Household Decision-Making

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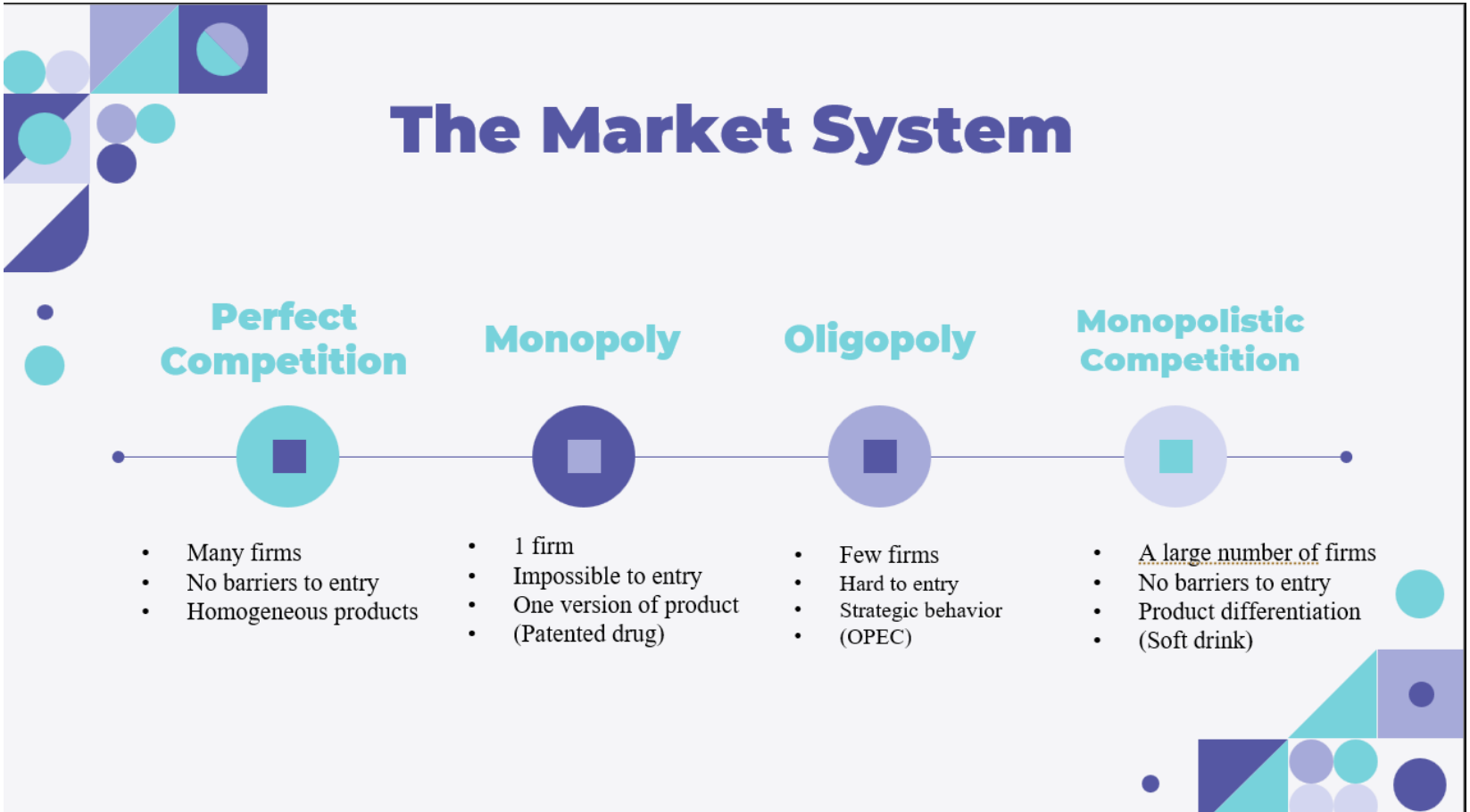
Lesson 1: Household's Budget Constraint

First of the first: Where are we?

	Name	Publication year	Publication	
Classical political economy	Adam Smith	1776	The Wealth of Nations	
	Thomas Robert Malthus	1798	An Essay on the Principle of Population	used the conce
	David Ricardo	1817	On the Principles of Political Economy and Taxation	
	John Stuart Mill	1848	Mill pointed to a distinct difference between the market's two roles:	
Neoclassical economics	Daniel Bernoulli	1738		The value of an a
	Jean-Baptiste Say	1803	Treatise on Political Economy or, The Production, Distribution, and Consumption of Wealth	Economics was
	Francis Ysidro Edgeworth	1881	Lots of publications	
	Alfred Marshall	1890	Principles of Economics	Marginalism; supp market equilibriun
	Vilfredo Pareto	1906	Lots of publications	
	Lionel Robbins	1932	An Essay on the Nature and Significance of Economic Science	Economics is th between
Keynesian economics	John Maynard Keynes	1936	The General Theory of Employment, Interest and Money	The determina
Chicago school of	Milton Friedman	1980	Market economies are inherently stable if the money sup	

A Simple Competitive Economy

- **Assumption**: 1) Perfect knowledge; 2) Perfect competition; 3) Homogeneous products
- **Players**: Households and firms
- **Our Tasks**: Understand HH's and firm's decision-making process.



Today's plan[1]

Content: Consumer/HH's choice

- The budget constraint
- Utility-maximizing and diminishing marginal utility
- Income effect and Substitution effect

Goal:

- Explain where the budget constraint comes from
- Understand how the utility maximizing rule works in HH's choice.
- Describe income effect and substitution effects of a decrease in the price of a good

[1] Textbook Chapter 6: Page 116-133

Budget Constraint

The Budget Constraint

- **Question**: What choices are possible for households?
- **Budget Constraint**: The limits imposed on household choices by *income, wealth, and product prices.*
- **Choice set**: The set of feasible options that is defined by the budget constraint.
  $X = \{1 \text{ orange and } 2 \text{ bananas}, 2 \text{ oranges and } 1 \text{ banana}, 3 \text{ oranges...}\}$

- Example: Barbara's salary is \$1000. Her monthly expenditures are limited to her income. Here are some available choices for her to allocate the income.

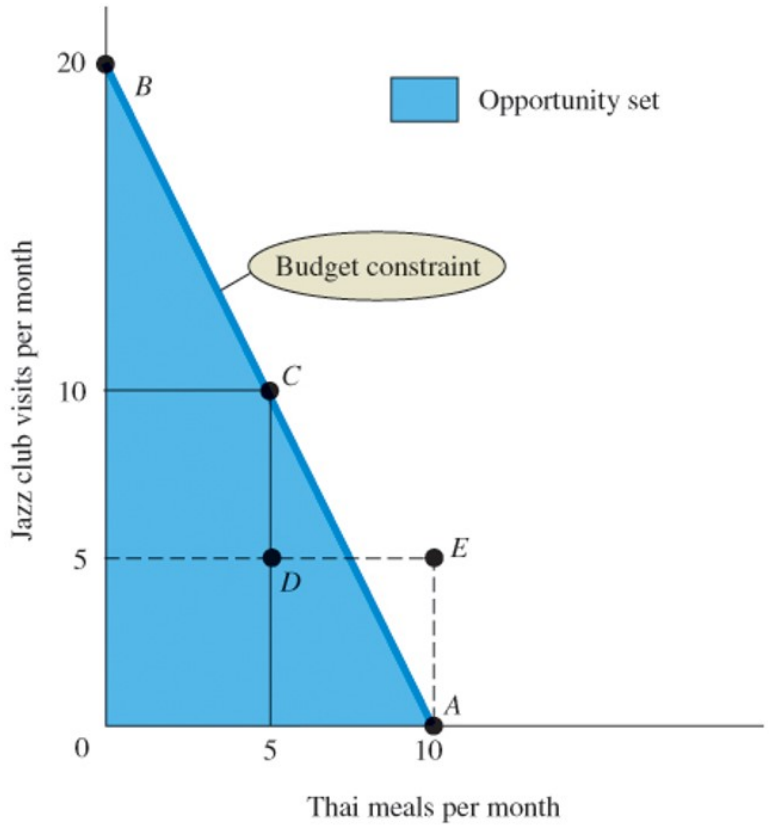
Options	Monthly Rent	Food	Other expenses	Total	Available
A	400	250	350	1000	Yes
B	600	200	200	1000	Yes
C	700	150	150	1000	Yes
D	1000	100	100	1200	No

The Budget Constraint

- Example: Ann and Tom are a couple, and they try to allocate $200 monthly scholarship on two things: Either eating at the Thai restaurant (Unit price: $20), or going to a jazz club (Unit price: $10).
- At most, how many times could Ann and Tom consume Thai food?
- At most, how many times could they go to the jazz club?

The Budget Constraint

- At most, they could consume: 200 ÷ 20 = 10 times of Thai food
- At most, they could go to 200 ÷ 10 = 20 times of jazz club.
- Of course, they can also choose to mix their spending.



- Both prices and income could affect one's opportunity set.

The Budget Constraint

- **Question**: If my income stays the same, but the price of the goods falls, I feel happier. Why?
- **Real income**: The set of opportunities to purchase real goods and services available to a household as determined by prices and money income.
- A consumer's opportunity set expands as the result of a price decrease.
- When prices go up, we say that the HH's real income has fallen.

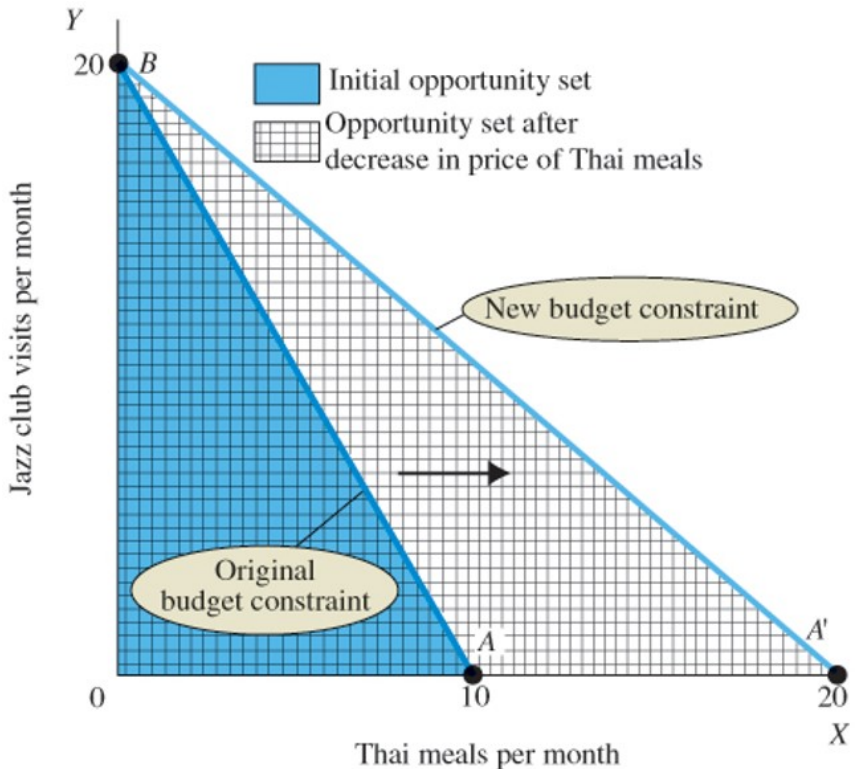
- The equation of Budget constraint:

$$P_X X + P_Y Y = I$$

- P_X = price of X; P_Y = price of Y; I = Income
- X = the quantity of X consumed; Y = the quantity of Y consumed
- Example: \$20 $\times$ Thai meals + \$10 $\times$ Jazz visits $\leq$ 200

The Budget Constraint

- **Question**: When the price of a single good changes, which changes might happen?
  - The quantity demanded of that good will be affected. (The law of demand)
  - The opportunity set will change.
    $20X + 10Y = 200 \Rightarrow 10X + 10Y = 200$



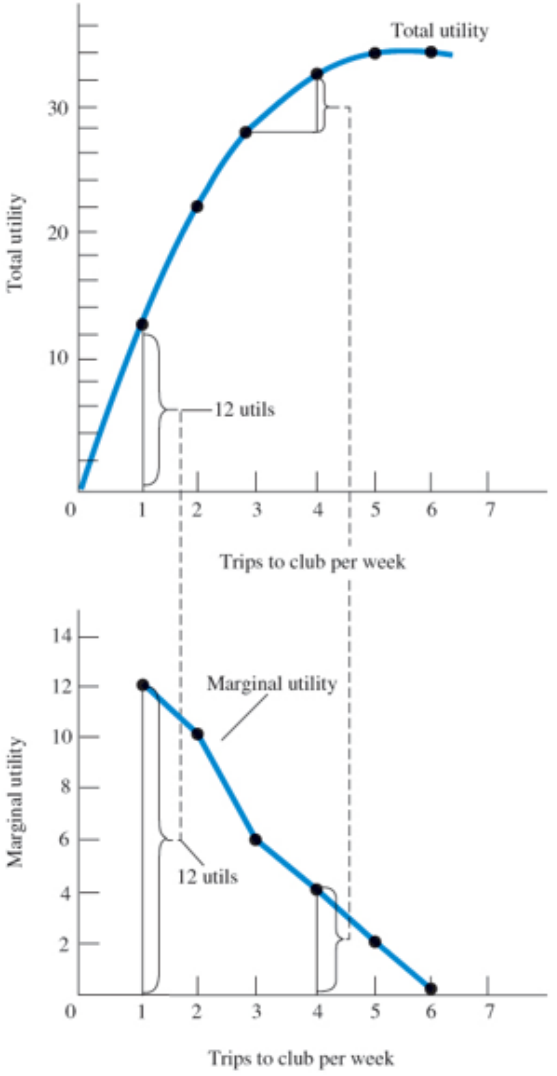
Lesson 2: Household's Utility

Total utility and Marginal utility

- Marginal utility $\approx$ marginal use value
- Total utility $\approx$ use value
- **Law of diminishing marginal utility**: The more of any one good consumed in a given period, the less satisfaction generated by consuming additional unit of the same good.
- Law of diminishing marginal utility $\Rightarrow$ The downward-sloping demand curve

Total utility and Marginal utility

Trips to Club	Total Utility	Marginal Utility
1	12	12
2	22	10
3	28	6
4	32	4
5	34	2
6	34	0



The Utility Maximization Problem: Example

- Frank is facing a trade-off between watching a basketball game and going to the club. When we do not consider about the unit price, let us help Frank to figure out the best choice to maximize his utility level

(1)Go to the club	Total utility	Marginal utility (MU)
1	12	12
2	22	10
3	28	6
4	32	4
5	34	2
6	34	0
(2)Watch the basketball	Total utility	Marginal utility (MU)
1	21	21
2	33	12
3	42	9
4	48	6
5	51	3
6	51	0

The Utility Maximization Problem

- Now we consider about the unit price, and let us help Frank to figure out the best choice.

(1)Go to the club	TU	MU	P	$\frac{MU}{P}$
1	12	12	3	4.0
2	22	10	3	3.3
3	28	6	3	2.0
4	32	4	3	1.3
5	34	2	3	0.7
6	34	0	3	0
(2)Watch the basketball	TU	MU	P	$\frac{MU}{P}$
1	21	21	6	3.5
2	33	12	6	2.0
3	42	9	6	1.5
4	48	6	6	1.0
5	51	3	6	0.5
6	51	0	6	0

The Utility Maximization Problem

- In general, utility-maximizing consumers spread out their expenditures until the following conditions hold:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

- where MU_X is the marginal utility derived from the last unit of X consumed.
- If $\frac{MU_X}{P_X} > \frac{MU_Y}{P_Y}$, the consumer could increase his utility by spending a dollar less on Y and a dollar more on X
- As the consumer shifts to buying more X and less Y, he runs into diminishing marginal utility. Buying more X decreases his marginal utility.
- Now the marginal utility of another dollar spent on X falls.
- The process continues until the above equation holds.

Consumer's Decision-Making Process

- Economists study:
  - Given Anna bought an apple, and Anna is a rational person, how did she make this purchasing decision?
    - Jeremy Bentham (1748-1832): Created the concept "Utility". Anna is maximizing her total utility.
    - Karl Marx (1818-1883): The use value and the exchange value.
    - Adam Smith (1723-1790): Paradox of water and diamonds. Water possesses a lower economic value than diamonds, even though water is far more vital to human existence.
- Economists usually do not study:
  - Given that there are so many alternative options, why Anna bought an apple?

Utility

- **Definition:** Economists refer the enjoyment or satisfaction people received from consuming goods and services as *utility*.
- **Consumer's goal**: Spend *available income* so as to *maximize utility*.
- **Challenge**: Utility is hard to be measured.
  - There is no way of knowing exactly how much enjoyment someone receives from consuming a product.
- How did economists deal with this challenge?
- Util? Impossible to measure.

Marginal Utility

- **Marginal utility**: The change in total utility a person receives from consuming one additional unit of a good or service.
- **The law of diminishing marginal utility**: The principle that consumers experience diminishing additional satisfaction as they consume more of a good or service during a given period of time. (Alfred Marshall)

Marginal Utility and the optimal decision

- Economists try to understand: Given that the marginal utility is diminishing over quantities, how consumers allocate their limited incomes among all the products they want to buy?
- **Budget constraint**: The limited amount of income available to consumers to spend on goods.
- To select the best way to spend income, the key principle: Optimal decisions are made at the margin.
- To maximize the utility, we need to follow the rule of equal marginal utility per dollar.
- As consumers decide how to spend their incomes, they should buy good A and good B up to the point that the last unit A and the last unit of B give them equal increases in utility per dollar.

Decision-Making Process

- As researchers, we observe consumers' choices by collecting data.
  - Anna bought 1 apple in the Kroger (191 Apps road.)
- Researchers assume that Anna is a rational person.
- $\Rightarrow$ Anna has rational preferences over all available options.
- Assume we could also observe Anna's choice set. (All kinds of fruits in the Kroger.)
  - Anna's Choice Set = { Banana, Grapes, Apple, ...}
- **Preferences**: $\succsim$
  - Apple $\succsim$ Banana $\succsim$ Grapes $\succsim$...
- **Rational Preferences**: $\succsim_R$
  - Complete: If the choice set = {Apple, Banana }, it must have: Either Apple $\succsim_R$ Banana, or Banana $\succsim_R$ apple.
  - Transitivity: If the choice set = { Banana, Grapes, Apple}, and if: Apple $\succsim_R$ Banana, and Banana $\succsim_R$ Grapes, then it must be: Apple $\succsim_R$ Grapes.

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Nowadays: Decision-Making Process

- Since Anna chose an Apple, so researchers could conclude:
- Given Anna's income and the price apple, purchasing apple maximizes Anna's total utility.
- Given Anna's income does not change, but the price of the same apple increases by $5, we observe that Anna does not buy apple anymore. We could conclude: The law of demand works.
- Current economics: Match the data with the well-established theory.
- **Question**: Is it reasonable to assume that every consumer has rational preference? (Behavioral economics)
    - Imperfect information (Akerlof, 1970)
    - Too many options
        - Abaluck and Gruber (2020): When Less is More: Improving Choices in Health Insurance Market
    - Ignoring non-monetary opportunity costs.

Nowadays: Decision-Making Process

- Example: The NFL ran a lottery that allowed the winners to purchase Super Bowl tickets at their face value $300. Assume all of us won the lottery. We need to decide whether or not pay $300 and go to watch the game. (Alan Kruger)
    1. If you had not won the lottery, would you have been willing to pay $3000 for your ticket?
    2. If after winning your ticket and paid $300 face value, and before arriving at the stadium, someone offered you $3000 for your ticket, would you have sold it?

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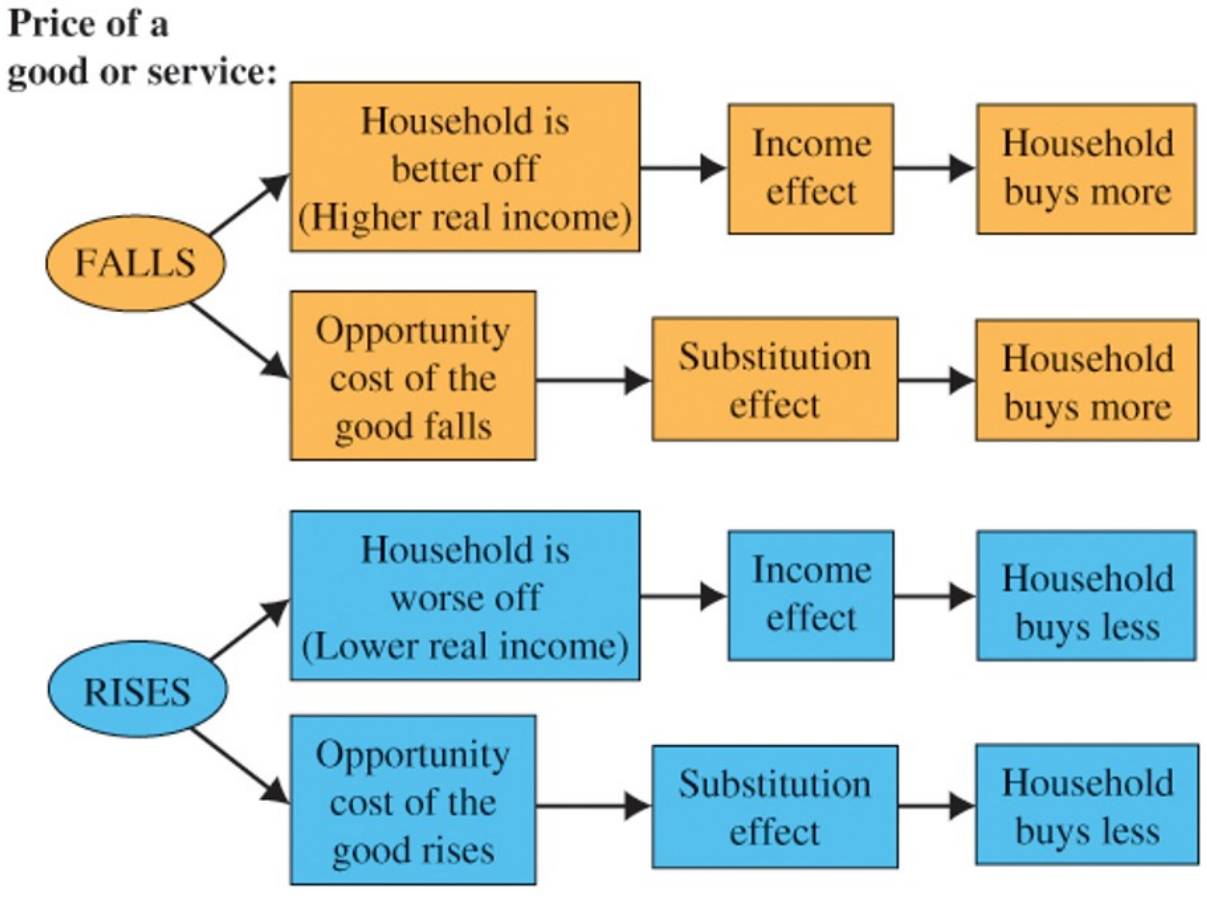
Lesson 3: Income and Substitution Effects

The Income and Substitution Effect

- Starting point: Both two effects are caused by **A price change**
- Now, suppose there are two options in my choice set (A, B)
- **Income effect**: Price of a good $\downarrow \Rightarrow$ I am happier $\Rightarrow$ Income left over $\Rightarrow$ I am richer $\Rightarrow$ Increase my consumption on all goods
- **Substitution effect**: Price of a good A $\downarrow \Rightarrow$ Relative to B, A is cheaper $\Rightarrow$ My demand for A increases, and the demand for B decreases

The Income and Substitution Effect



Example

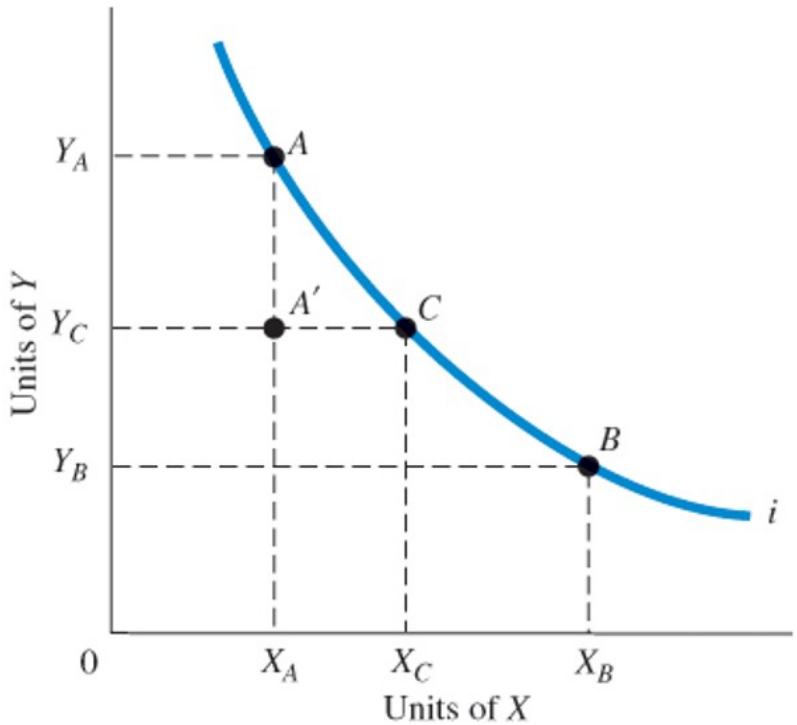
- **Question**: Rachel is spending all her incomes \$100 on two goods: puzzles and yogurts. Suppose that $P_{\text{yogurt}} = \$5$ and $P_{\text{puzzles}} = \$10$. If the price of yogurt decreases, we find that Rachel's demand for yogurt increase, and her demand for puzzles also increases. How to explain Rachel's behavior?
- No prediction. No measurement on market response. Try to to figure out the reason.

The Income and Substitution Effect

- Starting point: Both two effects are caused by **A price change**
- Now, suppose there are two options in my choice set (A, B)
- **Income effect**: The change in the quantity demanded of a good that results from the effect of a change in price on consumer purchasing power, holding all other factors constant.
- Price of a good $\downarrow \Rightarrow$ I am happier $\Rightarrow$ Income left over $\Rightarrow$ I am richer $\Rightarrow$ Increase my consumption on all goods
- **Substitution effect**: The change in the quantity demanded of a good that results from a change in price making the good more or less expensive relative to other goods, all else equal.
- Price of a good A $\downarrow \Rightarrow$ Relative to B, I feel that A is cheaper $\Rightarrow$ My demand for A increases, and the demand for B decreases

Indifference Curve

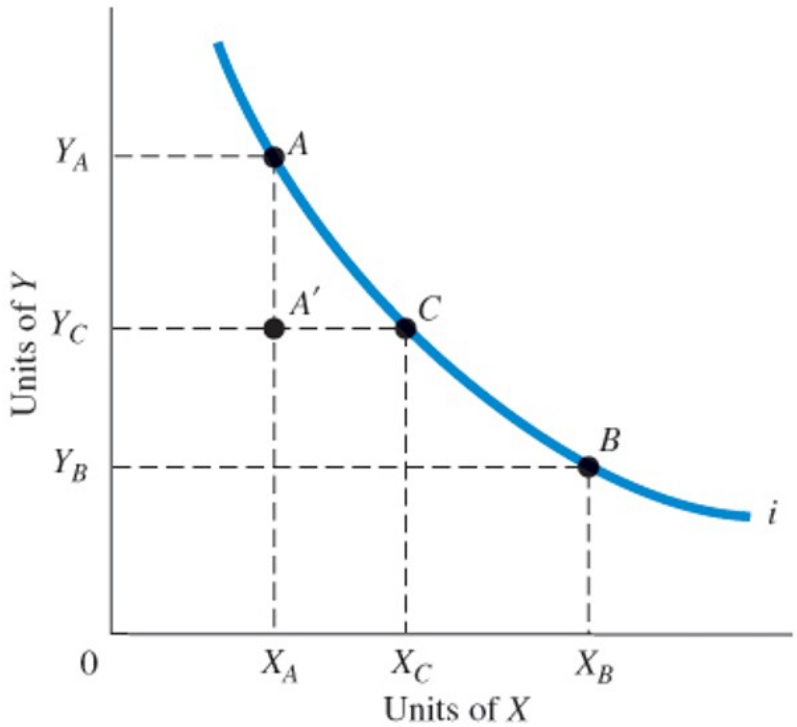
- **An indifference curve** is a set of points, each point representing a combination of goods X and Y, *all of which yields the same total utility.*



- Points A, C and B yields the same utility level.

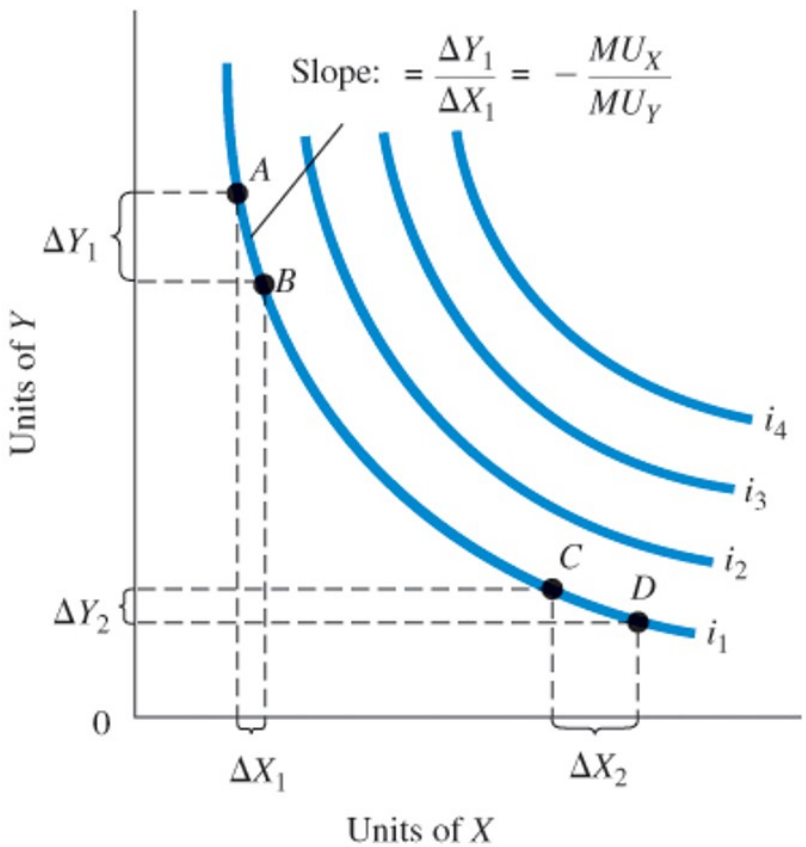
Properties of Indifference Curves

- The slope of the indifference curve : Marginal rate of substitution, $\frac{MU_X}{MU_Y}$. It is decreasing.
- Intuition: The more Y I have, the less likely that I will give up Y to exchange for X.
- The indifference curve is convex towards the origin point. This shape follows from the law of diminishing marginal rate of substitution.



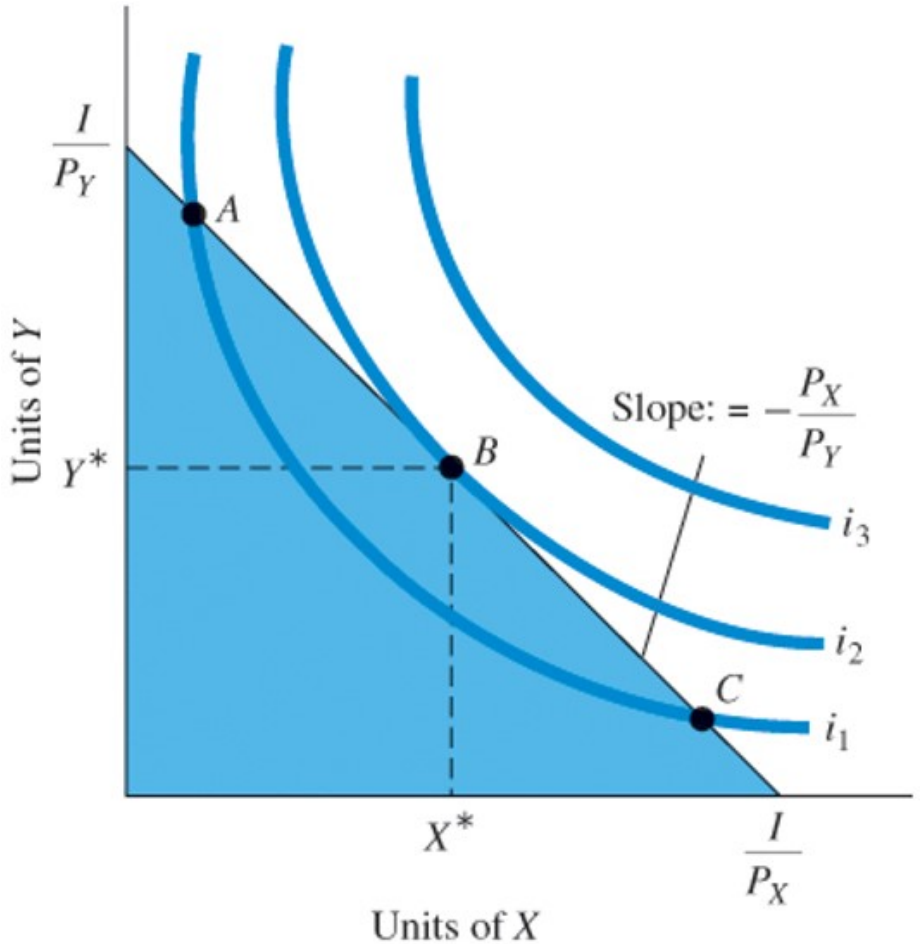
Properties of Indifference Curves

- The indifference Curves at the upper right represents higher utility levels.
- The indifference curves at the bottom left represents lower utility levels. Example: $i_4 > i_3 > i_2 > i_1$
- Any two curves do not intersect.



Utility Maximization Problem: Graph

- At point B, utility is maximized subject to the budget constraint that this person has. At B, we have: $\frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$



Utility Maximization Problem: Graph

- **Question**: How does this household's decision making process link to the demand curve?