Microeconomics

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Contents

Lecture 1: Introduction to Microeconomics

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- Teacher: ...
- Books:
  - Microeconomics: Krugman's Economics for AP
  - Macroeconomics: Unknown
- Period 2, make sure to check daily block rotations for when class is
- AP Exam:
  - Microeconomics: Details to be given at a later date
  - Macroeconomics: Details to be given at a later date
- No mandatory homework, but use the workbook in order to gain practice

Chapter 1

Introduction

Definition 1. *Economics is the study of scarcity and choices. Economics will study the choices of individuals, firms, societies, and governments*

Economics assumes that society has unlimited wants and limited resources, and because of this choices must be made. The cost of every choice becomes the opportunity cost. Since everyone acts in their own "self-interest", everyone makes decisions based on the **marginal cost** and the **marginal benefits** of the choice.

1.1 4 Factors of Production

Since all resources are scare, they can be catagorized into:

Land: Natural resources that are used to produce goods and services.

- Timber
- Clean Water
- Minerals

Capital: Physical capital, where any human resource that is used to create goods and services, as well as Human capital which the skill or knowledge gained by a worker through education and/or experience.

- Machinery
- Building
- Tools
- Worker training

Labor(Human): The effort a person devotes to a task for which they are paid for.

- Effort of workers

! Do not confuse this with human capital

Entrepreneurship: Creative leaders who combine the other factors of pridyction to create goods and services.

- Risk Taking

- Innovation

- Creative combination of resources to increase production

Lecture 2: Economic Systems

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1.2 Opportunity Cost and the PPC

Definition 2. *A **Production Possibilities Curve** is an economic model that shows alternative ways that scare resources can be used. The model graphically shows scarcity, trade-offs, and opportunity costs.*

With economic models, there are some assumptions that have to be made for the PPC model to apply,

- Only **TWO** goods can be produced

- Full employment of resources
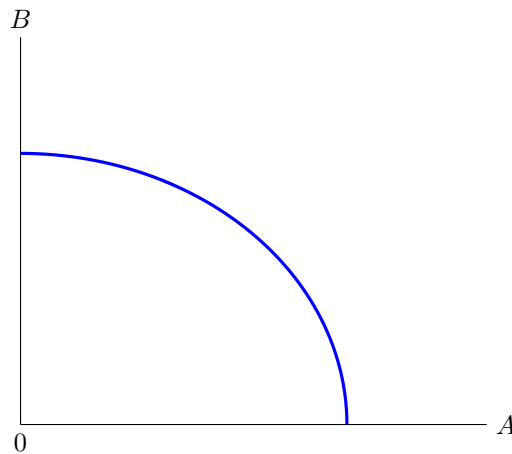
- Fixed resources

- Fixed technology

Figure 1.1: an example of a PPC curve between good A and good B

The data can also be displayed in a **Production Possibilities Table**, where each point represents a specific combination of goods that can be produced given full employment of resources.

	A	B	C	D	E
Bikes	14	12	9	5	0
Computers	0	2	4	6	8

Table 1.1: Production Possibilties Table between Bikes and Computers
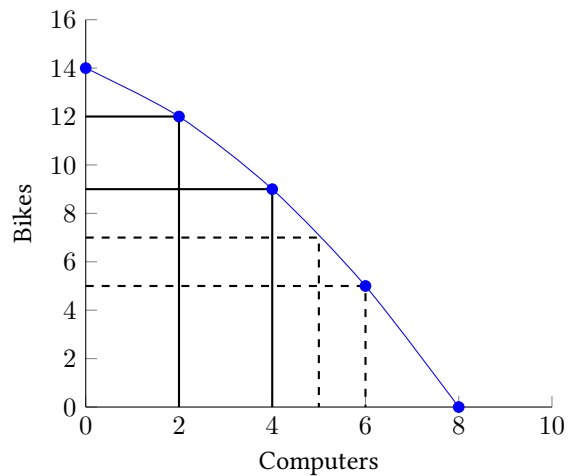
Figure 1.2: Graph of Production

The table demonstrates how much of each good can be produced with full employment of resources. Country X can produce 14 Bikes or 8 Computers if they solely focus on producing said good. If we take the points and plot them, we get a PPC curve.

The PPC can shift, just like any econonmics graph. Make sure you can logically reason through why

Example 1. *What happens if there is an increase in population?*
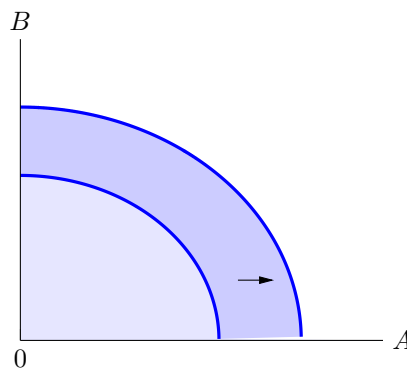
Example 2. *What happens when Good A technology improves*
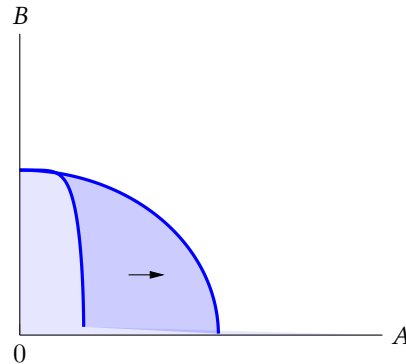
Lecture 3: Advantages

1.3 Absolute and Comparative Advantage

Countries will vary in their absolute and comparative advantages because they have different factors of production. This leads them to have different **Absolute and Comparative advantages** then other countries.

Definition 3. *Absolute Advantage is who can make the **MOST** with the given resources. They have the highest output or have a more efficient use of scarce resources(fewest resources required to produce).*

Definition 4. *Comparative Advantage is who has the lowest opportunity cost to produce. Who has to give up less in order to produce something.*

In order to answer a advantage question, you must been given data about **TWO** entities(individuals/firms/countries) and **TWO** outputs or inputs. It can be presented in classic data tables, a sentence, or a PPC curve/graph. A data table is the best way to orient the data for the advantage calculations.

How to determine absolute and comparative advantage

Step 1: If you are not given a data table, its recommended to make a table and leave space so you can write notes down

Step 2: Pay attention, check if the data is provided is about **inputs**(resources to create one good) or **outputs**(number of goods produced)?

Step 3: Write whatever conclusion you have at Step 2

Step 4: Read the data table that you have or created and see who has absolute advantage in each alternative

Step 5: Calculate the opportunity cost for each alternative, and compare the values to determine who has comparative advantage.

Example 3. *Determining Absolute Advantage, when the data is* ***Outputs***

Output	Bikes	Cars
U.S.	4	2
Japan	5	1

Table 1.2: Production Possibilities between Bikes and Cars

Imagine the data as two seperate PPC curves, and reason your way through:

- *Using all given resources, the US can either produce 4 bikes* ***OR*** *2 cars.*

- *Using all given resources, Japan can either produce 5 bikes* ***OR*** *1 car.*

Absolute advantage looks for who can create the ***MOST*** *outputs with the given resources:*

- *Japan has the absolute advantage in producing bikes because 5 bikes is greater than 4 bikes.*

- *The US has the absolute advantage in producing cars because 2 cars is greater than 1 car.*

Example 4. *Determining Absolute Advantage, when the data is* ***Inputs***

Input	Dishwashers	T.V.s
Spain	4	2
China	5	1

Table 1.3: Production Possibilities between Dishwashers and T.V.s

The numbers in this chart are ***inputs*** *rather than outputs, and represents the* ***numbers of hours*** *to produce either good in both countries. The reasoning changes when you are working with the number of hours that are required to produce one good than the outputs.*

Look for who can create ***ONE*** *product with the* ***FEWEST*** *resources:*

- *Spain has the absolute advantage in producing dishwashers because 4 hours < 5 hours*

- *China has the absolute advantage in producing TVs because 1 hour < 2 hours*

Comparative Advantage Comparative advantage follows the same setup as Absolute advantages, but requires a bit more work in order to solve. The goal for Comparative advantage is to look for **who gives up the least**.

Example 5. *Calculating Comparative Advantage, when the data is* ***Outputs***

The numbers in the chart are outputs, and represent the maximum number of goods that can be produced in each country with a given amount of resources.

CHAPTER 1. INTRODUCTION   7

Output	Bikes	Cars
U.S.	4	2
Japan	5	1

Table 1.4: Production Possibilities between Bikes and Cars

- *Every time the U.S. produces **ONE** bike, they give up $\frac{1}{2}$ cars.*

  - *! Remember, you are trying to find out what they give up for one unit, so divide both sides by 4 bikes to get how many cars they give up.*

Once you find out the OC for producing each good, its as simple as choosing the lower OC:

- *The U.S. has a **comparative advantage** in Cars, and should specialize in their production. The U.S. can produce a auto for the OC of 2 bikes which is less than Japans OC of 5 bikes.*

- *Japan has a **comparative advantage** in Bikes, and should specialize in their productionl. Japan can produce a bike for the OC of $\frac{1}{5}$ an auto, which is less than the U.S.s OC of $\frac{1}{2}$*

An important point to think about is that if each country specializes in their comparative advantage, and engages in trade, they can both **CONSUME** outside their PPC.

Example 6. *Calculating Comparative Advantage, when the data is **Inputs***

Input	Dishwashers	T.V.s
Spain	4	2
China	5	1

Table 1.5: Production Possibilities between Dishwashers and TVs

Same deal with Absolute Advantage, but we need to think differently to calculate OC because its an input problem.

- *When Spain produces **ONE** dishwasher, it must use 4 hours to do so, which means Spain gives up producing 2 TVs*

  - *! Remember, the data is already in terms of **ONE** unit, this means to calculate Comparative Advantage, divide the dishwashers by the number of hours it takes to produce TVs. The OC of producing 1 dishwasher is $4/2$ or 2 TVs.*

Once you calculate the Advantages, you can compare the OC and choose whichever one is a smaller value:

- *Spain has **comparative advantage** producing dishwashers.*

- *China has **comparative advantage** producing TVs.*

Quick Notes: International trade leads to mutual gain as it allows each country to specialize more fully in the producion in what it does best according to the **law of comparative advantage**.

Chapter 2

Basic Economic Concepts

Short Recap: The previous chapter focused on advantages and basic charts and diagrams. This chapter will take those concepts one step further. This chapter will focus on **Gains from trade** and what parameters for trade are beneficial.

Lecture 4: Specializations

2.1   Gains from Trade

Gains from trade allow countries to consume outside their PPC. However it does become quite annoying to calculate the parameters in which a trade is beneficial to two countries.
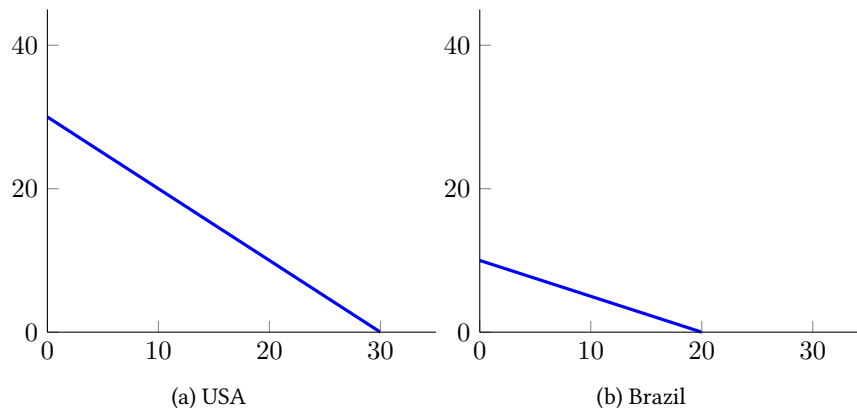

(a) USA

(b) Brazil

Figure 2.1: PPC of two countries

Steps to determine gains from trade

Step 1: Make A table

      ! Note - Is it outputs or inputs

Step 2: Determine opportunity cost for each producer for each product

Step 3: Determine comparative advantage for each producer

Step 4: Determine the parameters of gains from trade

Step 5: Determine who should export goods and import goods

So first, make a table if it is not given to you already so that it makes calculation and reasoning a lot easier.

	Wheat	Sugar
USA	30	30
Brazil	10	20

Table 2.1: Table to determine OC and CA

Then do some quick analysis of the table to determine your OC.

	Wheat	Sugar
USA	30 (1 w cost 1 s)	30 (1 s costs 1 w)
Brazil	10 (1 w costs 2 s)	20 (1 s costs $\frac{1}{2}$ w)

Table 2.2: Table to determine OC and CA

Then after comparing the OC of each country, you establish who should export and import said goods. In this scenario, the U.S. has a comparative advantage in wheat, and so they should produce it and export it to Brazil. This also means that the U.S. should import sugar from Brazil. The opposite is also true, where Brazil should export sugar and import U.S. wheat.

Example 7. *Now check, if the following trade agreement is advantageous for both countries?*

- ***Trade 1 ton of wheat for 1.5 tons of sugar***

A simple way to solve this is just to look at the table.

	Wheat	Sugar
USA	30 (1 w cost 1 s)	30 (1 s costs 1 w)
Brazil	10 (1 w costs 2 s)	20 (1 s costs $\frac{1}{2}$ w)

*The question is asking in terms of 1 wheat, so examine that portion of the table. Since the U.S. specializes in wheat, they want to get **MORE THAN** 1 sugar for 1 wheat in trade. Since Brazil specializes in sugar, they want to give up **LESS THAN** 2 sugars for 1 what in trade.*

1.5 tons of sugar for 1 wheat is a gain for both countries

Lecture 5: Demand
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2.2   Supply and Demand

Definition 5. *Markets are **actual** or **nominal** place, where the forces of **demand** and **supply** operate. It is a place where **buyers** and **sellers** interact to trade **goods** or **services**.*

In order to first understand supply and demand, its important to understand the relationship between price and quantity. Price is the amount of money paid for a good or service, and is commonly placed on the Y-axis on econ graphs. Quantity is the amount of a good/service that is purchased or provided, and is commonly placed on the X-axis on econ graphs.

Definition 6. *Demand is a consumers' **willingness** and **ability** to buy at various price levels.*

- *Willingness: buyers want an item*

- *Ability: buyers have the financial resources to pay for an item*

It is important to understand that demand is often a behavior, not a numerical amount. Demand has a inverse relationship between price and quantity. This leads to a downward sloping curve. With demand, it is important to understand the **Law of Demand**.

Definition 7. *Law of Demand is the idea that all other things equal, the quantity demanded of a good falls when the price of the good rises.*

Now, it was mentioned that demand has a inverse relationship between price and quantity that leads to a downward sloping curve. There are 3 reasons why it has a downward sloping curve.

- Subsitution Effect
    - When the price of peaches rises, consumers will substitute nectarines instead
- Income Effect
    - When something is expensive, money buys less
    - When something is inexpensive, money buys more
- Law of Diminishing Marginal Utility

- Each additional unit of an item purchases offers less marginal utility(happiness points)

- People will only buy more units if the price is lower, because of marginal decision making

The net result of this is that if price goes up, the **Quantity Demanded** will go down, and the inverse is true. Make sure you understand the difference between **Quantity Demanded** and **Demand**.

Definition 8. *Quantity Demanded states that at a given price, how many units of X are demanded. QD will change as a result of a price change.*

Demand is the number of units demanded at various prices, which differs from QD. Demand will change when something changes consumer's behaviors **at all price levels** (demand curve shifts).
What can shift the Demand curve?

- **T**astes and Preferences

- **R**elated Goods

  - Complements

  - Substitutes

- **I**ncome

  - Normal Goods

  - Inferior Goods

- **P**opulation

- **E**xpectations

Quickly, lets define some of those terms:

Complements Goods/services used along with each other, like Eggs and Bacon or Chips and Salsa

Substitutes Goods/services used instead of each other, like Butter and Margarine

Normal Goods When income rises, demand rises; When income falls, demand falls

Inferior Goods When income rises, demand falls; When income falls, demand rises

Changes in prices can help affect the demand curve for complements and substitutes. Lets say there is a sale on salsa, we can model the supply and demand on salsa and chips.
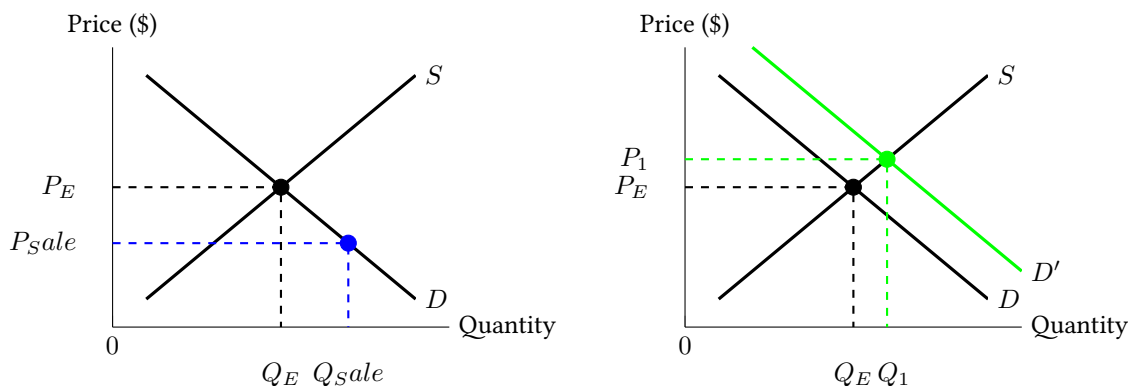
Figure 2.2: Market for Salsa(L) and Chips(R)

The market for salsa will result in a shift **along** the demand curve, since price is the only thing that has changed. A lower price means more demand for the good, which is seen with the new equilibrium point. In the market for chips however, the entire demand curve will move to the right, since more people will want chips for the salsa they just bought.

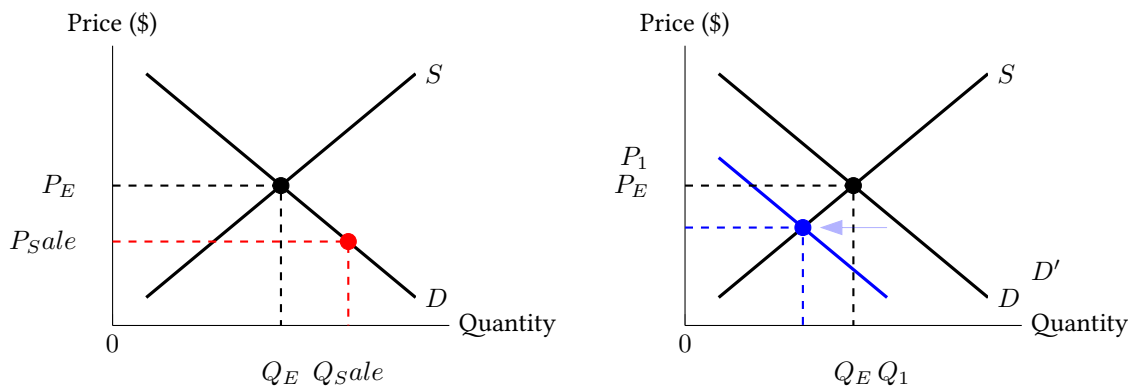Now, lets model the supply and demand for substitutes like butter and margarine.

Figure 2.3: Market for Butter(L) and Margarine(R)

The market for butter will result in the same shift in demand, as a sale lowers price of a good, which increases **quantity demanded**. Since butter has become cheaper, and more desirable, butter will be substituted for margarine. Since less people are buying margarine, the demand curve shifts to the right, with less people willing to buy it at every price point.

Another one to watch out for is expectations, as consumers predicting what will happen will affect their demand. If consumers expects prices to rise in the future, then

the demand will increase now. If they expect them to fall, demand decreases now because they will wait. The same analogy can be placed onto future income. If you expect your income to rise, you will start spending a bit more. The opposite is true as well.

Definition 9. *A decrease in demand will cause the curve to shift left, a increase in demand will cause the curve to shift right.*

Lecture 6: Supply

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Definition 10. *Supply is a producers' **willingness** and **ability** to sell at various price levels.*

Supply has a direct relationship between price and quantity. This leads to a upward sloping curve. The reason for this is the Law of Supply and with it the willingness of suppliers.

Definition 11. *Law of Supply is when all other things are equal, the quantity supplied of a good rises when the price of the good rises.*

The Law of Supply reinforces the upward sloping curve that supply has, as the price of an item determines the quantity supplied.

- The lower the price, the lower the quantity supplied will be, or in laymans terms: Less people will want to sell at lower prices

- The higher the price, the higher the quantity supplied will be

As seen with demand, supply also has a difference between **supply** and **quantity supplied**. A change in supply is the curve shift, where a different quantity will be supplied at every price point than before. The same principles of shift also apply, where a rightward shift means a increase in supply, and the inverse. A change in quantity supplied is a slide along a existing curve, most commonly due to a change in price.

- ! Its helpful to realize, that a change in **demand** will result in a change in **quantity supplied**. This is the same for the inverse, where a change in **supply** will result in a change in **quantity demanded**. This is not always the case, but is something I have personally oberserved and is just including as a small note.

What can shift the supply curve?

- **I**nput Costs: The changes in price of resources, which affects profitabilty

- **T**echnology

- **E**xpectations

- **P**opulation: Increase in the number of producers, and in term competition

- **G**overnment Action: Taxes, Subsidies, and Regulations

Its important to realize than suppliers also have to predict the future, which will end up changing the curve. They can sell now, or store now and sell later. They can also just shift production over to something that is more profitable. Same with government action, where it will end up changing **input costs**.

Chapter 3

Supply and Demand

This chapter is pretty similar to the last, but it focuses on two key components about supply and demand. This also had its own lecture, but I think its more helpful if this is all put together as one.

3.1 Equilibrium and Double Shifts

With supply and demand, equilibrium is a important part of econ graphs. Equilibrium is the point at which supply and demand intersect, and it creates a single price and quantity for a good/service. This means that at this price, all those who want it are able to purchase it, and there is enough supplied to meet the demand.
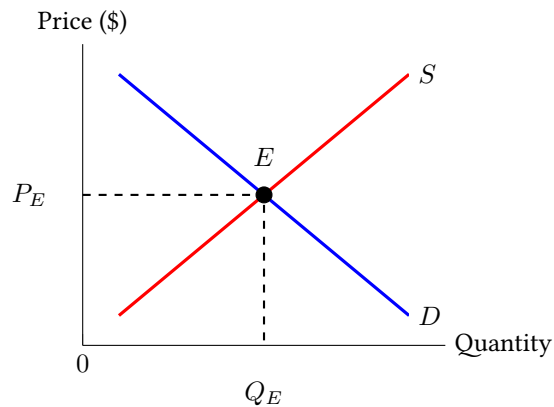

Figure 3.1: Simple Supply and Demand

In 3.1, point E is the equilibrium point. It is as the point where the two lines intersect. Make sure to realize that these type of econ graphs often assume that the market is

a perfectly competitive. Only in equilibriumis quantity supplied equal to quantity demanded. The market will come to rest at equilibrium unless there is a outside force.

Example 8. *With equilibrium, there also exists disequlibrium, which is when the market is not at its stable state. It usually is either a surplus or a shortage, and can be resolved with changes.* **Surplus** *is when demand shifts, and supply has not compensated yet. This leads to a surplus of goods, which is often solved by lowering the price.* **Shortage** *is when supply shifts to the left, which is solved by raising the price.*

Another part of supply and demand graphs, is double shifts. Double shifts is when both supply and demand are shifted in directions, and cause the equilibrium point to be moved completely. Each teacher recommends doing this in different ways, but the best rule of thumb is to do the shifts in two different graphs, compare price and quantity and determine how it would move. You could get away with doing it all in one graph, but it depends on your teacher or if the collegeboard allows it. Two graphs is always a safe bet if you dont know which one to go with.

Instead of doing a random example, lets model this with Toyota RAV4s. Toyota RAV4s are expected to rise 10% after the new year. Create two different graphs, and analyze them to answer the questions:

- What can you conclude about the current price of RAV4s?
- What can you conclude about the current quantity of RAV4s being bought and sold?

So lets reason this out: If the price is **expected** to go up after the new year, consumers will want to purchase now. Suppliers will attempt to store and wait for the new year to sell at a higher price.
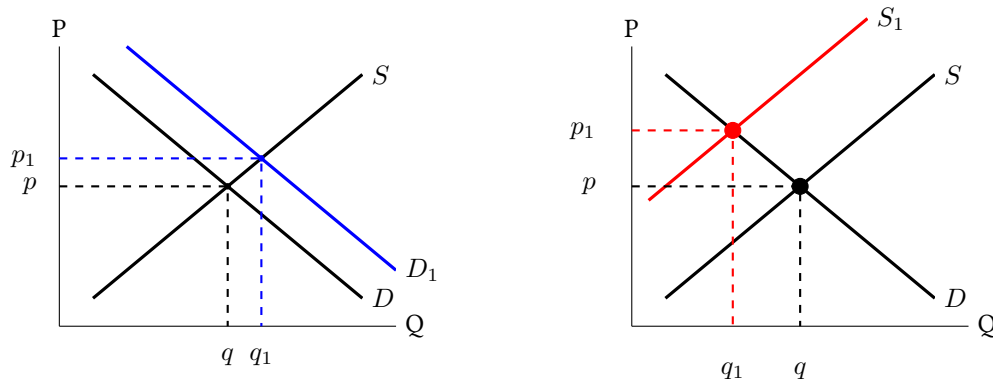

Figure 3.2: Market for RAV4

Now we can analyze the graphs, and focus on them one at a time. With the increase in demand, price went up and quantity went up. With decrease in supply, price went up and quantity went down.

- Since price increases in both graphs, it is certain that **price will increase**

- Since quantity went up in one graph, and down in another, that means **quantity is indeterminate**

Chapter 4

Market Efficiency

With econ, there are so many assumptions that have to be made. When we do any analysis of markets, its important to remember the assumptions to avoid silly mistakes. **Market Assumptions**

- The market is perfectly competitive
    - There exists many buyers and sellers
- Consumers are rational
    - They will maximize utility
- Producers are rational
    - They will act in their interest to maximize profit
- No government intervention
    - No taxes, subsidies, etc
- No externalities
    - No additional costs or benefits to people not directly invokved in the transaction
    - MPB = MSB and MPC = MSC

Lecture 7: Resources thur 23 sep 8:35

4.1   Allocating Resources

Consumers often have to make **Marginal Decisions** behind their purchases, and its something that economists take into consideration. The big idea behind marginal

decision making is that **Marginal Utility = Marginal Cost**. You can see Marginal Utility written as Marginal Benefit, but they are interchangeable.

Definition 12. *Marginal Decision is the added "satisfaction" from consuming another unit vs. the cost of the additional unit. Marginal is usually used to represent the "additional". Marginal utility is the utilty from each additional unit. Marginal cost is the cost of each additional unit.*

With this comes the idea of **Diminishing Marginal Utility:** each additional unit will bring less benefit to the consumer than the previous unit. This means that rational consumers will purchase in order to maximize their marginal utility, or their "happiness". There are multiple different ways to maximize your resources which is Allocative and Productive Efficiency.

Allocative Efficiency Consumers who value good/service at least as much as it cost to produce are able to buy it. HIgh value consumers are able to obtain the goods or services. MB = MC

Productive Efficiency All producers who are able to produce their good/services at the price in the market or below are able to sell their items. Goods and services produced at lowest possible cost. MC = MB

With market effiency, comes the idea of surplus. There are a few types of surplus that you should know, stuch as **Consumer Surplus (CS)**, **Producer Surplus (PS)**, and **Total Surplus (TS)**.

Consumer Surplus The difference between what consumers are willing to pay and have to pay (P_m)

Producer Surplus The difference between the price at which producers would be willing to sell and what they can charge (P_m)

Total Surplus CS + PS, and is maximised in perfectly competitive markets at equilibrium

Make sure to remember that if you are trying to find the regions on a graph, its usually in the shape of a triangle. So $\frac{1}{2}bh$ can find the area, and its always a $ amount.

Definition 13. *Deadweight Loss is missed opportunities to have mutually beneficial transactions, as it decreases total surplus and becomes inefficient.*

  ! DWL is usually a side effect of government intervention, but could be caused by others.

Lets look at some examples of market efficiency, specifically at equilibrium and at disequilibrium.
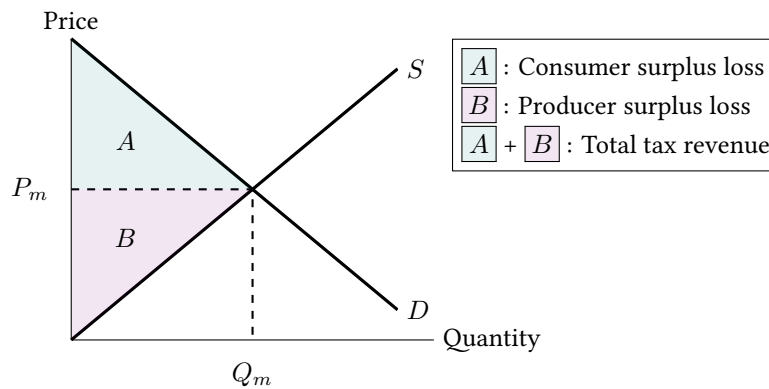
Figure 4.1: Market for NYC Apartments

4.1 represents a market at equilibrium, where Total Surplus is maximized, and DWL is no where to exist. Now if we were to graph the market in disequilibrium, it would look a bit different.
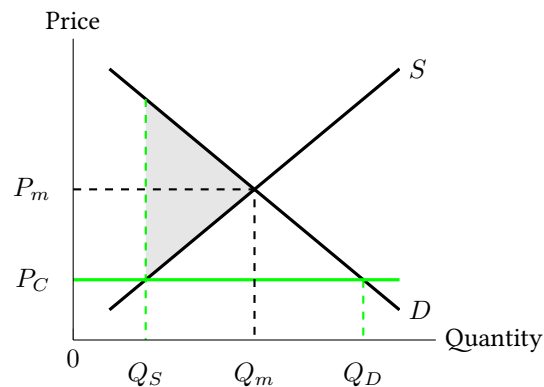

Figure 4.2: Market for NYC Apartments, with rent control

4.2 represents a market at disequilibrium due to a price ceiling that was placed on apartments in NYC. We will cover floors and ceilings later, but for now just understand that it prevents prices of apartments from rising above the line. This causes DWL in the black region, where both CS and PS, and in turn TS, is lost.

Lecture 8: Ceilings and Floors

4.2 Price Control

Definition 14. *Price control is a restriction set in place and enforced by governments, on the prices that can be charged for goods and services in a market.*

Price Ceiling *is the maximum price a good or service can be*

Price Floor *is the minimum price a good or service can be*

I mentioned a price ceiling briefly in the last section, but this will cover more on it and how it affects DWL and the market as a whole. Lets use the previous graph to understand price ceilings.
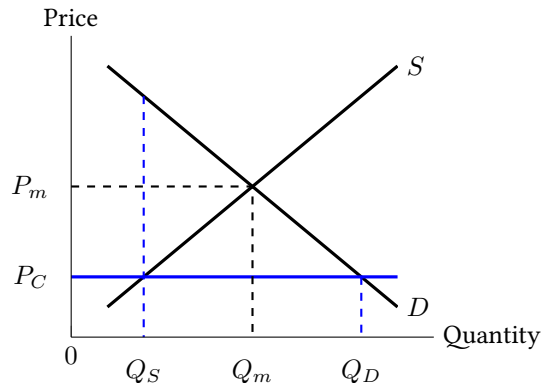

Figure 4.3: Market for NYC Apartments

Whats happening here is that the government has administered a price that is set **BELOW** the equilibrium price to prevent prices from rising to the equilibrium price. This example is easy to understand when looking at rent control in NYC apartments. Since the cost of living is so high in large cities like NYC, its difficult to house critical public employees with the wage they earn. So the government creates a ceiling, that prevents the price from exceeding a set amount. This causes a shortage, as demand is high but supply is low. $Q_S < Q_D$. The shortage cant resolve either, since it isnt able to increase to the equilibrium price.

Price ceilings end up creating inefficiencies in the market, and wasting resources. It costs extra to deal with the shortage, and means that some high value consumers cannot get it, while low value do get it. The quality of the good will also go down, as producers have no incentive to improve the quality. In the case of NYC apartments, the producer cannot raise prices to cover repairs. This also has the side effect of black market negotiations.
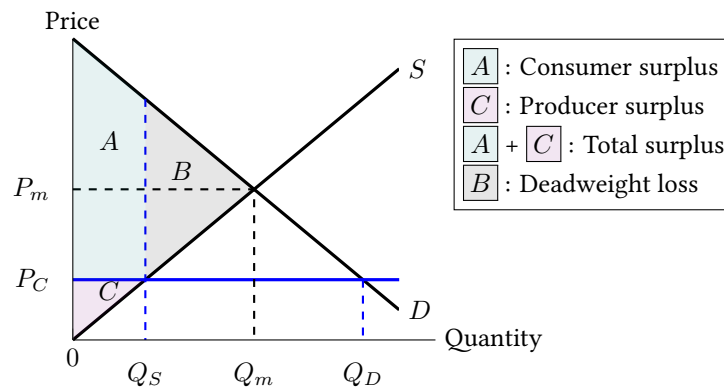
Figure 4.4: Market for NYC Apartments

This is the same graph, but highlights where specifically the DWL, the reduced PS and CS is. Since at $P_C : Q_D > Q_S$ a shortage exists. Producer surplus decreases, while consumer surplus does increase. TS decreases by DWL. Price ceilings make the market inefficient, but thats not the goal. They are used to make a market more equitable, rather than efficient. A ceiling can only operate if its placed **under** the equilibrium point. If its over, it becomes non-binding.

Price floors on the other hand, do the opposite of a ceiling. The government administered a price that is set **ABOVE** the equilibrium price to prevent prices falling to the equilibrium price.
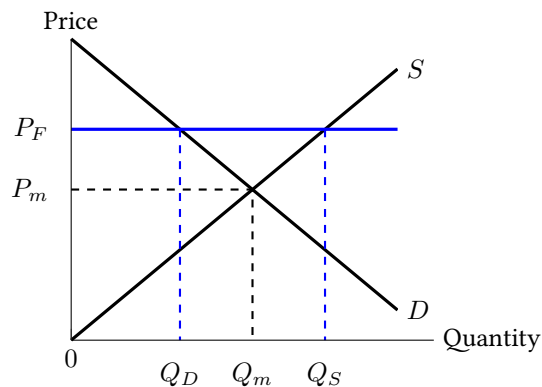

Figure 4.5: Market for Corn

An example where a price floor wouldbe useful is with agricultural products, as the industry has lobbied Congress to implement a price floor. Another example could be the minimum wage, when the cost of living becomes higher. With a price floor, a surplus exists, as $Q_D < Q_S$. The surplus cannot correct itself because of the floor.

Price floors result in the same inefficiencies that price ceilings do, but in a different way. Instead of different consumer allocation, it focuses on producers. Some high cost producers can sell, while some low cost producers cannot. This causes wasted resources, and only benefits private industries. This also causes a sharp contrast in high quality and low quality goods, because of the DWL. Price floors are to help protect a particular industries or workers.
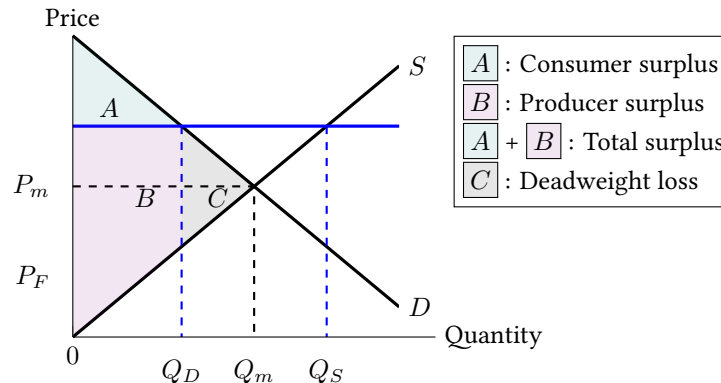

Figure 4.6: Market for NYC Apartments

Since at minimum wage, $Q_S > Q_D$, there is a surplus of workers. CS goes down, while producer surplus goes up. Total surplus is still reduced by DWL. The floor in this scenario increase unemployment. Some will lose their job, and can only calculate if exact numbers are given. For a price floor to be binding, it must be placed **above** the equilibrium point. If its placed below, it becomes non-binding.

Lecture 9: Taxes

4.3 Taxes

Definition 15. *Taxes are a sum of money demanded by the government to support the government itself, as well as specific facilities or services. It is paid by **taxpayers** or people who pay tax to national, state government, or municipal government.*

There are 4 types of taxes:

- Income

- Payroll

- Sales

- Excise tax - Focused alot in Micro

These taxes follow 3 types of structure: progressive, proportional, and regressive taxes. In AP Micro we focus alot on **Excise Tax**.

Definition 16. *Excise tax are taxes paid when purchases aer made on specific goods. It is a per unit tax, and is on a narrow range of products. It is more burdensome than a sales tax, and is often a higher percent of the retail price.*

Now that we know what Excise tax is, lets go back to the structures and learn what they are.

- Progressive:

    - % of income paid in taxes increases as income increases

    - Income tax

- Proportional:

    - % of income paid in taxes remains constant

    - Flat tax

    - Payroll tax for Medicare

- Regressive:

    - % of income paid in taxes decreases as income increases

    - Sales tax, higher income houses spend lower of their incomes.

Taxes reduce consumer and producer surplus, as both buyers pay more and sellers receive less. This is considered a wedge, and causes the quantity sold to fall below the natural market equilibrium. The **Total Werlfare** declines because the market shrinks, unless the government is correcting a market failure. With a tax, the **Total Surplus** becomes the CS + PS + Tax Revenue. Since the market shrinks, the total surplus declines which ends up being the DWL. The size of DWL is determined by the **ELASTICITY**. The greater the elasticity of demand and supply:

- The larger the decline in equilibrium quantity

- The greater the DWL of a tax

- ! Dont worry, we will cover elasticity alot more later

The tax causes some buyers and sellers to drop out of the market, as it increases the amount a consumer has to pay and decrease the amount a seller will receive. Lets look at a graph that demonstrates this idea in a bit more detail.
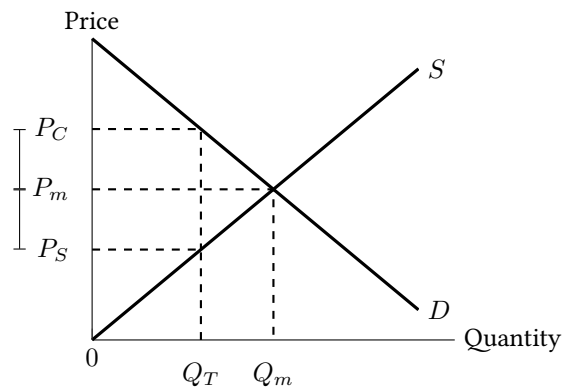
Figure 4.7: Tax affects welfare

This just shows the tax wedge, and how that contributes to DWL. In this scenario, the government would benefit as it collects the tax revenue to provide public goods and services. The line between P_C and P_S is the total tax wedge. Buyers pay more, sellers recieve less, and the quantity with tax decreases.

Whenever you make a graph, you want to place it onto the Supply curve, since tax is comparable to a input cost. **How to graph a per unit tax:**

Step 1: Draw a market model graph that is labeled

Step 2: Identify the value of the tax. Example 2.00 dollars per unit

Step 3: Apply the tax to the graph, by drawing a new supply to the left. **DON'T DRAW ARROWS**. This is not a true shift, but a graph technique to show a tax

Step 4: Label Qtax and now there are two prices Ps and Pd. The price is always determined by what consumers are willing to pay

Step 5: Read the graph - New price is Qm + value of tax

Lets do an example with sweaters if they were imposed a 50c excise tax.

The DWL is a cost to society as a whole that is generated by an economically inefficient allocating of resources within the market. Mutually beneficial transactions do not occur. Allocative efficiency is reduced; it does not reach its maximum level.

The effect of a tax is that the government will obtain revenue from it, to calculate the revenue it is just,

$$T * Q = \text{the government's tax revenue.}$$

where
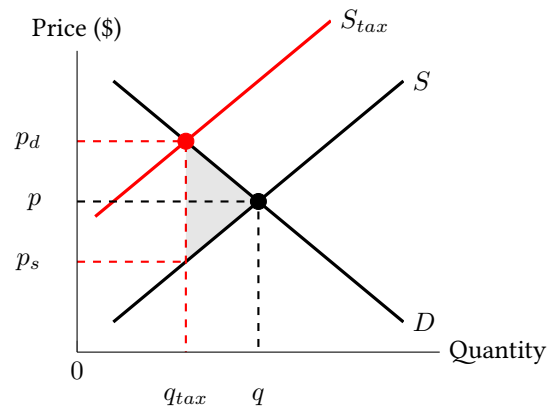
T = Size of the tax

Q = Quantity of good sold

Figure 4.8: Sweaters with tax

Its important to understand that as the size of the tax rises, the revenue grows **up to a certain point**. The increase in tax can cause the size of the market to decrease lowering the revenue.

Chapter 5

Consumer Choice and Utility Maxmimization

Just a heads up, this unit was taught very weirdly by my teacher, so I will attempt to use what they taught and also put some of the concepts into my own words. Once again, sorry for any mistakes that could come up.

Lecture 10: Utility

5.1 Marginal Utility

Definition 17. *Utility is how much satisfaction you get from the consumption of a good or service. Utility is not usefulness, and is subjective. This causes utility to be difficult to quantity.*

Within microeconomics, economists have to often conduct **Utility Analsys** to understand how people behave rather than how they think. One of the key theories when conducting utility analysis is the **Theory of consumer choice** which states that each consumer will spend their income in a way that will yield the greatest satisfaction. Within the idea of utility itself, there exists two forms:

- Total Utility, or the total benefit to a consumer from all the units of a good purchased

- Marginal Utility, or the additional benefit from one additional unit of a good purchased. Another way to think of this is the change in total utility from the purchase of 1 more unit of a good.

Its important to realize that that if you purchase a high number of goods, the total utility will be high but the marginal utility will be low.

$$\uparrow \text{ number of goods purchased} \rightarrow \uparrow \text{ Total utility} + \downarrow \text{ Marginal utility.}$$

Total and Marginal Utility

Tacos consumed per meal	Total Utility	Marginal Utility
0	0	
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2

Table 5.1: Utility Chart

So lets focus on the marginal utility section of the table. Notice the diminishing marginal utility that is occuring from 10 to -2. This idea will come in handy later, but for now just see that Marginal Utility is **the increase in total utility**. In this example, when someone eats two tacos, they gain a marginal utility of 8 for that 2nd taco. $18 - 10 = 8$

This trend is called the **Law of Diminishing Marginal Utility**, where the added satisfaction declines as a consumer acquires additional units of the good. A good example of this is purchasing cars. If you have a strong desire for a car, what happens to that desire if you buy a second car, or a third one. It becomes unneccesary.

Now how can we use marginal utility and the law previously mentioned, well we can look to the **Optimal Purchase Rule** which states that people will buy the quantity of each good at which price and marginal utility are equal. So consumers will(or should stop) purchase any good that has a price equal to the marginal utility they gain from it. With this comes a weird statement, but can be summarized to if the marginal utility is greater than or less than the price, then the consumer can improve their well being/purchase optimally by purchasing more or less.

> ! Just note that you want price to equal marginal utility, so try to match them, but if its not possible, use the greater value. What I mean is, lets say a good is $10 but gets me 11 units of marginal utility, but if I purchase one more, it gets me 9 units of marginal utility, go for the quantity that has a higher marginal utilty.

Marginal Utility and Demand

- Utility has a connection to the slope of the Demand Curve

  - Law of diminishing marginal utility $\implies$ negative slope of demand curves

  - $\uparrow$ price $\implies$ $\downarrow$ quantity demanded $\implies$ $\uparrow$ marginal utility

    > ! Dont worry if this does not make any sense, cause in my opinion it does not. When price goes up, quanity demanded goes down, this we

know. But why does that increase marginal utility? (I will ask other teachers and update this when I get answers)

Theory of Consumer Behavior
Ah this topic, one that also was not taught at all. I do recommend everyone taking this course does do external activities. But regardless, lets assume a consumer is rational (they want to maximize their total utility), they have preferences, budget constraints, and every good has a price. So, every consumer has to make choices. For every choice, they forgo something else. Sounds similar to something we know, Opportunity Costs. In this case we are measuring the OC of the utilty.

Utility Maxmizing Combination
Lets assume there is a $10 budget, and I want to purchase two goods, dubbed Product A and Product B. Product A which will be in red is $1, while Product B which is in black is $2.

Unit of product	Marginal Utility	MU/$	Marginal Utility	MU/$
First	10	10	24	12
Second	8	8	20	10
Third	7	7	18	9
Fourth	6	6	16	8
Fifth	5	5	12	6
Sixth	4	4	6	3
Seventh	3	3	4	2

Table 5.2: Allocation of money

Alright, the table looks way more intimidating then the process really is. When comparing OC of marginal utility, it is recommended to compare the utility per price. So divide all the marginal utility by the price of the good and record them, as I did and created a MU/$ section. Then just pick the larger Marginal Utility per dollar. The teal number is a unique condition, when the MU/$ is the same between the products, "buy" both of them.

This is called the **optimal consumption bundle** is the consumption bundle that maximizes a consumer's total utility, given the budget constraints.

$$\frac{\text{MU of product A}}{\text{Price of A}} = \frac{\text{MU of product B}}{\text{Price of B}}.$$

In this scenario,

$$\frac{8 \text{ Utils}}{\$1} = \frac{16 \text{ Utils}}{\$2}.$$

This is just a mathematical way of representing it, but I believe using a table is the quickest way to solve this.

Lecture notice: Message

Hey everybody,

Hope y'all are having a great school year so far, or if you are like me and failing all your classes, that you're doing all right. If you probably are using this note sheet, then you probably take the same class, so you will most likely understand what I will be talking about in a second. WIth the next unit in this note sheet, and even the previous one, the teacher doesn't really teach the topic in a easy to understand way. I think that the concepts and topics are way easier to understand if they are taught differently, so thats what I plan on doing. I will be moving away from using the teachers words and slides as reference, and use them as guidelines.

Somethings will remain similar between them, but I will be modifying the content, or inclduing more notes in sections to help everyone taking this class. Anyway, just a small update that I doubt anybody will read but Ill include anyway. GL on upcoming exams, and thats everything from me.

Chapter 6

Price Elasticity of Demand

Elasticity is a concept that is going to be used extensively in econ. You will be expected to apply all the concepts in this chapter onto your graphs both in class and on the AP exam.

Lecture 11: Inefficiency

6.1   Property Rights & Market Failure

Definition 18. *Market Failure is whenever DWL is current. However in this scenario we will also be covering when the equilibrium quantity of output is different than the socially optimal level of a good.*

I mentioned the term socially optimal, and that just means that the Marginal Social Benefit = Marginal Social Cost. Social is a bit different then the free market that we always use on our graphs. For now, just keep this concept in mind, as it will come in later units near the end of microecon.

Same with the idea of externality, or external influence. There can be both Negative and Positive Externality.

- Negative Externality

    - When the production or consumption of goods creates spillover costs

    - The cost is something that neither party is involved with, some examples of this are pollution, smoking, and drinking

- Positive Externality

    - The opposite of negative externality, but instead of a cost its a benefit

    - Examples are education, vaccinations, and mass transit

Property rights are also linked to externality, and its just the idea that if you own a resource or good, you have incentive to take care of it. However, when property rights are not given/are unclear, you may want to use that good quickly or not care for it at all.

Dont worry about this chapter too much, its more of things to keep in mind for later units of econ.

Lecture 12: Demand Elasticity

6.2   Price Elasticity of Demand

Definition 19. *Elasticity is the responsiveness to change. In laymans terms, you can safely see the elasticity is the slope of the line.*

- Price Elasticity of Demand

    – Consumers' responsiveness to a change in price

- Income Elasticity

    – Consumers' responsiveness to a change in income

- Cross Price Elasticity

    – Consumers' responsiveness to a change in the price of a related good

- Price Elasticity of Supply

    – Suppliers' responsiveness to a change in price

So for now we will focus on elasticity with demand. So we know that the law of demand tells us the price and quantity demanded are inverselt related, which leads to the downword slope. What we dont know is how much the quantity demanded changes as result in a price drop. **That is what** elasticity is.
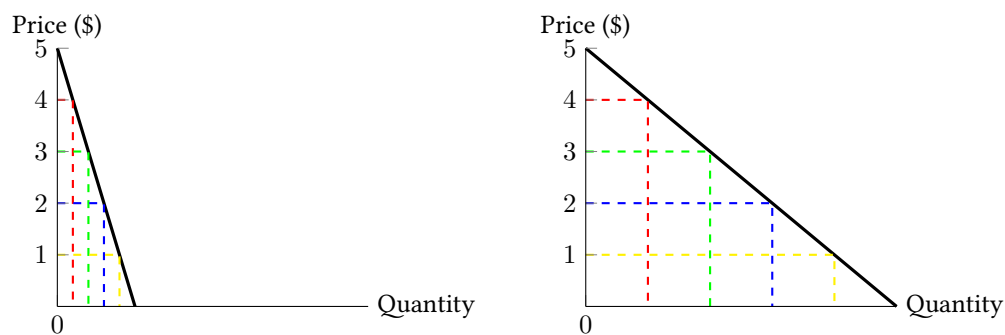

Figure 6.1: Elasticity

The slope of the line will tell how much quantity demanded will change when the **price** changes. What can affect the slope? Well things like income, necessity vs luxury items, or substitutes and their availabilty can affect the slope.

How to calculate elasticity, sadly it isnt as simple as finding the slope, instead you will either need to find the % change formula or the Total Revenue Test. The income effect and substitution effect can determine the price elasticity of demand.

Example 9. *Lets look at some examples:* **Substitution Effect**
Lets see a bag of navel oranges, navel oranges are a specific type of oranges, and thus have lots of substitutes. So naval oranges is price elastic. Now what about gasoline, gasoline has no substitutes so its fairly price inelastic.
Income Effect
Lets look at compact SUV's, which makes up a large part of the middle class income, so its price elastic. People will wait till they get a good price on the vehicle. Candy bars on the other hand, are so inexpensive that they make up a small part of the middle class income, so its price inelastic. You would be willing to pay higher prices on the candy bar since it is such a small part of your income.

In most cases, the income effect with reinforce the substitution effect. In normal goods they reinforce each other, but in the case of inferior goods, they contradict each other. When price goes up, quanity demanded will also go up in inferior goods.

Now let me lay the ground work for your understanding of Elasticity of Demand.

$$E_D < 1 = \text{inelastic} \quad E_D = 1 = \text{unit elastic} \quad E_D > 1 = \text{elastic}.$$

Now lemme clarify how something inelastic, unit elastic, or elastic graph would look. Make sure to include arrows to indicate change, but since this is a pdf and its quite difficult to draw arrows, everything will move from subscript 1 to 2.
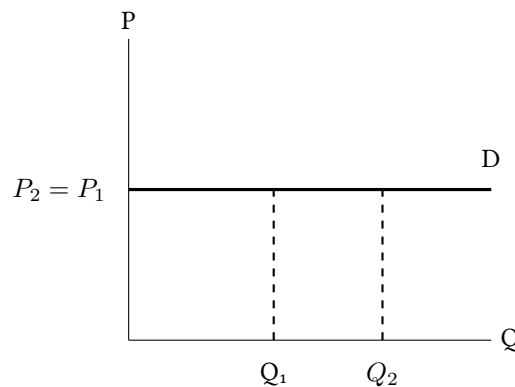
Perfectly Inelastic Demand
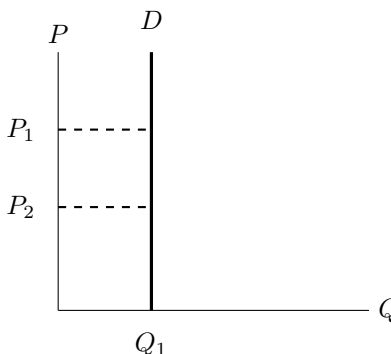
Whats happening here is that no matter how much the price falls, the quantity does not change. This would make $E_D = 0$. This should help explain that inelastic is when the quantity does not change drastically.

Relatively Inelastic Demand

I am pretty lazy to draw this in my software, but its a steep slope in mathematics. When price falls, the quantity rises less than the change in price. Remember this is being done in percents, so if price falls by 10%, the quantity will rise less than 10% in this scenario.

Unit Elastic
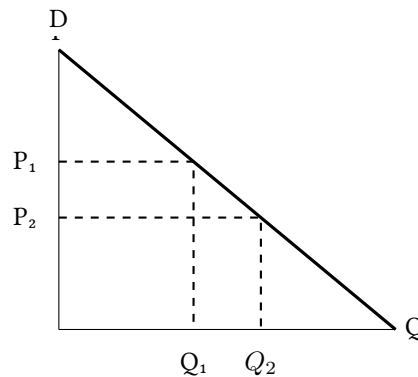
With this graph, unit elastic means that however much the price falls, the quantity will rise by. So if the price falls by 10% then the quantity will rise by 10%. This is usually a 45 degree angle on the graph, and its where the price effect = the quantity effect. $E_D = 1$

Perfectly Elastic Demand

This represents a perfectly elastic demand, where at the current price you can get as many people that you want to buy it. But if the price drops, then no-one will buy it. This results in a $E_D = \infty$ and is a horizontal slope.

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Relatively Elastic Demand
Since I am still lazy, I will just explain what it is. It is when $E_D > 1$, and its more of a flat slope. If price falls by 10%, then the quantity will rise more than 10%. The quantity will rise more than the price has fallen.

As a summary of everything, inelastic means that the price changes more than the quantity will. If price falls more than quanity rises, its inelastic. If its unit elastic, price and quanity will equal. If price falls, quanity will rise the same amount. Elastic means that quantity will be greater than price. If price falls, the quantity risen will be greater than what price fell. Perfectly inelastic just means at no change in price, the quantity is infinite, meaning you can already get everyone at that price. I mentioned E_D in this section, and you will learn how to calculate this in the next lecture.

Lecture 13: Calculating

6.3 Calculating Price Elasticity of Demand

To calculate the price elasticity, you have two options. There is the percent change formula and the total revenue test. You should only use the total revenue test if the percent change info is not given. The rest of the time you should be using the percent change formula when you have percents.

Definition 20.
$$E_D = \frac{\%\Delta QD}{\%\Delta Price}.$$

Lets say that Quantity falls by 15% and as a result, Price rises by 10%, you just have to do:
$$E_D = \frac{15\%}{10\%} = 1.5.$$

Since the E_D is greater than 1, the demand is elastic. This is where those definitions that were mentioned earlier come in handy, but as a refreshers, if E_D is equal to 1, its unit. Otherwise if its greater than 1 its elastic, and less than 1 if its inelastic. I wanna emphasize a point, that even if the slope of the line is constant, the elasticity is not. Make sure to actually do the calculations to find the elasticity.
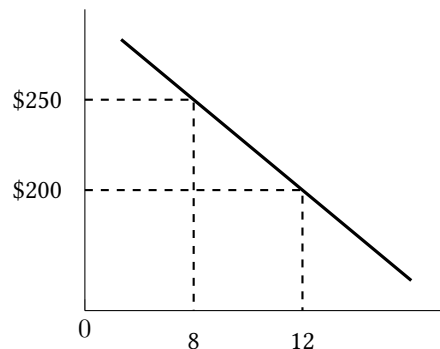
Now you should also know how to calculate percent change, which is commonly,

$$\%\Delta = \frac{\text{new-old}}{\text{old}} * 100\%.$$

Since P and Q move in opposite directions on a demand curve, it is common to get a negative price elasticity and drop the negative sign. Lets try an example with a graph.

Lets calculate from \$250 to \$200,

$$\%\Delta = \frac{200 - 250}{250} = -0.2.$$

Add since we did a falling price, we need to calculate a increasing QD,

$$\%\Delta = \frac{12-8}{8} = 0.5.$$

Then we can just plug those values into the equation,

$$E_D = \frac{50}{20} = 2.50.$$

Since E_D is greater than 1, the graph is elastic. However there is a flaw with the percent change method. If done with price as a increase, you actually get a elasticity of 1.33. Still greater than 1, but be careful to make sure you are doing the correct percent changes.

Now there is a midpoint method, and in my opinion, it is much easier,

$$E_D = \frac{\frac{(Q_2-Q_1)}{\frac{Q_2+Q_1}{2}}}{\frac{(P_2-P_1)}{\frac{P_2+P_1}{2}}}.$$

It doesnt matter what value is chosen, as long as they are consistent throughout the formula. However at the current moment I dont recommend using this formula, as it is outputting different values compared to the percent change formula. Since the AP exam focuses more on percent change, thats what I recommend for now.

Now there is a different way to calculating this which I mentioned earlier. The **Total Revenue Test** is a way of just measuring profit, and how elasticity can affect it. This will not net you a number with the elasticity, but it is a good way of visually comparing.

Well what is total revenue? Good question, total revenue is simply,

$$TR = P * Q.$$

I am not going to cover why this is in too much detail, since it is basic algebra. All you have to do then is just compare the starting price and the total revenue. If price

and total revenue move in the same directionm it is inelastic, and the opposite results in elastic.

Now there are some really specific things like price effect and stuff that shows how this works, but I am not going to include them. You can look them up if you want to learn more, but they really dont provide much for understanding.

Chapter 7

Other Elasticities and Taxes

This chapter includes the other forms of elasticities and how to calculate them.

7.1 Other Elasticities

So this chapter covers some of the other forms of elasticity. The first one we will cover is income elasticity. Income elasticity is the,

$$\frac{\%\Delta QD}{\%\Delta Income}.$$

This covers changes in income, however the change in income will cause a change in demand as a whole. This results in a curve shift, and measures how responsive demand is to a change in income. Income elasticity depends on if the good is a normal good or inferior good. With inferior goods, If $E_Y < 0$, then Income has risen and Quantity Demanded drops, or the inverse. With normal goods, E_Y cannot go lower than 0. If $E_Y > 0$, then Income has risen and Quantity demanded has increased, or the inverse. If it is a necessity, then $0 < E_Y < 1$ and if it is a luxury good $E_Y > 1$.

That is what income elasticity is, and now we can move onto Cross-Price Elasticity. Cross price is used for goods that are related in some way and is,

$$\frac{\%\Delta QDofGoodX}{\%\Delta PofGoodY}.$$

A change in price Y can cause a change in demand X. This can also create a curve shift with demand, and measures how far does the demand curve shift. If the goods are complements, then price of Y will increase, QD of X will decrease and $E_{CP} < 0$. If they are substitutes, then price of Y increase, and QD of X increases, and $E_{CP} > 0$.

If they are unrelated, then price of Y increases, and QD of X does not change, and $E_{CP} = 0$. The inverse for substitutes and complements are also valid.

We can also calculate Price Elasticity of Supply. Instead of measuring consumer response to a change in price, it measures a producers' response to a change in price. It can also be calculated the same as demand, so I will not go to far into depth with it. Just make sure to do some practice problems involving all of these.

Lecture 15: Taxes

7.2 Elasticity & Taxes

With taxes into consideration, whichever supply curve is more elastic will endure less of the burden. The more inelastic one side is, the more of the burden they will have to bear. With taxes, you have to consider who submits the tax, and add it to that curve respectively. In most taxes, you will be applying them to the supply curve.

I will be honest, I am super tired as I am writing this, so I do recommend checking the Elasticity 20.21 v5 slideshow posted in the unit guide. At the end of the slideshow it has the graphs and practice which I do recommend doing. Make sure to realize how TS, CS, and PS are being affected by the elasticity.

Summary

- Elasticity measures the responsiveness of Q to one of its determinants
- Price Elasticity of Demand equals percentage change in Q divided by percentage change of P
  - When it's less than one, demand is inelastic. When its greater than one, demand is elastic
  - When demand is inelastic, total revenue rises when prices rise
  - When demand is elastic, total revenue falls when prices rise
  - Same can be said for supply, just replace word demand for supply
- Income Elasticity
  - Measures how much quantity demanded responds to changes in buyers' incomes.
  - $E_Y < 0$ = inferior good
  - $0 < E_Y < 1$ = normal good-necessity
  - $E_Y > 1$ = normal good-luxury
- Cross-Price Elasticity
  - Measures how much demand for one good responds to changes in the price of another good.

- $E_{CP} < 0$ = complements
- $E_{CP} = 0$ = unrelated
- $E_{CP} > 0$ = substitutes

This is all you will need to know for the Unit 2 test, and make sure to review with the workbook and other resources such as the slides.