- This is called *self-sufficiency*
- The other alternative is for individuals and nations to specialise and trade with one another
- This leads to *economic interdependence*
- The question before us is simple
- Which is better and why? To be self-sufficient or economic interdependence?

Interdependence and trade

- We start with a general observation about the society we live in
- Individuals and nations rely on specialized production and exchange as a way to address problems caused by scarcity
- This gives rise to two questions
 - Why is interdependence *the norm*?
 - What determines production and trade when individuals and nations are economically interdependent?
- Interdependence occurs because *people are better off* when they specialize and trade with others

What determines the pattern of production and trade?

- Patterns of production and trade are based upon *differences in opportunity costs*
- This is true within an economy among different regions
- Also among different communities and individuals
- It is also true among *nations and regions*
- Almost all the products we consume have been produced by the efforts of different individuals, usually in many different countries of the world
- Most individuals do not consume at all what they themselves produce

A parable for the modern economy

- We use a very simple model that is easy to handle
- The model does not reflect reality but helps us understand the issues
- Let us imagine a world with
 - only *two goods* (potatoes and meat)
 - only *two people* (a potato farmer and a cattle rancher)
- What should each produce?
- Why should they trade?
- The table in the next slide gives the production of each good by the farmer and the rancher

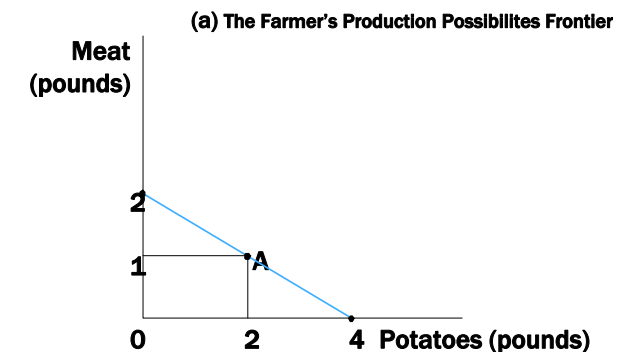
Production of farmer and rancher

	Hours needed to make one pound of		Amount Produced in 40 hours	
	Meat	Patatoes	Meat	Patatoes
FARMER	20 hours/lb	10 hours/lb	2 lbs	4 lbs
RANCHER	1 hour/lb	8 hours/lb	40 lbs	5 lbs

Self-sufficiency

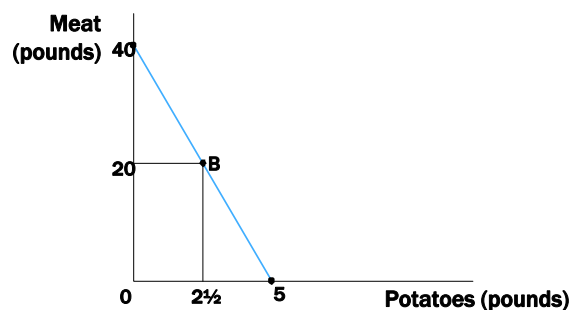
- What happens if the farmer and the rancher decide to ignore each other
- There is *no exchange* or trade among them
- Therefore each can only consume *their own* production
- In other words, for each one, the production possibilities frontier is also the consumption possibilities frontier
- Without trade, there are no economic gains
- There is *no economy* to talk about
- But each will be losing the prospect of using their respective potential fully

Self-sufficiency - farmer



Self-sufficiency - rancher

(b) The Rancher's Production Possibilities Frontier

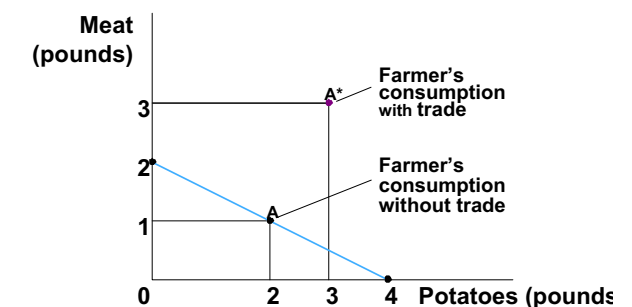


The farmer and the rancher specialize and trade

- Our claim is that each would be better off if they specialize in producing the product that they are more suited to produce, and then trade with each other
- In our example the farmer should produce *potatoes*
- And the rancher should produce *meat*
- The actual quantities will depend on factors that determine *the relative price* of meat and potatoes
- But an arbitrary trade bundle that is beneficial to both (otherwise there is no trade) is sufficient to make our point

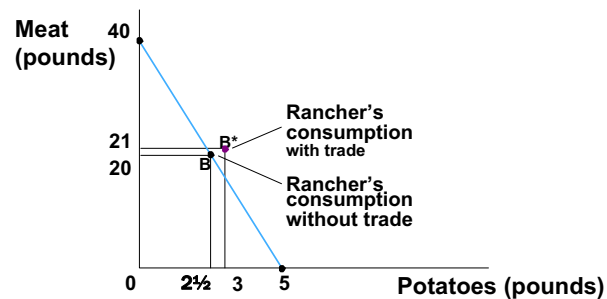
How trade expands consumption opportunities

(a) How Trade Increases the Farmer's Consumption



How trade expands consumption opportunities

(b) How Trade Increases the Rancher's Consumption



The gains from trade

	Without Trade		With Trade		
	Production and Consumption	Production	Trade	Consumption	Gains from Trade
Farmer	1 pound meat 2 pounds potatoes	0 pounds meat 4 pounds potatoes	Gets 3 pounds meat for 1 pound potatoes	3 pounds meat 3 pounds potatoes	2 pounds meat 1 pound potatoes
Rancher	20 pounds meat 2 1/2 pounds potatoes	24 pounds meat 2 pounds potatoes	Gives 3 pounds meat for 1 pound potatoes	21 pounds meat 3 pounds potatoes	1 pound meat 1/2 pound potatoes

Measuring costs of production

- Differences in the costs of production determine the following
 - Who should produce what?
 - How much should be traded for each product?
- There are two ways to measure differences in costs of production
 - The number of hours required to produce a unit of output (for example, one pound of potatoes)
 - The *opportunity cost* of sacrificing one good for another
- Is it the latter that is the basis of trade between the farmer and the rancher

Absolute advantage

- Before we move on, let us look at a different set of production figures for the farmer and rancher
- In the new example, the farmer produces more potatoes while the rancher produces more meat
- The producer that requires a smaller quantity of inputs to produce a good is said to have an *absolute advantage* in producing that good
- This is an easy but also uninteresting situation: the farmer will specialise in potatoes and the rancher in meat
- Our original example is interesting because the rancher is producing *more of both* potatoes and meat

Production of farmer and rancher - 2

	Hours needed to make one pound of		Amount Produced in 40 hours	
	Meat	Patatoes	Meat	Patatoes
FARMER	20 hours/lb	4 hours/lb	2 lbs	10 lbs
RANCHER	1 hour/lb	8 hours/lb	40 lbs	5 lbs

Comparative advantage

- Comparative advantage* looks at relative costs, in other words to the opportunity costs
- The producer who has the smaller opportunity cost of producing a good is said to have a comparative advantage in producing that good
- In our original example the rancher is able to produce *more of both goods*
- Still, the farmer has comparative advantage in *potatoes* while the rancher has comparative advantage in *meat*
- Farmer gives up 0.5 lb. of meat to produce 1 lb. of potatoes: the ratio is 8 to 1 for the rancher

The principle of comparative advantage

- Comparative advantage and differences in opportunity costs are the basis for specialized production and trade
- Whenever potential trading parties have *differences in opportunity costs*, they can each benefit from trade
- Individuals, regions and nations specialise because they have *comparative advantage* not absolute advantage
- Specialisation and trade* lead to higher levels of consumption for all the parties that participate in trade

Other benefits of exchange

- Specialisation* permits each producer to have a deeper knowledge and experience about the tasks involved during production
- Better knowledge and experience means more can be produced by the same amount of effort
- Higher productivity* benefits everyone in society
- Precious talent is not wasted on doing things others can also do
- We don't want *Hagi* to sing or *John Lennon* to play football
- Our current welfare is wholly the result of high productivity due to specialisation

Trade among nations

- What is true within a nation is also true among nations
- Exports* are what Turkey sells to other countries
- Imports* are what Turkey buys from other countries
- The principle of comparative advantage applies in international trade
- Absolute advantage in international trade works in limited areas of *natural differences* (oil, tourism, etc)
- Big differences in productivity among countries does not prevent international trade
- Turkey benefits from trade with US and EU even if they both have higher productivity

Conclusion

- Self-sufficiency is not desirable
- Specialisation leads to higher productivity for the producers of goods and services
- Interdependence and trade allow people to enjoy a greater quantity and variety of goods and services
- The person who can produce a good with a smaller quantity of inputs has an absolute advantage.
- The person with a smaller opportunity cost has a comparative advantage
- The gains from trade are based on comparative advantage, not absolute advantage
- Turkey benefits from international trade

PART TWO: SUPPLY AND DEMAND I: HOW MARKETS WORK

THE MARKET FORCES OF SUPPLY AND DEMAND

Chapter 4

What we learn in Part Two?

- Part Two introduces *the model of supply and demand* in a market economy
- Supply and demand is the basic tool of economic analysis
- In Principle Five and Chapter 3 we learned that specialisation and trade makes everybody better off
- Principle Five tells us that markets are a good way to organise economic activity
- Now we must see *how markets work* to achieve this result
- Markets work through *supply and demand*

Plan of Part Two

- There are three chapters in Part Two
- Chapter 4: *Market forces of supply and demand*
- It introduces the concept of supply and demand along with other basic concepts such as competition, market type, etc.
- Chapter 5: *Elasticity and its applications*
- It is about the relation between changes in prices and changes in quantities
- Chapter 6: *Supply, demand and government policies*
- The tools of supply and demand are used to evaluate different government policies towards markets

Plan of this chapter

- We start by defining *market types* such as competition, monopoly, oligopoly, etc.
- Then examine the factors that determine the *demand* for a good or service in a competitive market
- Next we look at the determinants of the *supply* of a good or service again in a competitive market
- Supply and demand come together to set *the price* of the good or service and *the quantity* sold
- We establish how changes in demand or in supply *conditions* affect the price and quantity
- And look at the key role of prices in the *allocation* of scarce resources of society

Market forces of supply and demand

- *Supply* and *demand* are certainly the two words that economists use most often
- *Supply* and *demand* are the forces that make market economies work efficiently
- Supply and demand determine the quantity of each good produced and the price at which it is sold
- Any event or policy that affects the economy will work through its impact on supply and demand of some goods
- Modern microeconomics is about supply, demand, and the *market equilibrium* that results from their interaction

Markets

- The terms *supply and demand* refer to the behavior of people as they interact with one another in *markets*
- A market is a group of buyers and sellers of a particular good or service
 - *Buyers* determine demand
 - *Sellers* determine supply
- Some markets are *formally organised* with a building, etc. such as the Stock Market, Commodities Market, etc.
- Most markets *are not* formally organised but they exist because buyers and sellers know them
- People know where to go to buy a car, bread, etc.

A Competitive Market

- A *competitive market* is a market
 - with *many* buyers and sellers
 - that is not controlled by any one person
 - in which a *narrow range of prices* are established that buyers and sellers act upon
- The number of buyers and sellers are an important part of the definition of competition
- The second element is that a buyer or seller cannot influence prices by his own actions alone
- When these two characteristics exist the market is called competitive

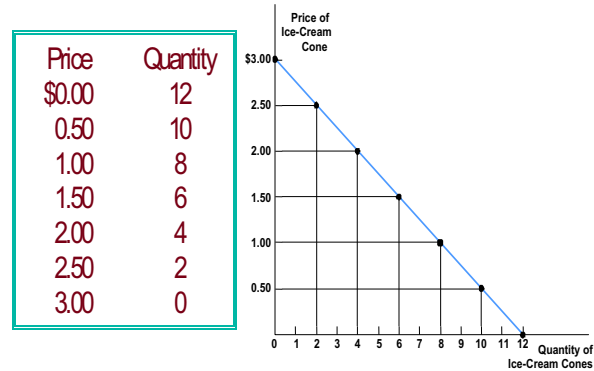
Types of markets

- Economic theory distinguishes among four different types of markets
- *Perfect Competition*
 - Competitive market where products are the same
- *Monopoly*
 - One seller, and seller controls price
- *Oligopoly*
 - Few sellers
 - Not always aggressive competition
- *Monopolistic Competition*
 - Many sellers
 - Differentiated products

The Concept of Demand

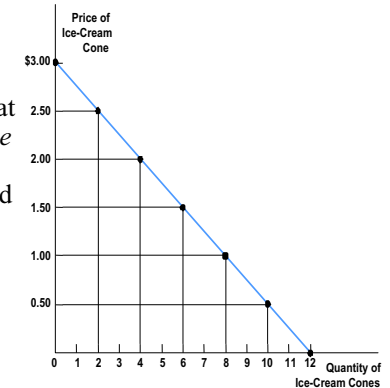
- We begin our analysis of demand by examining the behaviour of buyers in the market for a good or service
- Quantity demanded* is the amount of a good that buyers are willing and able to purchase
- Quantity demanded will vary with *the price* of the good in question
- The *demand schedule* is a table that shows the relationship between the price of the good and the quantity demanded
- The *demand curve* is the downward-sloping line relating price to quantity demanded
- Market demand is the sum of individual demands

Demand for Ice Cream



Law of Demand

- The *law of demand* states that there is an *inverse relationship* between price and quantity demanded.



Determinants of Demand

- What are the factors that determine how much of a product is bought in the market for that product?
- In the previous slides we looked at the demand for ice cream
- What determines *how much ice cream* will be bought?
 - Market price of ice cream
 - Consumer income
 - Prices of related goods
 - Tastes
 - Expectations
 - Number of consumers

Demand function

- We can present the determinants of demand by the symbols of a function

$$Q = F(P, Y, P_n, P_e, \alpha)$$
- It is called the demand function
 - P = price of the good or service
 - Y = income
 - P_n = prices of other goods and services
 - P_e = expectations about the change in price
 - α = fashion and tastes of consumers

Demand function

- What is the meaning of the demand function

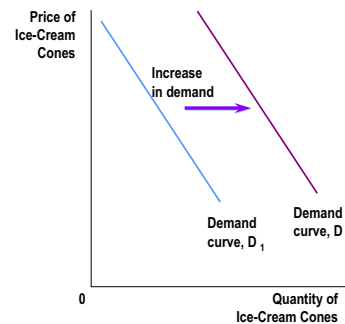
$$Q = F(P, Y, P_n, P_e, \alpha)$$
- We look at the relation between price and quantity demanded while we keep other factors as constant
- In other words, P is the only *independent variable*, the others are kept constant
- Changes in income, other prices, price expectations and tastes will cause a *shift* in the demand curve
- Whereas changes in price only affect *quantities*
- Change in prices changes the quantity demanded but not the demand function

Changes in income: normal and inferior goods

- Changes in income cause a *shift* in the demand curve
- Usually the direction of the shift is *upward*
- In other words, higher income means more demand for most goods at all prices
- These are called *normal goods*
- However, for some goods, an increase in income may actually result in less demand or a *downward* shift in the demand curve
- These are called *inferior goods*
- They are consumed by the very poor

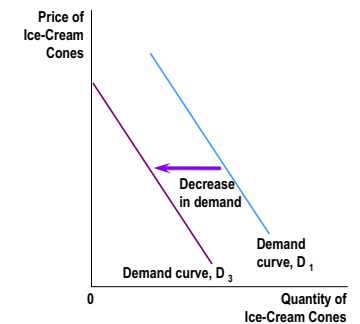
Effect of an increase in income: normal good

- As income increases the demand for a *normal good* will increase.



Effect of an increase in income inferior good

- As income increases the demand for an *inferior good* will decrease.



Prices of Related Goods

- The effects of changes in the prices of related goods depend on the characteristics of the goods
- Two goods are called *substitutes* if they represent similar goods for the consumer: beans or chick peas are close substitutes
- A fall in the price of a substitute will reduce demand for a good (demand curve shifts down)
- Two goods are called *complements* when consuming one entails consuming the other: a car and tyres
- A fall in the price of a complement will increase demand for a good (demand curve shifts up)

Ceteris Paribus

- Warning about one aspect of the analysis so far
- We change one constant at a time while we keep the remaining unchanged
- For example, when we look at the effect of a change in income we keep the prices of related products plus tastes plus price expectations unchanged
- Economic theory uses a short-cut to express this method
- Ceteris paribus* is a Latin phrase that means that all variables other than the ones being studied are assumed to be constant

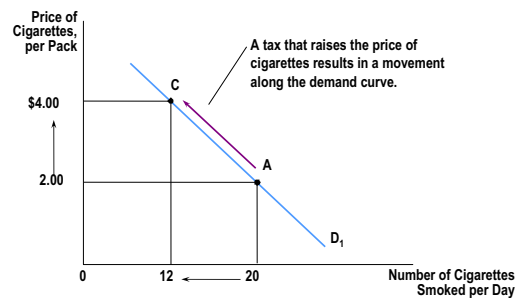
Change in Quantity Demanded versus Change in Demand

- The distinction between change in demand and change in quantity demanded is vital to understand the analysis of demand
- Change in *Quantity Demanded*
 - Movement along the demand curve.
 - Caused by a change in the price of the product
- Change in *Demand*
 - A shift in the demand curve, either to the left or right
 - Caused by a change in a determinant other than the price (income, tastes, etc)

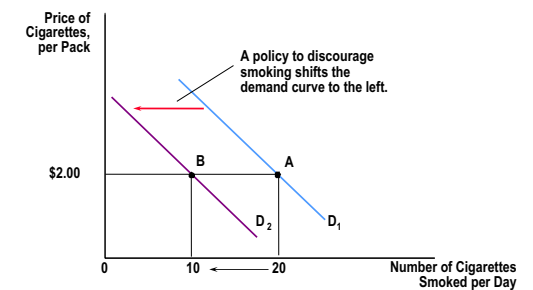
Change in Quantity Demanded versus Change in Demand

Variables that Affect Quantity Demanded	A Change in This Variable . . .
Price	Represents a movement along the demand curve
Income	Shifts the demand curve
Prices of related goods	Shifts the demand curve
Tastes	Shifts the demand curve
Expectations	Shifts the demand curve
Number of buyers	Shifts the demand curve

Changes in Quantity Demanded



Change in Demand



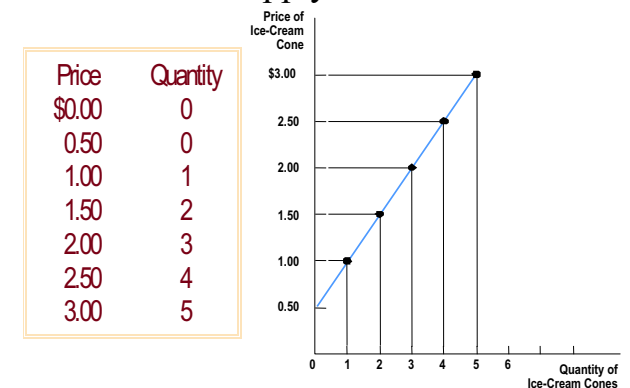
The Concept of Supply

- Goods and services are supplied to the market by producers who are also sellers
- Supply looks at the behaviour of the producers
- Quantity supplied* is the amount of a good or service that sellers are willing and able to sell
- What determines the quantity supplied?
 - Market price of the good or service
 - Input prices (of those used in its production)
 - Technology (with which it was produced)
 - Expectations about the future level of prices
 - Number of producers of the good or service

Law of Supply

- The *law of supply* states that there is a direct (positive) relationship between price and the quantity supplied
- At higher prices there will be higher quantities of the good or service supplied
- The *supply schedule* is a table that shows the relationship between the price of the good or service and the quantity supplied
- The *supply curve* is the upward-sloping line relating price to quantity supplied
- Market supply curve is the sum of the supply curves of the individual producers

Supply Curve



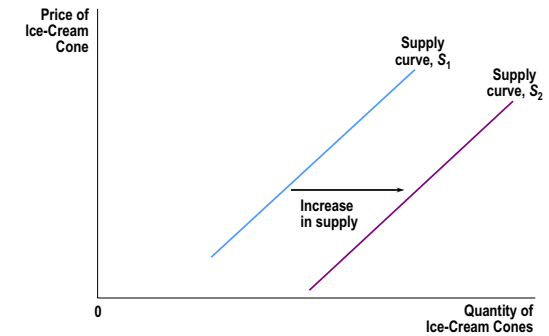
Change in Quantity Supplied versus Change in Supply

- As in the demand, attention must be paid to the difference between changes in the supply and changes in the quantity supplied
- Change in *Quantity Supplied*
 - Movement along the supply curve
 - Caused by a change in the market price of the product
- Change in *Supply*
 - A shift in the supply curve, either to the left or right
 - Caused by a change in a determinant other than price (input prices, technology, expectations, etc)

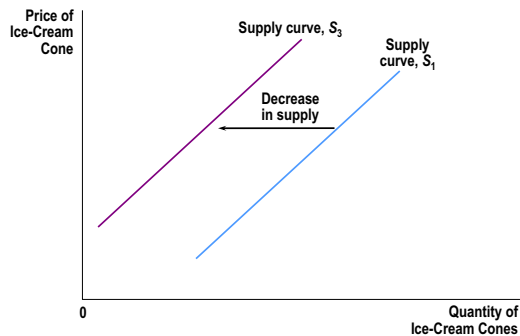
Change in Quantity Supplied versus Change in Supply

Variables that Affect Quantity Supplied	A Change in This Variable . . .
Price	Represents a movement along the supply curve
Input prices	Shifts the supply curve
Technology	Shifts the supply curve
Expectations	Shifts the supply curve
Number of sellers	Shifts the supply curve

Increase in Supply



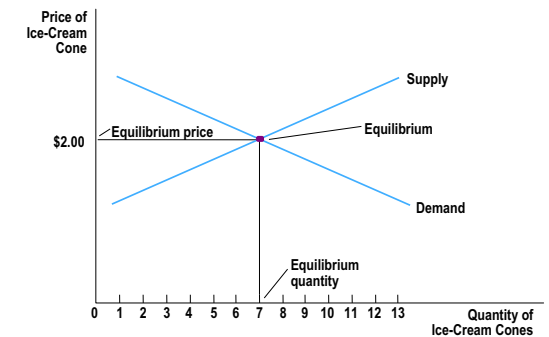
Decrease in Supply



Supply and demand together

- Market works by the interaction of supply and demand
- Now we can see how the two come together
- Market equilibrium* corresponds to a price where quantity demanded and supplied is equal
- Equilibrium Price*
 - The price that balances supply and demand. On a graph, it is the price at which the supply and demand curves intersect
- Equilibrium Quantity*
 - The quantity that balances supply and demand. On a graph it is the quantity at which the supply and demand curves intersect

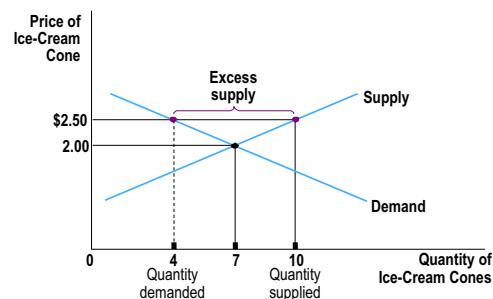
Equilibrium of Supply and Demand



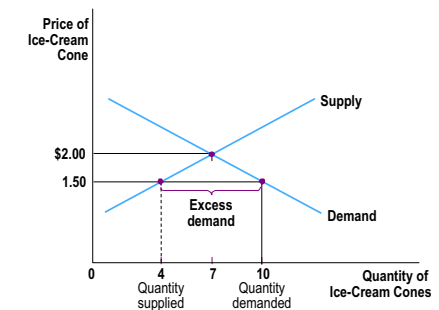
Markets Not in Equilibrium

- To understand the meaning of market equilibrium we can look at a market not in equilibrium
- Outside of equilibrium there will be either unsold products or unsatisfied customer demand
- Excess Supply*
 - Price is above equilibrium price
 - Producers are unable to sell all they want at the going price
- Excess Demand*
 - Price is below equilibrium price
 - Consumers are unable to buy all they want at the going price

Excess Supply



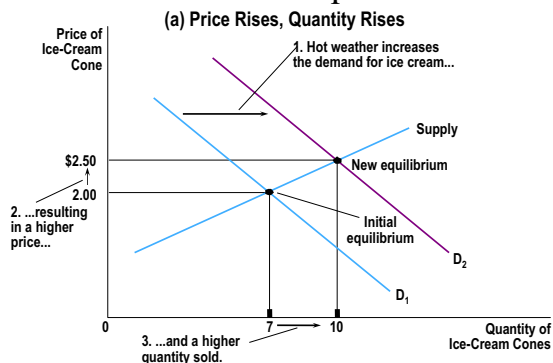
Excess Demand



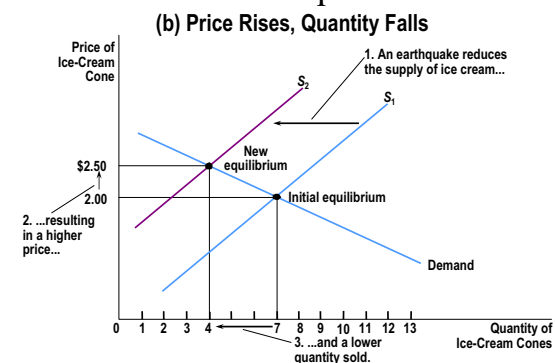
Changes in Equilibrium

- For the market equilibrium to change one or more of the *determinants* of demand or supply must have changed
- When faced with an *event or policy* that affects the market
- First, we must try to understand whether the event shifts the supply or demand curve (or both)
- Then we search for the *direction* of the shift(s) in the curve(s): upward or downward
- Only then can we determine the *impact* of the event or policy on the equilibrium price and quantities
- And also the direction of the change

How an increase in demand affects market equilibrium



How a Decrease in Supply Affects the Equilibrium



Effects of Supply and Demand Shifts

	No Change in Supply	An Increase in Supply	A Decrease in Supply
No Change in Demand	P same Q same	P down Q up	P up Q down
An Increase in Demand	P up Q up	P unknown Q up	P up Q unknown
A Decrease in Demand	P down Q down	P down Q unknown	P unknown Q down

Some Examples

- *Weather conditions* are important for the supply of most agricultural products
- Exceptional temperatures below freezing in warm climates lead to crop failures
- Read *ITN* (p.81) “Mother Nature Shifts the Supply Curve”
- We have a more recent example from the US besides agriculture
- In September 2005 *Hurricane Katrina* hit hard a region with important oil refining and oil-gas distribution networks
- Potentially disrupting the supply of energy
- Leading to higher prices in international oil markets

Conclusion

- Trade happens in markets of different types, some competitive other not
- Market economies harness the forces of supply and demand
- Demand comes from the consumers
- Quantity demanded of a good depends on its price, on income, on the prices of related goods, on expectation, on tastes and fashion
- When we analyse demand, only the price is allowed to change while the other factors are kept constant (*ceteris paribus*)
- Quantity demanded is a decreasing function of price

Conclusion

- Changes in the other factors cause upward or downward shifts in the demand curve
- Supply comes from producers or sellers
- Quantity supplied is a function of the price, of input prices, of technology, etc.
- Higher prices increase quantity supplied
- Supply and demand together determine the prices of the economy’s goods and services as well as the quantities produced
- Market equilibrium changes when supply or demand (or both) shifts
- Prices are the signals that guide the allocation of resources in the market economy

ELASTICITY AND ITS APPLICATIONS

Chapter 5

What we learn now?

- Everyday, in every market, billions of decisions are made by producers, consumers, governments, etc.
- In Ch.4 we developed our basic model to explain the determination of prices and quantities in the markets
- By the interaction of supply and demand
- In Ch.5 we deal with some important characteristics of supply and demand curves
- The word *elasticity* refers to
 - How changes in prices affect quantities?
 - How changes in quantities affect prices?
- Information about the reaction of prices and quantities to one another is vital for many aspects of economic decision making

Elasticity

- Elasticity is a *practical measure* developed by economists to enrich our understanding of the forces of supply and demand and how they interact
- Elasticity calculates the response of buyers and sellers to changes in *market conditions*
- Through this measure producers and government gains valuable insights about the behaviour of different markets
- We will learn about *three types* of elasticity
 - Price elasticity of demand
 - Income elasticity of demand
 - Price elasticity of supply

Price elasticity of demand

- Price elasticity of demand* is the percentage change in quantity demanded given a one percent change in the price
- The price elasticity of demand is computed as the percentage change in the quantity demanded divided by the percentage change in price
- Attention: price elasticity of demand is a measure of two points *on the same* demand curve

$$\text{Price Elasticity of Demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

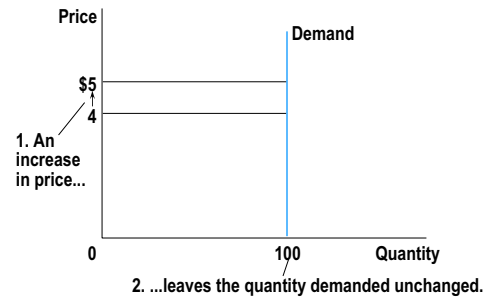
Some concepts

- Before we proceed, some definitions are needed
- Necessities*: goods that people must buy for natural or similar reasons, like food, shelter, medical services, including habit forming goods such as cigarettes and drinks
- Luxuries*: goods that are bought for pleasure more than need, like fashion, travel, entertainment
- Close substitutes*: different categories of food are usually very close substitutes, like beans and chickpeas
- Market definition*: food market is broad, market for green vegetables is less broad, market for spinach is much narrower

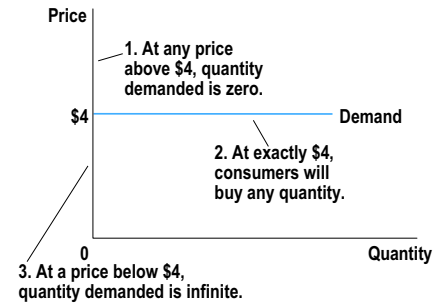
Ranges of elasticity

- Depending on the value of the price elasticity of demand we can say that demand is
- Perfectly Inelastic* when the quantity demanded remains unchanged when price changes
- Perfectly Elastic* when the quantity demanded changes by very large amounts with small changes in price
- Unit Elastic* when the quantity demanded changes by the same percentage as the price
- Inelastic Demand* when the quantity demanded does not respond strongly to price changes
- Elastic Demand* when the quantity demanded responds strongly to changes in price

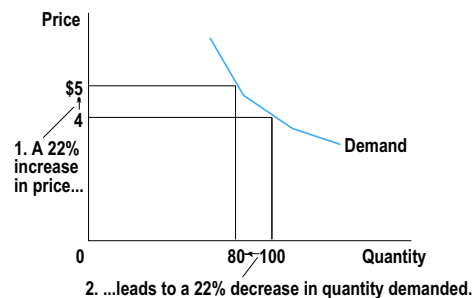
Perfectly inelastic demand



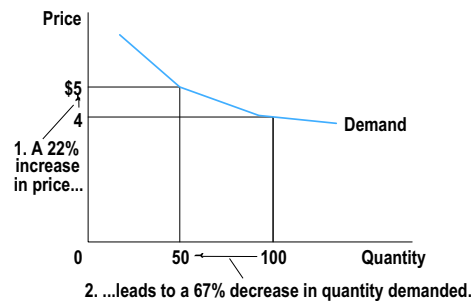
Perfectly elastic demand



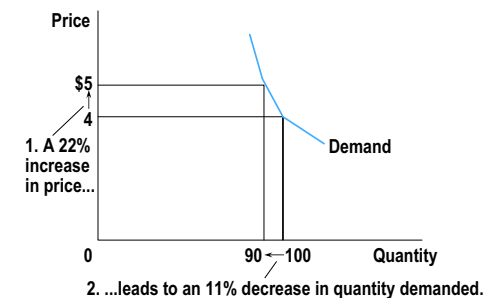
Unit elastic demand

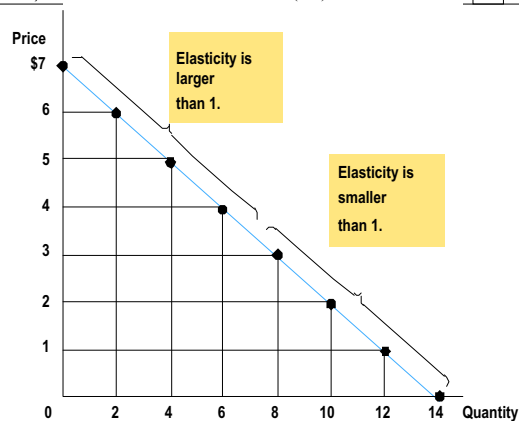


Elastic demand



Inelastic demand

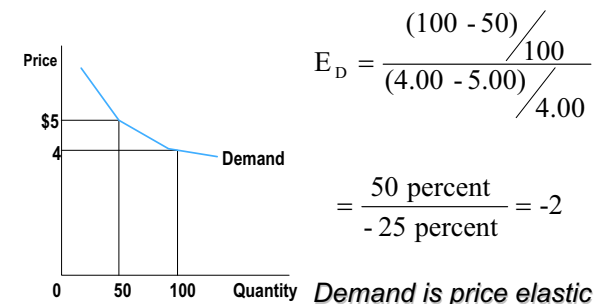




Determinants of price elasticity of demand

- Demand usually is more *elastic*
 - if the good is a luxury
 - the longer the time period
 - the larger the number of close substitutes
 - the more narrowly defined the market.
- Demand tends to be more *inelastic*
 - if the good is a necessity
 - the shorter the time period
 - the fewer the number of close substitutes
 - the more broadly defined the market.

Computing the price elasticity of demand



A better way: midpoint method

- Wider ranges may pose some practical difficulties in measuring elasticity
- Narrow price ranges give more precise results
- *Midpoint method* is a better way
- Assume the following prices and quantities:
- Point A: Price \$ 4 Quantity: 120
- Point B: Price \$ 6 Quantity: 80
- Midpoint: Price \$ 5 Quantity: 100
- The formula:

Midpoint Price Elasticity of Demand =

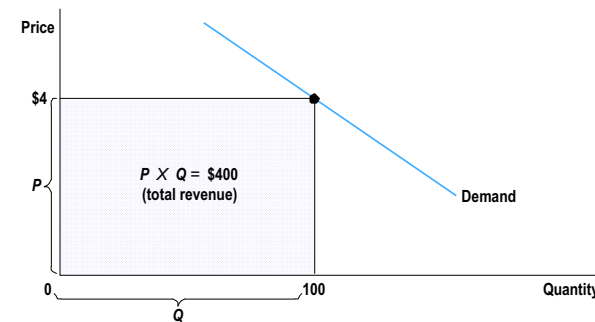
$$\frac{(Q_2 - Q_1) / [(Q_2 + Q_1) / 2]}{(P_2 - P_1) / [(P_2 + P_1) / 2]}$$

Elasticity and total revenue

- The price elasticity of demand has very important *practical implications*
- Producers gain valuable information about the impact of price changes on their sales
- Because there is a very strong relation between firm's sales (total revenue) and price elasticity
- *Total revenue* is the amount paid by buyers and received by sellers of a good
- Computed as the price of the good multiplied by the quantity sold
- The behaviour of total revenue when prices change depend on the price elasticity of demand

$$TR = P \times Q$$

Elasticity and total revenue



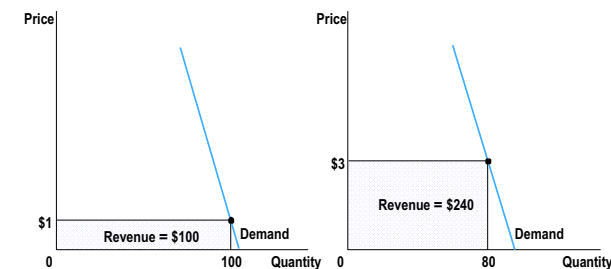
Effects on total revenue

- With an *elastic* demand curve, an increase in price leads to a decrease in quantity demanded that is proportionately larger
- Producers facing elastic demand curves have
 - decreasing revenues when prices go up
 - increasing revenues when prices go down
- With an *inelastic* demand curve, an increase in price leads to proportionately smaller decrease in quantity
- Producers facing inelastic demand curves have
 - increasing revenues when prices go up
 - decreasing revenues when prices go down
- Unit elasticity means constant revenues

Elasticity and total revenue: elastic demand



Elasticity and total revenue: inelastic demand



Some examples

- Reducing the price of a *toll-road* (paralı otoyol) may increase total revenue received by the owners (private or public)
- If the price elasticity is *higher than one*
- Read *ITN* (p.98) “On the Road with Elasticity”
- The same is also true for a Museum
- Reducing the *admission price* for a Museum may result in such an increase in the number of visitors that total revenue will be higher
- Again it means price elasticity is *higher than one*
- Read *CS* (p.98) “Pricing Admission to a Museum”
- It is possible to think of other such examples

Income elasticity of demand

- There exists another elasticity of demand besides price elasticity
- Income elasticity* of demand measures how much the quantity demanded of a good responds to a change in consumers' income.
- It is computed as the percentage change in the quantity demanded divided by the percentage change in income.

$$\text{Income Elasticity of Demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Income}}$$

Types of income elasticity

- Income elasticity of demand tells us about the behaviour of demand when income changes
- Higher income *raises* the quantity demanded for normal goods but *lowers* the quantity demanded for inferior goods
- Goods consumers regard as *necessities* usually have low income elasticity of demand
 - Examples include food, fuel, clothing, utilities, and medical services.
- Goods consumers regard as *luxuries* usually have high income elasticity of demand
 - Examples include sports cars, furs, and expensive foods

Price elasticity of supply

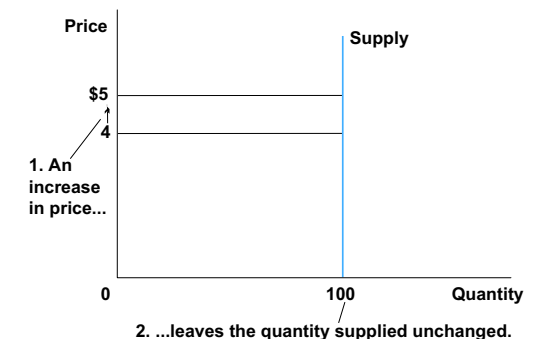
- Price elasticity of supply measures the response of quantity supplied to changes in price
- Price elasticity of supply* is the percentage change in quantity supplied resulting from a one percent change in price
- The price elasticity of supply is computed as the percentage change in the quantity supplied divided by the percentage change in price

$$\text{Elasticity of Supply} = \frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage Change in Price}}$$

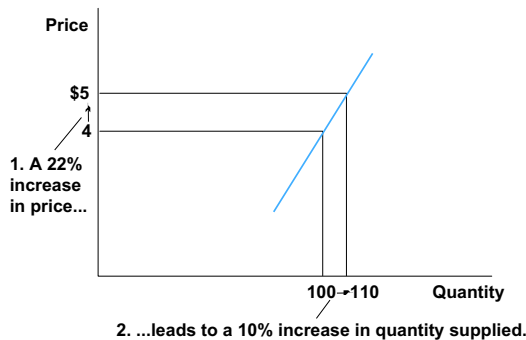
Ranges of supply elasticity

- Perfectly Elastic
 $E_S = \infty$ (*horizontal*)
- Relatively Elastic
 $E_S > 1$ (*flat*)
- Unit Elastic
 $E_S = 1$
- Relatively Inelastic
 $E_S < 1$ (*steep*)
- Perfectly Inelastic
 $E_S = 0$ (*vertical*)

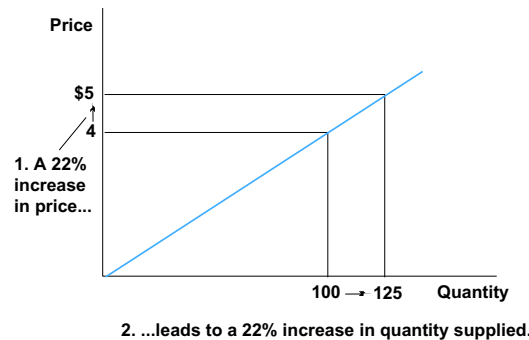
Perfectly inelastic supply



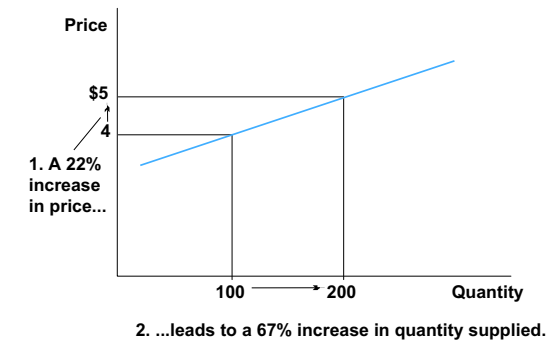
Inelastic supply



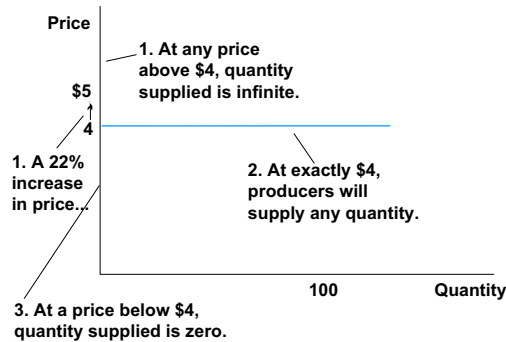
Unit elastic supply



Elastic supply



Perfectly elastic supply



Determinants of elasticity of supply

- Price elasticity of supply measures the speed of the change in the production of a good or service demanded in the market
- The availability or non-availability of a good is influenced by many factors
 - Beach-front land is limited by nature (inelastic supply)
 - Books, cars, and most manufactured goods can be produced at will (elastic supply)
- Time period
 - Supply is more elastic in the long run.

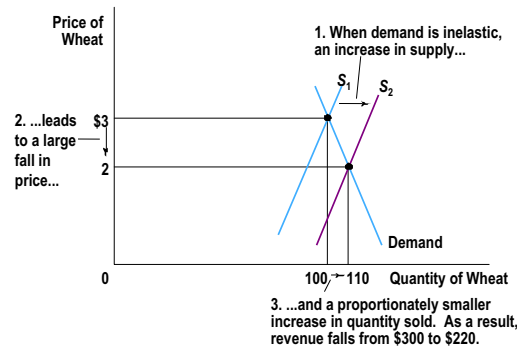
Application of elasticity

- How do we apply elasticity to real world events
- In case of a change in price, start by examining whether the shift is in the supply or demand curve or both
- Determine the direction of the shift of the curve(s)
- Use the supply-and-demand diagram to see how the market equilibrium changes
- You may want to distinguish between the short run and the long run
- We now look at three examples
 - Farming
 - Drugs
 - Oil

Elasticity and farming income

- Can good news for farming be bad news for farmers?
- What happens to wheat farmers and the market for wheat when university agronomists discover a new wheat hybrid that is more productive than existing varieties?
- Key to solution: price elasticity of both supply and demand is *very low (inelastic)* for food products
- The innovation increases supply: shifts the supply curve to the right
- The result will be more production of wheat but lower incomes for farmers
- *Farmers' dilemma*: the more they produce, the poorer they become

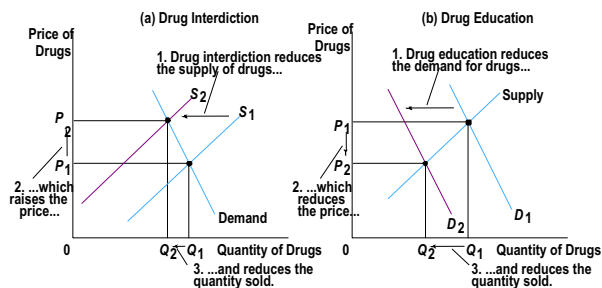
An increase in supply in the market for wheat



Reducing drug use

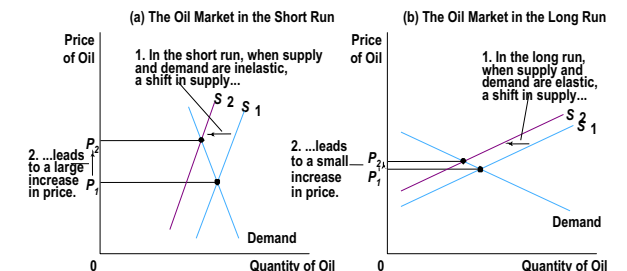
- The second example is from harmful drugs
- Let's evaluate two alternative policies to fight drugs
 - Better policing and the interdiction
 - Better education of potential drug addicts
- The first cause *a reduction of supply*: supply curve shifts to left
- Price of drugs and profits of drug dealers go up but the quantity used is not affected
- The second cause *a fall in demand*: demand curve shifts to left
- Both the price of and quantity drugs fall
- Price elasticity shows to policymakers the intelligent method of fighting drugs

Fighting drug addiction



OPEC and the price of oil

- *Organisation of Petroleum Exporting Countries (OPEC)* has control over the price of oil in the short run because it can cut oil production
- In the *short run* the price elasticity of both demand and supply is very low for oil (inelastic)
- Small cuts in production imply big jumps in price
- OPEC is successful in increasing the oil revenues of its members in the short run
- In the *long run* both supply and demand of oil is elastic as new wells come in and consumers switch to other sources of energy
- OPEC finds it difficult to maintain high prices in the long run



Conclusion

- Elasticity is a practical measure that helps producers and policymakers
- Price elasticity of demand measures how much the quantity demanded responds to changes in the price
- If a demand curve is elastic, total revenue falls when the price rises
- If it is inelastic, total revenue rises as the price rises
- The price elasticity of supply measures how much the quantity supplied responds to changes in the price
- In most markets, supply is more elastic in the long run than in the short run

SUPPLY, DEMAND, AND GOVERNMENT POLICIES

Chapter 6

What we learn now?

- In Ch.2 we mentioned two roles for economists:
 - As scientists they try explain the world
 - As policymakers they try to change the world
- Ch.4 and Ch.5 analysed objectively how supply and demand works in markets
- In Ch.6 we analyse various types of *government policy* towards the markets
- To that purpose we will only use tools of supply and demand that we just developed
- The analysis will yield some *surprising insights* about how markets work
- Common sense and economic analysis may give opposing advise to policymakers

Supply, demand, and government

- In a free, unregulated market system, market forces establish equilibrium prices and quantities
- The market equilibrium may be efficient, but it may not leave everyone satisfied
- Those who consider themselves to be losing from the market outcomes will ask for government to intervene in the market
- *Government intervention* in the markets may take several ways, depending on the circumstances
- We will look at two different cases of direct government involvement in markets:
 - Price controls
 - Taxes levied on goods and services

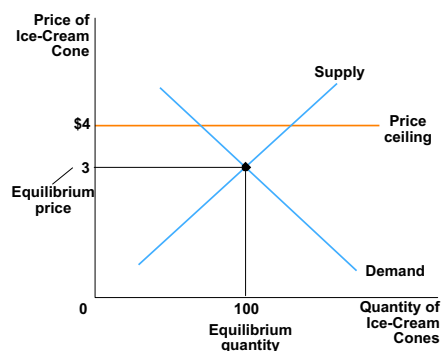
Price controls

- *Price control*: government sets an upper or lower limit (or both) to the price of good or service
- Price controls are often used in many countries
- Price controls are enacted by governments because there is a demand for them from some sections of the public
- Who, either as buyers or sellers feel that the existing market price is unfair to them
- We will distinguish between two types of controls
- *Price Ceiling*: a legally established maximum price at which a good can be sold.
- *Price Floor*: a legally established minimum price at which a good can be sold

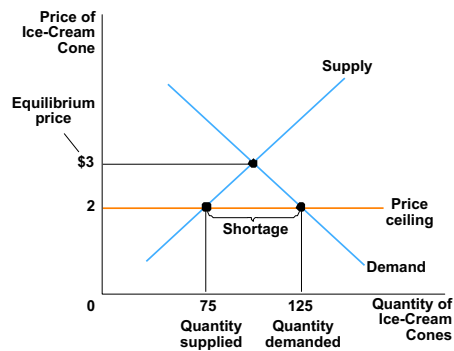
Price ceilings

- Price ceilings limit *the maximum price* that sellers can charge to their customers
- In other words, market price can be lower but can not be higher than the price fixed by government
- Two outcomes are possible when the government imposes a price ceiling
- The price ceiling *is not binding* if it is set *above* the equilibrium price
- It will have no impact on the market
- The price ceiling *is binding* if it is set *below* the equilibrium price
- It will lead to *shortages* in the market as demand exceeds supply at that price

A price ceiling that is not binding



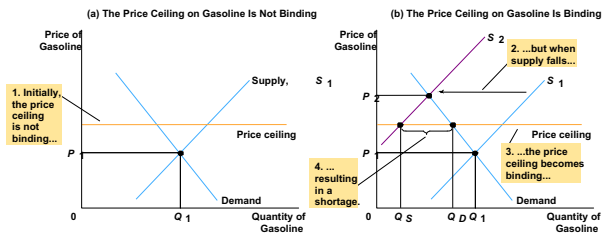
A price ceiling that is binding



Effects of price ceilings

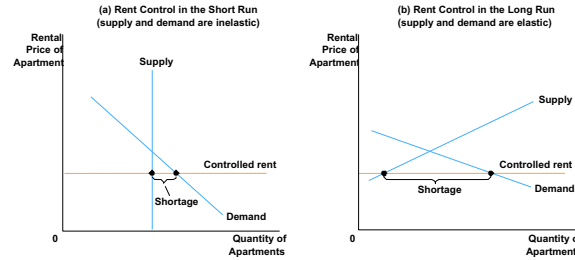
- A price ceiling prevents the price to rise further even if demand is high
- A binding price ceiling creates *shortages* because $Q_D > Q_S$.
- Example: there was a margarine shortage in Turkey during 1978-79 crisis because the price was fixed too low to cover the costs of producers
- Shortages result in non-price rationing such as long lines in front of the shops, discrimination by sellers and as a rule the formation of a “*black market*”
- In Turkey there was a black market for dollars before 1980s because the government had fixed the exchange rate below the market equilibrium rate

Price ceiling on gasoline



A fall in supply turns an unbinding price ceiling into a binding ceiling and causes shortages of gasoline

Rent control: short and long run

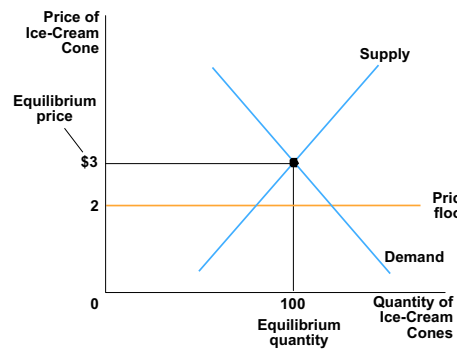


Controlling rents cause bigger shortages in the long run because new construction becomes unattractive, reducing long run supply

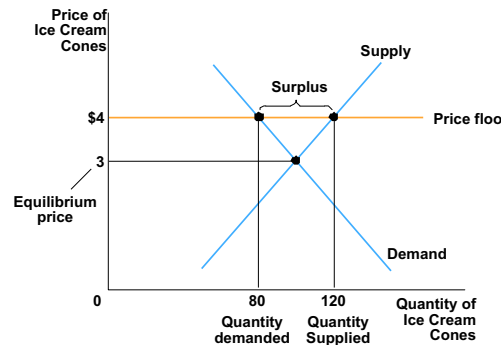
Price floors

- Price floors set *the minimum price* that buyers must pay for a product
- Market price can be higher but not below the price set by the government
- When the government imposes a price floor, again two outcomes are possible
- The price floor *is not* binding if it is set *below* the equilibrium price
- It has no effect on the market
- The price floor *is* binding if it is set *above* the equilibrium price
- It leads to a *surplus* because demand is less than supply at that price

A price floor that is not binding



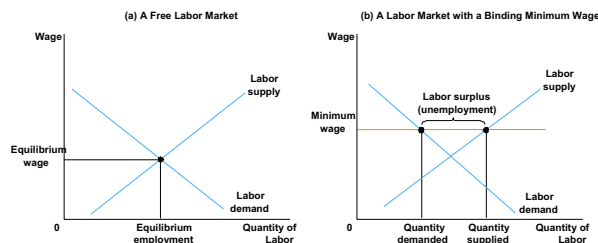
A price floor that is binding



Effects of a price floor

- A price floor prevents price to fall even if demand is very low
- When the market price hits the floor, it can fall no further, and the market price equals the floor price
- A binding *price floor* causes a *surplus* of supply over demand because at that price $Q_S > Q_D$.
- Agricultural support prices are typical examples
- When set above market levels, they result in large unsold stocks (tobacco?)
- Minimum wage laws also set price floors for wages
- Binding minimum wages prevent wages to go down and therefore cause unemployment

Minimum wage law and employment



Minimum wage legislation increases both the real wage of employed and the number of unemployed

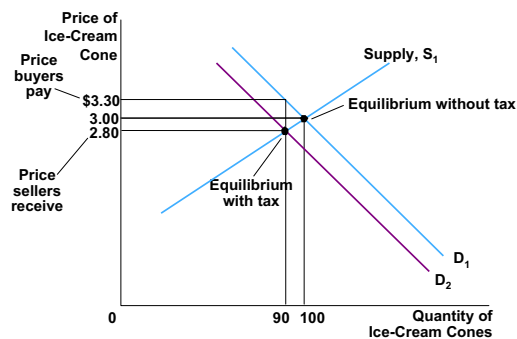
Letting the price system work

- Most economists believe in the *superiority* of the price system in solving most problems
- Therefore dislike government interference with the working of the price mechanism
- Even in the case of *natural disasters*
- Read *ITN* (p.119) “Does a Drought need to Cause a Water Shortage”
- The author argues that increasing the price that consumers pay for water would be a better way of allocating scarce water in case of a major drought
- A drought is always a *natural event*
- A water shortage is always a *man-made event*

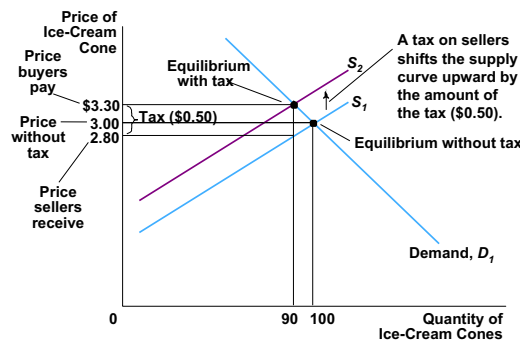
Taxes: impact

- Taxes levied on goods and services are called *indirect taxes*
- The amount of tax fixed by the government is added to the price and paid everytime the good is sold
- Taxes discourage market activity
- When a good is taxed, the quantity sold is smaller
- Buyers and sellers share the tax burden
- *Tax incidence* is the study of who bears the burden of a tax
- Taxes result in a change in market equilibrium
- Buyers pay more and sellers receive less, regardless of whom the tax is levied on

Impact of a 50¢ tax on buyers



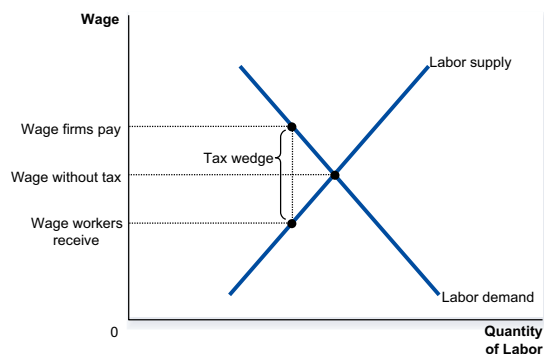
Impact of a 50¢ tax on sellers



The burden of a payroll tax

- Taxes from the wages that firms pay to their employees are called “*payroll taxes*”
- Income tax, contribution to Social Security and to Unemployment Insurance are typical payroll taxes
- When the Parliament passes legislation about these taxes, the issue of “who pays the tax” comes up
- Read CS (p.127) “Can Congress Distribute the Burden of a Payroll Tax”
- Whether the tax is legally levied on employees or employers makes little difference
- Conditions in the *labour market* and the elasticities of demand and supply determine who pays the tax

Payroll tax and the labour market



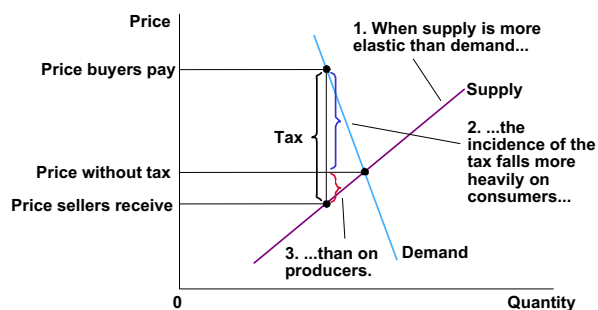
The incidence of tax

- Tax incidence tries to establish *who pays* the tax in the end?
- In other words, in what proportions is the burden of the tax divided between buyers and sellers?
- Alternatively, how do the effects of taxes on sellers compare to those levied on buyers?
- This is an opportunity for us to see how the measure of elasticity can be used in economics
- Because the answers to these questions depends on the elasticity of demand and the elasticity of supply.
- We shall show that the burden of a tax falls more heavily on the side of the market that is *less elastic*

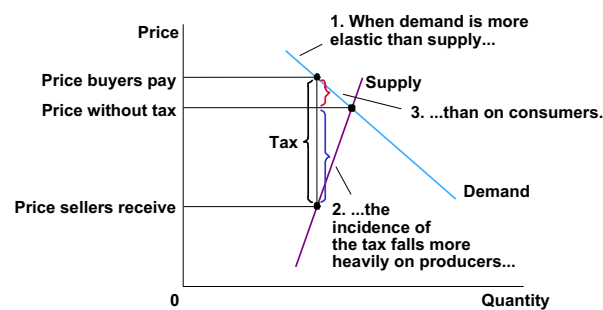
Elasticity and tax incidence

- Elasticity enters the picture because *total revenue* in the market depends on the price elasticity of demand and price elasticity of supply
- We can distinguish among three major cases
 - If demand is inelastic while supply is elastic, then a larger share of the tax will fall on the *buyers*
 - If demand is elastic while supply is inelastic, then a larger share of the tax will fall on the *sellers*
 - If demand and supply are unit elastic, buyers and seller will share the tax burden *equally*
- Knowing the price elasticities of demand and supply permits the government to *target correctly* those whom it wishes to pay the tax

Elastic supply, inelastic demand



Inelastic supply, elastic demand



Taxing luxuries or necessities?

- There is always a demand from the public to tax luxuries but not necessities
- Taxing goods that are considered luxuries is popular both with the public and governments
- Unfortunately luxury goods usually have high price elasticity of demand (bigger than 1)
- Therefore taxes reduce the consumption of luxuries
- Tax revenue is much lower than expected
- In turn, necessities have low price elasticity of demand (smaller than 1)
- And yield high tax revenues to the government
- In order to obtain revenues the government ends up by *taxing necessities* in Turkey

Conclusion

- The economy is governed by two kinds of laws:
 - The laws of supply and demand
 - The laws enacted by government
- Prices can be controlled by ceilings or floors
- Price ceilings cause shortages and black market
- Price floors result in surpluses and unsold stoks held by the government
- Taxes raise revenue to the government
- Taxes create new price equilibriums in which buyers and sellers share the tax
- The incidence of the tax depends on the price elasticity of demand and supply
- Necessities are taxed to get more revenue

PART THREE SUPPLY AND DEMAND – II MARKETS AND WELFARE

CONSUMERS, PRODUCERS, AND THE EFFICIENCY OF MARKETS

Chapter 7

What did we learn so far?

- *Part One* introduced us to some basic concepts as well as tools of economics as a science
 - Ten principles (Ch.1)
 - Thinking like an economist (Ch.2)
 - Exchange and trade (Ch.3)
- *Part Two* introduced us to markets and how they work through the forces of supply and demand
 - Supply and Demand (Ch.4)
 - Elasticities (Ch.5)
 - Markets and government policies (Ch.6)
- *Part Three* looks on the welfare implications of the market system

What do we learn in this part?

- We search for an answer to the following question
- Are *markets* a good way to organise the social process of production?
- To answer it we develop the concepts of consumer surplus, producer surplus and total surplus
- They allow us to explain *market efficiency*
- We then apply our new tools to understand the costs of taxation and the benefits of international trade
- Part Three is made of
- Ch.7 : Consumers, producers and market efficiency
- Ch.8 : Application: Costs of taxation
- Ch.9 : Application: International trade

Market equilibrium revisited

- Market equilibrium reflects the way markets *allocate scarce resources*
- Supply and demand determines the equilibrium price and quantity for each good
- Thus the resources that goes into its production as well as who shall benefit from its consumption
- The next question is to find out if the equilibrium price and quantity maximize the *total welfare* of buyers and sellers?
- *Welfare economics* answers this question
- And determines whether the market allocation is *desirable or not* from the perspective of society

Welfare economics

- *Welfare economics* study how the allocation of resources affects economic well-being in society
- It uses a new concept called “*surplus*”
- And shows that buyers and sellers both receive benefits from taking part in the market
- Therefore the equilibrium in a market maximizes the total welfare of buyers and sellers
- *Consumer surplus* measures economic welfare from the buyer side
- *Producer surplus* measures economic welfare from the seller side
- Together they allow us to evaluate the allocation of scarce resources by markets

Willingness to pay

- *Willingness to pay* is the maximum price that a buyer is willing and able to pay for a good or service
- It corresponds to the value attributed by the buyer to the good or service demanded
- The willingness to pay cannot always be directly measured in the market but it is still there
- How much a buyer will be willing to pay for a good or service is *the maximum price* at which he/she will purchase that good or service
- What determines the maximum price?
- The benefits that the buyer expect to receive from the consumption of that good or service

Consumer surplus

- Consumer surplus is the key concept of welfare economics
- The market demand curve shows the various quantities that buyers would be willing and able to purchase at different prices
- As the price goes down, the quantity bought goes up
- *Consumer surplus* is the difference between the willingness to pay for the good or service and the actual spending for it
- *Consumer surplus* is the amount a buyer is willing to pay for a good minus the amount the buyer actually pays for it

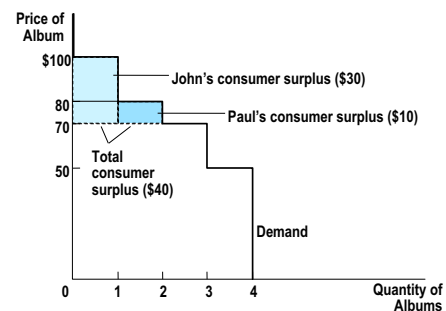
Willingness to pay with four possible buyers

Buyer	Willingness to Pay
John	\$100
Paul	80
George	70
Ringo	50

Willingness to pay with four possible buyers

Price	Buyer	Quantity Demanded
More than \$100	None	0
\$80 to \$100	John	1
\$70 to \$80	John, Paul	2
\$50 to \$70	John, Paul, George	3
\$50 or less	Ringo	4

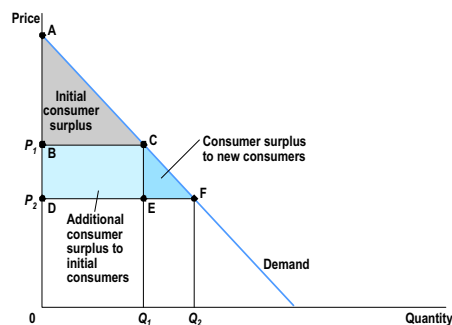
Measuring consumer surplus with the demand curve



Consumer surplus, demand and price

- Consumer surplus is *the area* that lies below the demand curve and above the market price
- Consumer surplus depends on the demand curve, which represents the willingness to pay
- And the market price which represents market equilibrium
- *Ceteris paribus*, changes in price and demand affect consumer surplus
 - Lower market price increases consumer surplus
 - Higher market price reduces consumer surplus
 - Higher demand increases consumer surplus
 - Lower demand reduces consumer surplus

How the price affects consumer surplus



Willingness to sell

- We can now apply the concept of surplus to the producers
- Market supply curve shows the various quantities that producers would be willing and able to sell at different prices
- It may be seen as a measure of *supplier costs*, that is, the opportunity cost of supplying various quantities of the good.
- The *marginal opportunity cost* of production increases as market output expands
- Because a producer's cost is the lowest price he/she will accept, cost is a measure of his/her *willingness to sell*