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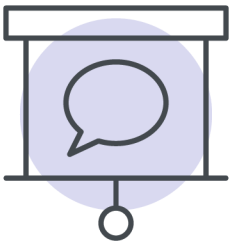
Economics 2150A/B

MIDTERM EXAM STUDY GUIDE

Fall 2018



Lecture Notes

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Economics 2150
Chapter 1 Textbook Notes
Sept. 9 2017

Chapter 1: Analyzing Economic Problems

Why Study Microeconomics?

- Economics = allocating limited resources to satisfy unlimited human wants
- Resources are scarce
  - This means we are constrained in the choices we can make about production
  - This is why economics is described as the science of constrained choice
- Microeconomics studies behaviour of individual economic decision makers

Three Key Analytical Tools

- Economic models must specify what vriables will be taken as given in the analysis, and which are to be determined by the model
- **Exogenous variables** = the value is taken as given/understood in a model
- **Endogenous variables** = the value is determined within the model being studied
- 3 key analytical tools:
  - constrained optimization
  - equilibrium analysis
  - comparative statics

Constrained Optimization

- this tool is used when a decision maker seeks to make the best choice, taking into consideration any possible limitations/restrictions
- these problems have 2 parts
  - objective function
  - set of constraints
- **objective function** = the relationship the decision maker seeks to optimize
- economists state constrained optimization problems as so:
  - max LW
    subject to: 2L +2W < F
    - the symbol is actually greater than or equal to sign but idk how to do that on my laptop
  - first line identifies objective function, second line represents the constraint
- the solution to any constrained optimization problem depends on the marginal impact of decision variables on the value of the objective function
  - eg) the marginal impact of money spent on TV advertising is how much beer sales go up for every ADDITIONAL dollar spent on tv advertising

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- "marginal" tells us how a dependent variable changes as a result of adding one unit of an independent variable

Equilibrium Analysis

- equilibrium is a state or condition that will continue indefinitely as long as exogenous factors remain unchanged
- in a competitive market, equilibrium is achieved as a price which the market "clears"
    - a price where the quantity offered for sale equals the quantity demanded by consumers

Comparative Statics

- this tool is used to examine how a change in exogenous variable will affect the level of an endogenous variable
- can be applied to constrained optimization problems or to equilibrium analyses
- allows us to do a before and after analysis by comparing 2 snapshots of the model

Positive and Normative Analysis

- **Positive Analysis** = explain how an economic system works or predict how it will change over time
    - Asks explanatory questions
        - What IS happening, what HAS happened
- **Normative Analysis** = asks prescriptive questions
    - What SHOULD be done

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Econ 2150 — Analyzing Economic Problems Ch.1

Market Model

- Only concerned with a single market at a time
- Consider only a single good — Apples
- 2 sets of agents; consumers (Demand) & producers (Supply)

Demand

- Represents actions of our consumers
- The quantity that consumers are willing to buy at any giving price level

Law of demand:

- Demand is downward sloping and consumers will buy more when price decreases
- Factors that determine demand
    1. Preferences
    2. Relationship to other goods
    3. Price of other goods
    4. Income
    5. Price
    6. Number of Consumers

Supply

- The quantity that producers are willing to bring to the market at any given price

Factors that Determine Supply

1. Price of factors of production — Inputs
2. Price of the good
3. Technology
4. Number of suppliers in the market — Market Structure

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5. Price of other goods

Ex. Demand Q^d = 500-4p (Downwards sloping)

Supply = Q^s =-100+2p (Upwards sloping)

At p1 there is excess supply

At p2 there is excess demand

Equilibrium = 500-4p=-100+2p

=600=6p

=p*=100

Sub into Q^d= 500-4p

= 500-4(100)

Q* = 100

Equilibrium @ 100

- Also, one can consider the demand curve as shows, for any given Quantity the maximum price consumers will pay
- Supply curve is the minimum amount suppliers are willing to receive for any given quantity

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Comparative Statics

- moving from equilibrium price and quantity to a new equilibrium price & quantity when some factor changes in the model
- Consider a shift in ex.1 in the demand curve
  - Increase in income generates a positive shift in the demand curve, thus increasing equilibrium
- Anything that shifts the demand curve rightward there is an increase in both the equilibrium price and quantity
- Anything that shifts the demand curve leftward causes a decrease in both equilibrium supply and demand
- For all shifts in the demand curve equilibrium price and quantity shift in the same direction

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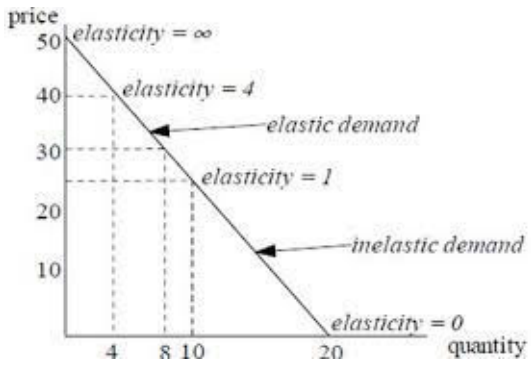
- Consider a leftward shift in the supply curve
  - Suppose price of labour goes up
    - Supply decreases
    - S2 has increase in equilibrium price and decrease in equilibrium demand
- Consider a rightward shift in supply
  - Supply increase and demand increase
    - Equilibrium price decreases & equilibrium quantity increases
- For shifts in supply equilibrium price and quantity move in opposite directions

Elasticity

- A measure of responsiveness
- Elasticity of demand:
- (ΔQ/Q)/(ΔP/P)
  - For demand one of these changes has to be negative
  - Therefor a negative number
  - If E = 0 then demand is perfectly Inelastic
    - Vertical straight line
  - IF -1<E<0
    - The percentage change in Quantity is less than the percentage change in price
    - If E =-1 Demand is unit elastic
    - If -∞<E<-1 Demand is elastic



- Estimated
- Cereal may have low elasticity but brands of cereal can have high elasticity

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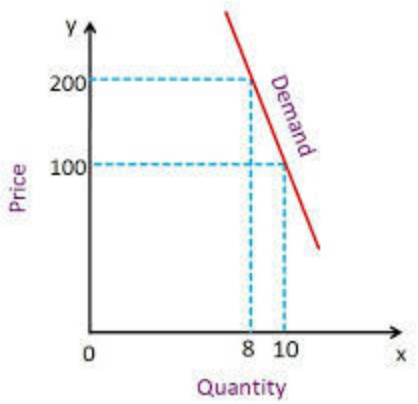
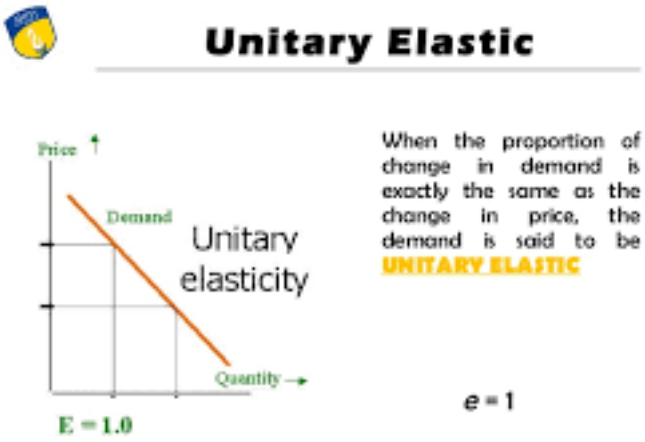
Demand Elasticity and Total Revenue

- Total revenue = Price * the Quantity
- For a price increase
  - If demand is Inelastic, the quantity decrease when the price goes up but by a smaller percentage then the price increase
    - This will increase total revenue



Unit Elastic

- If demand is unit elastic any changes will keep total revenue the same



If demand is elastic

- Total revenue decreases

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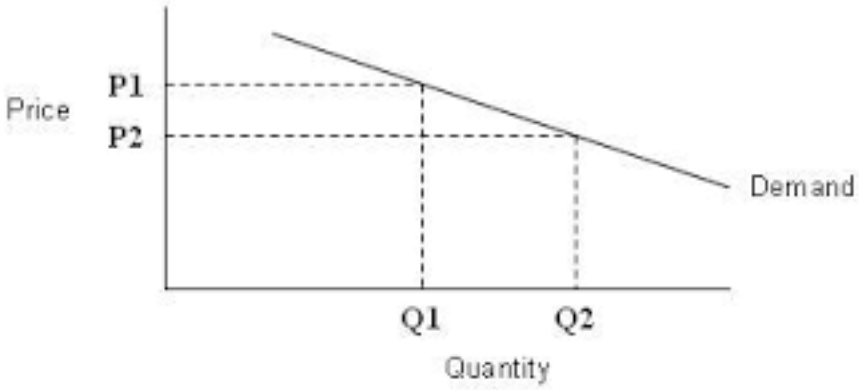

Income Elasticity

- % change in the quantity demanded/% change in income
- = (ΔQ/Q)/(ΔI/I)
  - Can be either positive or negative
  - For some goods a positive increase means consuming more of the good
  - Sometimes it means consuming less of a good

Types of Goods

- Negative income elasticity: As income goes up the consumption of that good goes down
  - Substituting for other goods instead
  - These goods are inferior goods
- Positive Elasticity: Normal goods. Quantity increases and income increases

Terminology	Measure of elasticity	Verbal descriptions
	Income Elasticity of Demand	
1. Inferior good	e_y = negative	Quantity demanded decreases as income increases
2. Normal good	e_y = positive	Quantity demanded increases as income increases
3. Income inelastic	$0 < e_y < 1$	Δ Q is less in proportion to income increase
4. Income elastic	$e_y > 1$	Δ Q more in proportion to income increase
	Cross-elasticity of Demand	
1. Substitute	e = positive	Price increase of a substitute leads to an increased quantity of the good demanded
2. Complementary	e = negative	Price increase of a complement leads to a decrease in quantity demanded of the good

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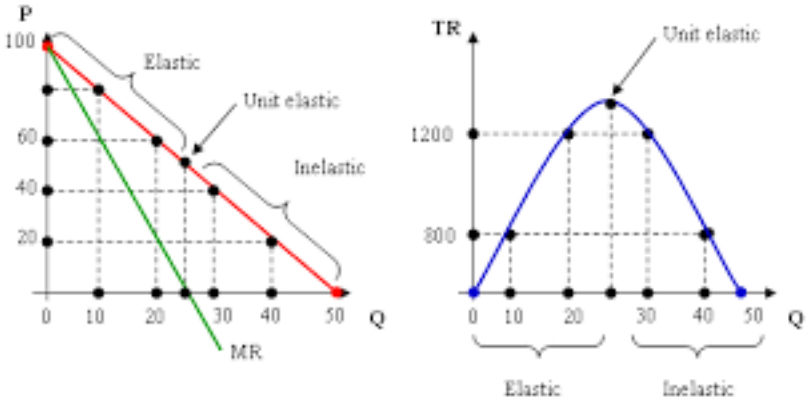
Elasticity and the Linear demand Curve

- Suppose Demand: Q= a-bP
- Can rewrite as P=a/b - 1/b * Q
- Elasticity = ΔQ/ΔP *P/Q
- E= -b * p/q



Finding a linear demand given the elasticity

- If the elasticity of demand is known = E
- To find the linear demand Q=a-bP
- Let P* and Q* be the current price and quantity
- E= -bP*/Q*
- b= - E(Q*/P*)

The solution for a

Q* = a -(-E(Q*/P*))P*

Q= a + EQ*

a=Q*(1-E)

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Chapter 2: Demand and Supply Analysis

- Model of perfect competition known as a model of "price taking" behaviour because the transaction of every individual buyer/seller is so small they each "take" the market price as given when making decisions

Demand Curves

- Tells us Q buyers are willing to purchase at different prices
- Derived demand = it is derived from the production & sale of other goods
    - Eg) high-fructose corn syrup demand incr. when demand for pop incr. (intermediate good)
- Direct demand = demand for the good itself
- Demand curve tells us highest price the market will bear for a given Q or supply of output
- Factors that affect QD:
    - Prices of related goods
    - Consumer incomes
    - Consumer tastes
    - Advertising
        - Imagine all these factors are fixed when we draw demand curve
- Slopes downward → the lower the price, the greater QD
- Law of demand = inverse relationship between price and QD

Supply Curves

- Tells us Q suppliers are willing to sell at different prices
- Constructed from the sum of supply curves of all individual suppliers
- Slopes upward → the higher the price, the more suppliers are willing to offer
- Law of supply = positive relationship between price and QS
- Factors that affect QS:
    - Prices of factors of production
    - Prices of other goods that sellers produce

Market Equilibrium

- Where demand and supply curves intersect
- At any other price, pressures exist for price to change
- Excess supply = QS > QD
- Excess demand = QD> QS

Shifts in Supply and Demand

- To do a comparative statics analysis, determine how an exogenous variable affects D or S

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- Represent this change by shifting in either curve
- Shifts will change equilibrium
- Incr. D + no change S = higher equilibrium P and Q
- Decr. In D + no change S = lower equilibrium P and Q
- Incr. S + no change D = lower equilibrium P and higher equilibrium Q
- Decr. S + no change D = higher equilibrium P and smaller equilibrium Q

Shifts in BOTH Supply and Demand

- Net impact on equilibrium depends on the magnitude of each shift as well as the shapes of the curves

Price Elasticity of Demand

- Measures the sensitivity of QD to price
- Denoted $\varepsilon_{Q,P}$
- % change in QD brought about by a 1% change in price

$\varepsilon_{Q,P}$ = % Δ Q / % ΔP .....or..... = ΔQ/ΔP x P/Q

- elasticity = 0 → **perfectly inelastic demand**
  - QD is completely insensitive to price
- elasticity between 1 and -1 → **inelastic demand**
  - QD is relatively insensitive to price
- Elasticity = -1 → **unitary elastic demand**
  - % incr. in QD equals % decrease in price
- Elasticity is between -1 and -∞ → **elastic demand**
  - QD is relatively sensitive to price
- Elasticity = -∞ → **perfectly elastic demand**
  - Any increase in price results in QD decreasing to 0
  - Any decrease in price results in QD increasing to infinity

- For any 2 demand curves that cross at a particular point, the flatter of the 2 curves is more elastic at the point where they cross
- Price elasticity of demand is important for:
  - Deciding how to price products
  - Determining structure and nature of competition within industries
  - Determining effect of various kinds of gov. interventions

Elasticities Along Specific Demand Curves

Linear Demand Curves

- Represented by $Q = a - bP$
  - A and b are positive constants
- a embodies effects of all the factors other than price that affect demand
- b reflects how the price of the good affects the QD

- any downward sloping Demand curve has a corresponding inverse demand curve
  - expresses price as a function of quantity
  - found by taking the equation for demand curve and solving for P in terms of Q
  - given by $P = \frac{a}{b} - \frac{1}{b}Q$
- the term a/b is called the **choke price**
  - price at which QD falls to 0

$$\varepsilon Q, P = \frac{\Delta Q}{\Delta P} * \frac{P}{Q} = -b\frac{P}{Q}$$

- for a linear demand curve, the price elasticity of demand varies as we move along the curve
- between the choke price (a/b) and a price of a/2b at the midpoint M, the price elasticity of demand is between -∞ aND -1
  - known as the elastic region of the demand curve
- for prices between a/2b and 0 → price elasticity of demand is between -1 and 0
  - the inelastic region of the demand curve
- slope of demand curve (-b) measures the absolute change in QD brought about by a 1 unit change in price
- price elasticity of demand measures the PERCENTAGE change in QD brought about by a 1PERCENT change in price
  - common terms used worldwide, whereas slope depends on the units of price which change country to country

Constant Elasticity Demand Curve

- given by $Q = aP^{-b}$
- for the constant elasticity demand curve, price elasticity is always equal to –b[13]

Price Elasticity of Demand and Total Revenue

- total revenue = PQ
- when price rises, so will total revenue but a higher price generally reduces QD
- so benefit of higher price is offset by the cost f reduction in quantity
- if demand is elastic → Q reduction outweighs the benefit of the higher price
  - total rev. decreases
- if demand is inelastic → Q reduction will not be severe
  - rev will rise

Determinants of the Price Elasticity of Demand

- eg. the estimated elasticity of -0.107 indicates a 10% increase in price results in a 1.07% drop in QD
  - inelastic demand
- we can rely on knowledge of products and nature of markets to make decisions
- factors that determine a product's price elasticity of demand:

- demand tends to be more price elastic when there are good substitutes for a product
- demand tends to be more price elastic when a consumer's expenditure on the product is large (either in absolute terms or as a fraction of total expenditures)
- demand tends to be less price elastic when the product is seen by consumers as being a necessity

Market-Level vs. Brand-Level Price Elasticities of Demand

- if the price of only a single brand rises, demand for that brand would drop substantially even if the good itself is inelastic in the marketplace
- what determines whether a firm should use market-level or brand-level elasticity in assessing effect of a price change?
  - Depends on what firm expects competitors to do
  - If expect rivals to quickly match price change then market-level elasticity is appropriate
  - If firm expects rivals to not match price change, brand-level elasticity is appropriate

Other Elasticities

Income Elasticity of Demand

- Ratio of % change of QD to % change of income

$$\epsilon Q, I = \frac{\Delta Q}{\Delta I} * \frac{I}{Q}$$

- Typically positive, as income incr. QD incr.

Cross-Price Elasticity of Demand

- Ratio of the percent change of quantity of good i demanded to the percent change of price of good j

$$\epsilon Q, P_j = \frac{\Delta Q_i}{\Delta P_j} * \frac{P_j}{Q_i}$$

- Pj denotes the initial price of good j, and Qi denotes the initial QD of i
- Can be pos. or neg.
- Pos → higher price food good j increases QD of i
  - Goods are demand substitutes
- Neg → higher price of good j decreases QD of i
  - Goods are demand compliments

Price Elasticity of Supply

- Measures sensitivity of quantity supplied to price
- % change in QS for each % change in price

$$\epsilon Q^s, P = \frac{\Delta Q^s}{P} * \frac{P}{Q^s}$$

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Elasticity in the Long Run vs. the Short Run

Greater Elasticity in the Long Run than in the Short Run

- long-run demand curve = pertains to the period of time in which consumers can FULLY adjust their purchase decisions to changes in price
- short-run demand curve = pertains to the period of time in which consumers cannot fully adjust their purchasing decisions to changes in price
- eg) natural gas is more price elastic in long-run than short run
    - long-run demand curve is flatter in this case
- firms sometimes cannot fully adjust their supply decisions in response to changes in price
    - eg) cannot expand facility in short run

Greater Elasticity in the Short Run than in the Long Run

- for certain goods, long run market demand can be LESS ELASTIC than short-run demand
    - eg) automobiles and airplanes
- true for durable goods → provide valuable services over many years
- same is true for certain goods in terms of supply
    - likely in the market for recycled goods

Back Of-The-Envelope Calculations

- one approach to determining demand curves involves collecting data then applying statistical methods to estimate an equation
    - this is data intensive
- we can use techniques called back-of-the-envelope calculations

Fitting Linear Demand Curves Using Quantity, Price, and Elasticity Information

- you can obtain info on prevailing/typical prices/quantities within a market as well as estimates of the price elasticity of demand in that market
    - estimates may come from statistical studies or judgements of informed observers
- if you assume the equation of the demand curve is linear (ie. $Q = a-bP$) you can find equation from these 3 pieces of info
    - prevailing price
    - prevailing quantity
    - estimated elasticity

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Steps:

Recall elasticity: $\varepsilon Q, P = -b\frac{P}{Q}$

Rearrange: $b = -\varepsilon Q, P\ \frac{P}{Q}$

To solve for a, note that Q* and P* must be on demand curve, so : $Q = a - bP$ ***or*** $a = Q + bP$

Substitute this into the equation: $a = Q + \left(\varepsilon Q, P * \frac{Q}{P}\right) P$

The P's cancel out, factor out Q: $a = (1 - \varepsilon Q, P\ )Q$

Identifying Supply and Demand Curves on the Back of an Envelope

- shift in the curves identify slopes

$$slope = \frac{\Delta Q}{\Delta P}$$

- slope for demand is –b, slope for supply is h
- we can only identify the slope of the demand curve by a shift in the supply curve if the demand curve remains fixed
    - and vice versa
- if both curves shift at same time, changes in eq. Q and P cannot identify slope of either curve
- see example on page 62

Identifying the Price Elasticity of Demand from Shifts in Supply

- sometimes we may not know the change in eq. Q for a product, but we may know about the extent to which its supply curve has hifted
- if we also know the extent to which the market price has changed, we can assess the degree to which the demand for product is elastic or inelastic
- when demand is elastic, given shift in supply would have a modest impact on eq price
    - demand for that product is likely price elastic
- when demand is inelastic, same shift in supply would have more pronounced impact on eq. price
    - demand for that product is likely price inelastic

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Chapter 3: Consumer Preferences and the Concept of Utility

Representations of Preferences

- Basket/bundle = collection of goods/services an individual might consume
- Consumer preferences tell us how an individual would rank any 2 baskets assuming the baskets were available at no cost

Assumptions about consumer preferences

- Preferences are complete → the consumer is able to rank any 2 baskets
- Preferences are transitive → consumer makes choices that are consistent with each other
- More is better
- These assumptions allow us to represent preferences with a UTILITY FUNCTION
    - Measures the level of satisfaction a consumer receives from any basket of goods

Ordinal and Cardinal Ranking

- Ordinal rankings = give us info about the ORDER in which a consumer ranks baskets
- Cardinal rankings= give us info about the INTENSITY of a consumer's preferences

Preferences with a single good: the concept of marginal utility

Marginal Utility

- How will the level of satisfaction change (ΔU) in response to a change in the level of consumption (Δy)
- Marginal utility = the rate at which total utility changes as level of consumption rises
- MU = ΔU/Δy
- MU is represented by the slope of the tangent to the utility function at that point

Principle of Diminishing Marginal Utility

- Keep in mind when drawing total and marginal utility curves:
    - Total utility and marginal utility cannot be plotted on the same graph
        - Vertical axis is not the same
    - The marginal utility is the slope of the total utility function
    - The relationship between total and marginal functions holds for other measure in economics
- **Principle of diminishing marginal utility** = after some point, as consumption of a good incr. the marginal utility of that good will begin to fall
    - Ie. The less additional satisfaction we get

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Is More Always Better?

- Ie. When does the marginal utility become 0 or even negative

Preferences with Multiple Goods: Marginal Utility, Indifference Curves & Marginal Rate of Substitution

- With 2 goods, graph of utility function must have 3 axes the marginal utility of any 1 good is the rate at which total utility changes as the level of consumption of that good rises, holding CONSTANT the level of consumption of ALL OTHER GOODS
- Mux = ΔU / Δx

Indifference Curves

- Each curve represents baskets yielding same level of utility – these are indifference curves
  - The consumer would be equally satisfied with all baskets on the curve
- Indifference curves have 4 properties:
  - When consumer likes both goods, (both Mus are pos.) all indifference curves have a negative slope
  - Indifference curves cannot intersect
  - Every consumption basket lies on one & only one indifference curve
  - Indifference curves are not "thick"

Marginal Rate of Substitution

- Consumers willingness to substitute one good for another while maintaining the same level of satisfaction
- When 2 goods have pos. marginal utilities, trade-off consumer is willing to make is illustrated by slope of the indifference curve
  - Δy/Δx
- MRS is the negative of the slope of the indifference curve
  - =-Δy/Δx = Mux/MUy

Diminishing Marginal Rate of Substitution

- for many goods, MRS diminishes as the amount of x increases along the indifference curve
  - ie. Diminishing marginal rate of substitution
- goods with diminishing MRS must be bowed towards the origin

<u>Special Preferences</u>

Perfect Substitutes

- if the MRS of one for the other is constant
- MRSxy = MRS yx = 1
- We can use U = aX + aY to describe these preferences
- MRSxy = Mux / MUy = a/a = 1
- Slope of indifference curves is constant and equal to -1

- Indifference curves are straight lines
- MRS is constant, though maybe not necessarily 1

Perfect Compliments

- Goods the consumer always wants in fixed proportion to each other
- Indifference curves are L shaped

The Cobb Douglas Utility Function

- Generally represented as $U = Ax^{\propto}y^{\beta}$
- 3 properties:
    - marginal utilities are positive for both goods
        - so the more is better assumption is satisfied
    - since both MUs are both positive, the indifference curves will be downward sloping
    - exhibits a diminishing MRS →the indifference curves will be bowed in toward the origin

Quasilinear Utility Functions

- a utility function that is linear in at least one of the goods consumed, but may be a nonlinear function of the other goods
- as we move north on the indifference map, the MRS of x for y remains the same
    - at any value of x, the slopes of all of the indifference curves will be the same → the indifference curves are parallel too
- equation: U(x, y) = v(x) + by
    - b is a positive constant
    - v(x) is a function that increases in x
        - ie. The value of v(x) increases as x increases
- linear in y generally not linear in x

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Chapter 4: Consumer Choice

The Budget Constraint

- Budget constraint = defines set of baskets that a consumer can purchase with a limited amount of income
- The **budget line** indicates all the combinations of 2 goods (x and y) that a consumer can purchase if they spend all their available income on the 2 goods
  - Expressed as: $P_xX + P_yY = I$
    - Means the price of good x times the # of units, plus that of good y equals income
- Budget constraint is expressed as $P_xX + P_yY$ is less than or equal to I
  - Because we can afford goods both on the line or under it
- Slope of budget line is $\Delta y/\Delta x$
  - Tells us how many units of the good on the vertical axis a consumer must give up to obtain an additional unit of the good on the horizontal axis
  - $-P_x/P_y$

How Does a Change in Income Affect the Budget Line

- when income rises, set of choice available increases
  - slope remains same, shift budget line outward

How Does a Change in Price Affect the Budget Line?

- Vertical intercept (I/Py) of budget line remains same
  - Because I and P do not change
- Horizontal intercept (I/Px) decreases if Price increases
  - Changes the slope of budget line
  - Consumer's purchasing power decreases because set of choices has declined

Optimal Choice

- Optimal choice = the optimal amount of each good to purchase
  - Maximizes utility
  - Allows them to live within their budget constraint
- No point inside the budget line is optimal because we are not using all our income
- U(x, y) represents the consumer's utility from purchasing x units of one good, and y units of another
  - Must choose while still satisfying budget constraint ($P_xX + P_yY$ is less than or equal to I)
- Choice problem is expressed as:
  - Maxx U(x, y) subject to $P_xX + P_yY$ is less than or equal to I
    - An optimal choice will be EQUAL to I
- To max utility, choose the highest indifference curve that is still on/inside budget line

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- At the optimal basket:
  - $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$
  - or MRS $_{x,y} = P_x/P_y$
- optimal basket is said to be an **interior optimum**
  - an optimal choice where the consumer is purchasing both goods at positive levels (above 0)
  - optimum occurs at a point where budget line is tangent to the indifference curve
    - ratio of marginal utilities equal ratio of the prices of goods
  - $\frac{MU_x}{P_x} = \frac{MUy}{P_y}$
    - at an interior optimum the extra utility per dollar spent on good x is equal to the extra utility per dollar spent on good y
    - ie. Each good gives equal bang for the buck

Using the Tangency Condition to Understand when a Basket is NOT Optimal

- at a point on the curve that is not at the bow
  - $\frac{MU_x}{MU_y} does\ not\ equal \frac{P_x}{P_y}$
- the marginal utility per dollar spent is not equal for all goods
  - $\frac{MU_x}{P_x} = \frac{MUy}{P_y}$

Finding an Optimal Consumption Basket

- when both marginal utilities are positive, optimal consumption lays on the budget line
- when there is diminishing marginal rate of substitution, an interior optimal consumption basket occurs at the tangency between an indifference curve & the budget line

2 Ways of Thinking About Optimality

- what basket should the consumer choose to maximize utility, given a budget constraint limiting expenditures to ___ a month
  - max utility = U(x, y) subject to $P_xX + P_yy$ is less than or equal to I = 800
  - exogenous variable are prices and I
- what basket should the consumer choose to minimize his expenditure ($P_xX + P_yY$) and also achieves a given level of utility?
  - Min expenditure = $P_xX + P_yy$ subject to $U(x, y) = U_2$
  - Called **expenditure minimization problem**
  - Exogenous variable are prices and required level of utility (U_2)
  - Ie. What basket requires the lowest expenditure to reach indifferences curve U_2

Corner Points

- A consumer may not purchase positive amounts of all available goods
- If consumer cannot find an interior basket at where the budget line is tangent to an indifference curve then might find an optimal basket at a corner point
  - A basket along an axis, where 1 or more of the goods is not purchased

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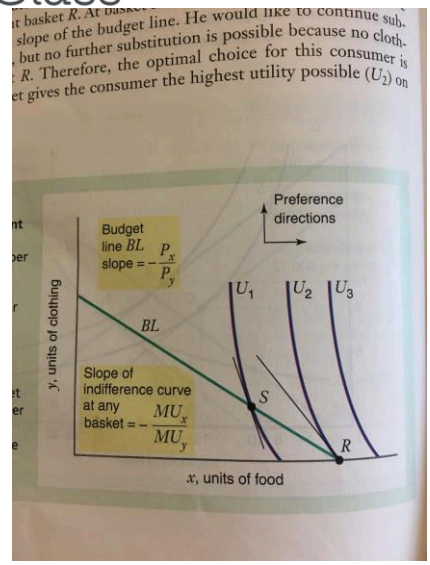

Consumer Choice with Composite Goods

- Good on the vertical axis is called a composite good because it is the composite of "all other goods"
    - Ie you model consumer behaviour for food, and all other goods
- Price of a unit of the composite good is Py = 1

Application: Coupons and Cash Subsidies

- Subsidy shifts the budget line outwards
- vouchers/coupon that can be redeemed for only 1 good, get budget line that is flat then diagonal because they cannot use the voucher to purchase other goods the same way a subsidy just provides more free income to use on all goods
- the favourable option still has to be tangent to a utility curve this
    - the gov may still implement a program that reaches the same level of consumption, however if it is not tangent to the new utility curve, then the consumer is not happy they would rather choose the program that is tangent
- see pg 126 for graph

Application: Joining a Club

- let's them purchase goods & services at a discount
- joining a club produces a long, shallower budget line

Application: Borrowing and Lending

- composite goods allow us to change the model for borrowing & lending
- every time you save $1 this year, the consumption for next year increases by (1 +r) dollars where r is the interest rate
- slope of budget line = ΔC2/ΔC1 = (1+r)/(-1) = -1(1+r)
- if consumer can borrow money at the same interest rate, every time you borrow $1 (incr. consumption, so move to right on budget line) this year, the consumption for next year decreases by (1 +r)

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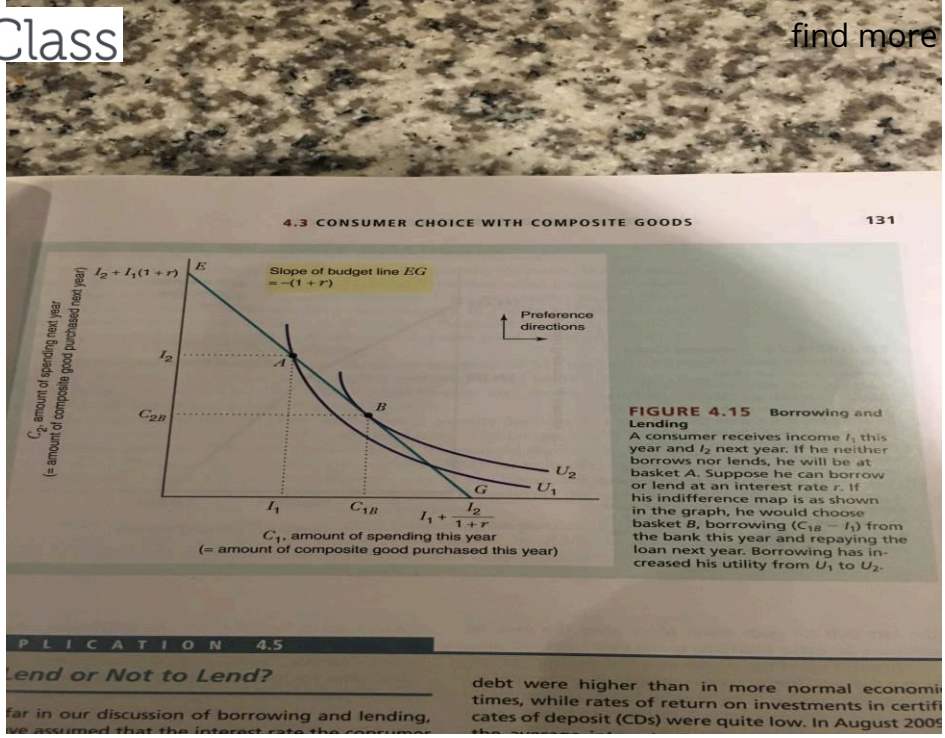


Application: Quantity Discounts

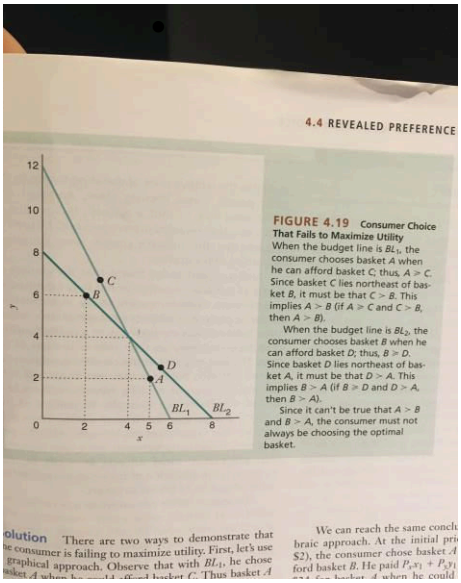
- offered from sellers
- if still has a regular price for first few items, but after that number gives a discount, budget line is made up of 2 parts
- discounts expand the set of baskets a consumer can purchase

<u>Revealed Preference</u>

- if the consumers chooses basket A when basket B costs just as much, then we know that A is weakly preferred to B
    - write as a greater than or equal to sign
- if consumer chooses basket C which is more expensive than basket D, we know C is strongly preferred to D
    - write as a greater than sign
- assume the consumers always chooses an optimal basket and that his underlying preferences do not change

Are Observed Choices Consistent with Utility Maximization?

- Does the consumer always choose a basket that maximizes their utility?
-



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Econ 2150
Chapter 5 Notes
Oct. 7 2017

Chapter 5: The Theory of Demand

Optimal Choice and Demand

The Effects of a Change in Price

Looking at an Optimal Choice Diagram

- Vertical (or horizontal) intercept of the budget line is the same since the price of that individual good/income hasn't changed, only the other one
- Slope of budget line changes as a result of Px changing
- If we draw a curve connecting all the baskets that are optimal, we get a **price consumption curve**
    - Generates our demand curve

The Effects of a Change in Income

- Results in a shift of the budget line since both intercepts are changing by the same amt
- If we draw a curve connecting all the baskets that are optimal, we get a **income consumption curve**

Changing Income: Shifting a Demand Curve

- As income incr. we buy more of both goods
- Also generates a demand curve

Engel Curves

- A curve that relates the amount of a good consumed to the level of income, holding prices constant
- Quantity is on horizontal axis, income is on the vertical instead of price
- Upward sloping (positive) for a normal good
    - Positive elasticity of demand
- Inferior goods have backwards C-shaped curves → at some point, has a negative slope

Change in the Price of a Good: Substitution Effect and Income Effect

- Substitution effect = the change in the quantity of the good the consumer would purchase after the price change to achieve the same level of utility
- Income effect = the change in the amount of a good that a consumer would buy as purchasing power changes, holding prices constant
    - Accounts for the part of the total difference in quantity purchased that isn't accounted for by the substitution effect
- Work together at same time to result in an overall movement of the consumer from an initial basket to a final basket

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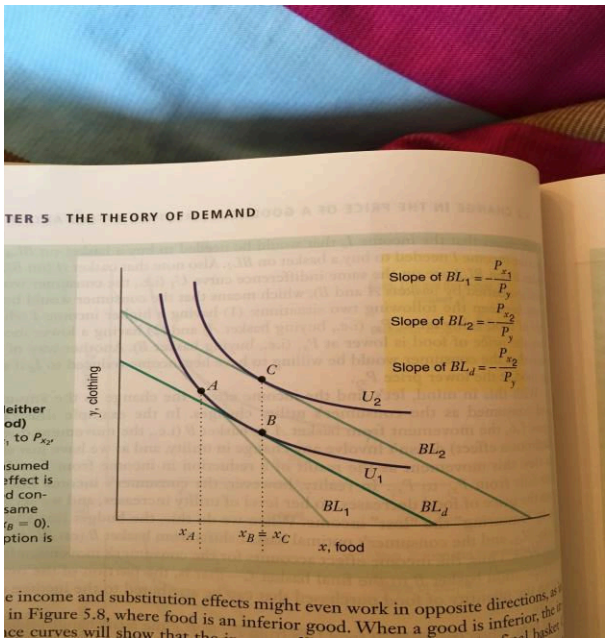
The Substitution Effect

- Step 1 – find the initial basket
  - At price Px1, face budget line BL1, maximizing basket is A on U1, the quantity purchased is xA
- Step 2 – find the final basket
  - Decr. in price of x rotates BL outwards (BL2), quantity purchased is now at xC, the overall effect of a price change is xc-xa
- Step 3 – find an intermediate decomposition basket that will enable us to identify the portion of the change in quantity due to the substitution effect
  - Keep in mind:
    - Decomposition basket reflects the price decrease, so must line on a BL parallel to BL2
    - The decomposition basket reflects the assumption that the consumer achieves the initial level of utility after the price decrease, so basket must at point where BL is tangent to indifference curve U1
  - The portion of the overall effect that is attributed to substitution effect is XB-Xa

The Income Effect

- Basically the change in amount consumed as the consumer's UTILITY changes
  - Ie. We will start with the utility curves
- Shift from BLd to BL2
- Optimal basket is now on BL2
- The income effect accounts for the consumer's movement from basket B to final basket C
  - We attribute Xc-Xb to the income effect
- Total change is substitution + income effect → (Xc-xA)



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Income and Substitution Effects when Goods are Not Normal

- Normal goods = when price decr. income effect leads to an increase in food consumption
- Because of diminishing MRS, substitution effect leads to incr. food consumption
- Income & substitution effects work in SAME DIRECTION
- Demand curve will be downward sloping
- Work in opposite direction for inferior goods
    - The income effect will be negative
    - Substitution effect is larger than income effect, total change will still be positive, so demand still downward sloping
- **Giffen good** = a good so strongly inferior that income effect outweighs the substitution effect
    - Result is an upward sloping demand curve over some regions of prices
    - Final basket lies to the left of both previous baskets
    - not very practical since inferior goods usually represent a very small portion of consumer's income

<u>Change in the Price of a Good: The Concept of Consumer Surplus</u>

- consumer surplus = difference between max. amount a consumer is willing to pay for a good, and the amount he actually pays to purchase the good
- measures how much better off consumer will be when they purchase the good

Understanding Consumer Surplus from the Demand Curve

- use concept of consumer surplus to measure impact of a price change when we do not know utility function, but do know the equation for the demand curve
- consumer surplus for more than 1 unit of a good = to all the surpluses from each individual unit (which will decrease due to diminishing marginal utility)
- consumer surplus is the area below the demand and above price consumer must pay for the good

Understanding Consumer Surplus From the Optimal Choice Diagram: Compensating Variation and Equivalent Variation

- how can we estimate the monetary value that a consumer would assign to a change in the price of a good?
    - First, see how much income consumer would give up **after** a price reduction or how much additional income consumer would need after price increase to maintain same level of utility they would have before the change
        - This is known as **compensating variation**
        - Compensating variation for price reduction is positive, since makes consumer better
        - Compensating variation for price increase is neg, since consumer is worse off

    - See how much additional income consumer would need **before** a price reduction, or how much less income consumer would need before a price incr. to give consumer same level of utility they would have after the change
        - Known as **equivalent variation**
        - The change in income that would be equivalent to the price change in its impact on the consumer
        - Pos for price reduction, since consumer better off
        - Neg for price incr.
- Compensating variation is the difference between income needed to buy basket A at initial price, and income to buy decomposition basket B at new price
    - B lies at a point where a line parallel to FINAL BL is tangent to INITIAL indifference curve
- Equivalent variation is difference in income needed to buy basket A at initial price and to buy basket E at the initial price
    - E lies at a point where a line parallel to initial BL is tangent to final indifference curve
- Compensating and equivalent variation won't be the same unless the utility function is quasi-linear
    - Because price change would have a zero income effect
    - Indifference curves are parallel
- If there is no income effect, compensating and equivalent variations will also be equal to the change in consumer surplus

<u>Market Demand</u>

- Market demand curve is the horizontal sum of the demands of individual consumers
- Can be kinked at the point where the casual consumer's demand kicks in (ie. Not people who are super into the product)
- Be careful:
    - Since market demand curves involves adding QUANTITIES, must write the demand curves in normal form (with Q expressed as a function of P, not the other way around) Q(P)
    - Pay attention to how underlying individual demand curves vary across the range of prices

Market Demand with Network Externalities

- Network externalities = present when a consumer's demand depends on how many other people purchase the good
- If one consumers demand incr. with the number of consumers who buy → externality is positive
- If the consumer's demand incr. when fewer other consumers have the good → externality is negative
- Present in virtual networks if there's not physical connection between users, eg) word documents are more useful when many people use word

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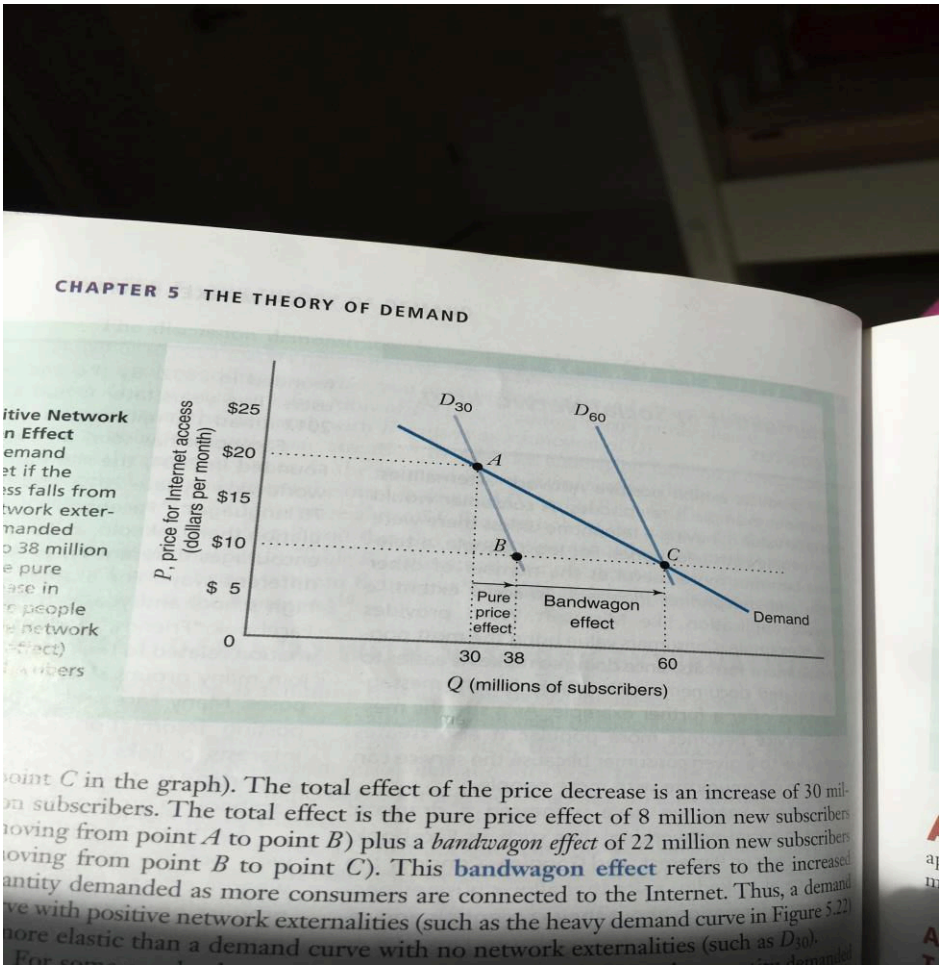
- Virtual network also present if a good requires 2 complimentary components to have value
    - Eg) software gains benefit with the more operating systems that can use it
- Positive network externalities can occur I the good is a fad



- Bandwagon effect = the incr. in QD as more consumers are purchasing
- Demand curve with positive network externalities is more elastic than one with no network externalities
- Negative externality = QD decr. when more people have the good
    - Have a snob effect = the decr in QD due to others buying it

<u>The Choice of Labour and Leisure</u>

As Wages Rise, Leisure First Decreases, then Increases

- Daily income = w(24-L)
- For any wage rate, the slope of BL is –w
- See page 190 for graph

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The Backward-Bending Supply of Labor

- Since day only has 24 hours, amount of leisure time demanded is also a choice of amount of labour they will supply
- An incr. in wage rate makes a unit of the composite good look less expensive to the consumer
- If wage rate doubles, consumer needs to work only ½ as long to buy as much
    - Leads to an upward rotation of BL
- Leads to a substitution and income effect
- Substitution effect is positive → incr. in wage induces consumer to sub more of composite good for leisure
    - Leading to less leisure, more labour
- Income effect is negative → leads to more leisure less labour

<u>Consumer Price Indices</u>

- Consumer Price Index (CPI)
- Viewed as a measure of the change in cost o living
- Ie. How much income will the consumer need in year 2 to be as well of as in year 1 (ie. On same indifference curve U1)
- Must think of a fixed basket of goods
- Calculate the ratio of new expenses/old expenses to find % increase