

Demand and Supply^a

Xi Wang

University of Georgia

^aReference: Principles of Microeconomics (13th), by Karl E. Case, Ray C Fair, and Sharon M Oster

Lesson 1: The Method of Economics

The Method of Economics: Positive and Normative economics

- **Positive economics:** attempts to understand behavior and operation of economic systems without making judgements about whether the outcomes are good or bad.
- Examples:
 - What determines the wage rate for unskilled workers?
 - How does schooling year impact income?
 - How do we explain price wars in airline industry?
 - Why is corruption more widespread in some countries than in others?

The Method of Economics: Normative economics

- **Normative economics:** is often called policy economics, and looks at the outcomes of economic behavior and asks *whether they are good or bad and whether they can be made better.*
- Examples:
 - Should we reduce the income taxes?
 - Should higher education be subsidized by the government?
 - Should the United States allow importers to sell foreign-produced goods that compete with U.S.-made products?

The Method of Economics: Theories and Models

- Assume that you are the CEO of a soft drink company, and you intended to market a new soft drink product: Mocha-Cola. There are some questions for you:
 1. Which factors do you think will be important in determining the amount of Mocha-cola that people will want to buy?
 2. In which way each factor will impact on the consumption of Mocha-cola?



The Method of Economics: Theories and Models

- Which factors do you think will be important in determining the amount of Mocha-cola that people will want to buy? (Causal effect)
- **Dependent variable:** the amount of Mocha-cola that people will want to buy, denote as **Y** (outcome).
- **Independent variable: Factors** that determine the amount of Mocha-cola that they want to buy, denote as $X_1, X_2, X_3 \dots$ (factors).
- **Model:**

$$\underbrace{Y}_{\text{the amount of Mocha-cola that people buy}} = \beta_1 \underbrace{X_1}_{\text{the price of Mocha-cola}} + \beta_2 X_2 + \beta_3 X_3 + \underbrace{\epsilon}_{\text{Other factors}}$$

- where $\{Y, X_1, X_2, X_3\}$ are variables.
- β_1 measures the impact of X_1 on Y

The Method of Economics: Model and Variable

- **Model:** A formal statement of a theory, usually a *mathematical* statement of a *presumed relationship between two or more variables*.
- Model is also based on the real-world data.
- **Variable:** A measure that can change from time to time or from observation to observation.

No.	Individual	Income (per month)
1	Alice	\$3,000
2	Bob	\$ 500
3	Cindy	\$ 12,000
4	David	\$ 100
5	Eleanor	\$ 50,000
...

The Method of Economics: Model and Variable

- All models simplify reality by stripping part of it away, so they are abstractions. (Think about a Map)
- **Ockham's razor:** The principle that irrelevant details should be cut away.
- Question: How to interpret a model? (What's the common problems that most models have?)
 1. All else equal
 2. Expressing in words, graphs and equations
 3. Correlation and Causality
 4. Testing theories and models

The Method of Economics: All else equal

- **All else equal:** or **ceteris paribus**, is to isolate the impact of one single factor.
- Example: The impact of driving age on the total miles driven by car owners.

$$\underbrace{Y}_{\text{total miles driven}} = \beta_1 \underbrace{X_1}_{\text{driving age}} + \beta_2 \underbrace{X_2}_{\text{price of gasoline}} + \underbrace{\epsilon}_{\text{Other factors}}$$

- We need to separate or isolate effects from driving age and effect from the price of gasoline.
- The question becomes: “What is the impact of driving age on the total miles, if we assume that nothing else changes?”

The Method of Economics: Correlation and Causality

- Example (The consumption of soda and obesity)
- Correlation or causality?
- Increase soda tax. Is it working?
- Michael Bloomberg has tried to ban sodas larger than 16 ounces and believes that it will cure obesity. But all we have is correlation.

Cook County sugary drinks tax will make the price of soda in Chicago among the most expensive in the nation

Taxes as applied to a 2-liter soft drink



Testing theories and models: Empirical Economics

- Empirical economics: the collection and use of data to test economic theories.
- Large datasets:
 - Google, Uber, Amazon have data about consumer's buying behaviors (Amazon: Upload receipts to obtain \$10 rewards)
 - Macro data: <https://fred.stlouisfed.org/>
 - Individual-level data: https://cps.ipums.org/cps-action/variables/group?id=css_css
- Big data

Economic Policy: Four Goals

- Efficiency: means allocative efficiency. An efficient economy is one that produces what people want at the least possible cost.
- Equity: Fairness
 - Notice: Absolute equity should not be our goal. We are trying to achieve the opportunity equity.
- Growth: An increase in the total output of an economy.
 - Example: Building roads, highways, bridges in developing countries; R& D department
- Stability: A condition in which national output is growing steadily, with low inflation and full employment of resources.
- Good resources:
https://www.youtube.com/watch?v=w3-_r_t7AZU&t=219s

Questions

- Question 1: What is the impact of the buyer mergers on a price negotiation between the drug manufacturer and pharmacies?
- Question 2: How does the PBM impact price negotiation between the drug manufacturer and pharmacies?

- Answer 1: Running a DID regression

$$\text{Drug Price}_{dt} = \alpha + \beta_1 * 1\{\text{Merger}\} + \eta * \text{Post} + \delta * \text{Merger} * \text{Post} + \epsilon$$

- Problem: (i) Each pharmacy could have many drug products, so tracking all drug prices could be a hefty task. (ii) It could not directly reflect the role of bargaining.
- I estimated the gross surplus function for the drug manufacturer by using Chipty and Snyder's method.

Economics in Practice

- Does your roommate matter for your grades?



Economics in Practice

- Several studies of the effect of roommates on college grades help to sort out causality in peer effects.
- One study looked at **randomly assigned** freshman roommates in one college to test the peer effects from different types of roommates.
- The author found strong roommate effects on grade point average, effort in school, and fraternity membership.
- Question: Would you expect college seniors who choose their own roommates to have more or less similar grades than college freshmen who are assigned as roommates? Why or why not?

Review

What did we learn?

- Opportunity cost
- Marginalism
- Efficient (Discuss it later)

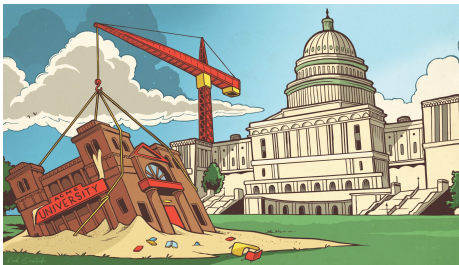
A Small Quiz for fun

1. Use your electronic devices to search this website: www.kahoot.it
2. Pin code
3. Create a nickname for yourself
4. Answer the question

Lesson 2: Read and Understand Graphs

An example about the economic policy

- Should higher education be subsidized?



Link

- Good resources:
https://www.youtube.com/watch?v=w3-_r_t7AZU&t=219s

Example: Funded Higher Education



Figure 1: Sources:

<https://datalab.usaspending.gov/colleges-and-universities/>

Example: Funded Higher Education

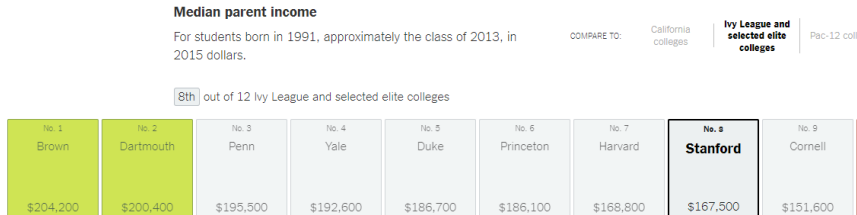


Figure 2: Sources: <https://www.nytimes.com/interactive/projects/college-mobility/stanford-university>

- By contrast, the median family income in the U.S. in 2015: \$55,775
- Good resources: <https://opportunityinsights.org/>
- Lesson: Having a “good will” is important, but good will do not necessarily lead to good outcomes.

Four Goals

- **Efficiency:** The condition in which the economy is producing what people want at the least possible cost.
 - Example: Two-side voluntary exchange.
 - Inefficiency: May be caused by government regulation or tax laws



- Land in Ohio is best suited for corn production



- Land in GA is best suited for peach production

Four Goals

- **Equity:** Fairness
 - Notice: Absolute equity should not be our goal. We are trying to achieve the opportunity equity.
- **Growth:** An increase in the total output of an economy.
 - Example: Building roads, highways, bridges in developing countries; R& D department
- **Stability:** A condition in which national output is growing steadily, with low inflation and full employment of resources. (covid)

Equality



The assumption is that everyone benefits from the same supports. This is equal treatment.

Equity



Everyone gets the supports they need (this is the concept of "affirmative action"), thus producing equity.

Justice



All 3 can see the game without supports or accommodations because the cause(s) of the inequity was addressed. The systemic barrier has been removed.

Correlation and Causality

- We often confuse the causality: When two events occur in a sequence, it seems natural to think A caused B, but it is not always true.
- Example: I got up at 5:30 am, and then I saw sun rise. Causal?!



- **Post hoc fallacy:** the error of inferring causality from two events happening one after the other.
- A theory must be developed that explain why one might cause the other
- Make sure you gathered sufficient data

Correlation and Causality

- We often confuse the causality: When two events occur in a sequence, it seems natural to think A caused B, but it is not always true.
- Example: I got up at 5:30 am, and then I saw sun rise. Causal?!



- **Post hoc fallacy:** the error of inferring causality from two events happening one after the other.
- A theory must be developed that explain why one might cause the other
- Make sure you gathered sufficient data

Graph

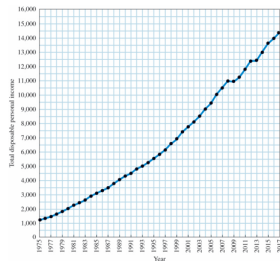
- A **graph** is a two-dimensional representation of a set of numbers, or data.
- Elements:
 - **X-axis**: a horizontal line
 - **Y-axis**: a vertical line
 - **Origin**: The axes contain measurement scales that intersect at zero
- X-intercept: The point at which the graph intersects the X-axis
- Y-intercept: The point at which the graph intersects the Y-axis
- Each point represents a pair of numbers: (X,Y) .

Ex: Time series graph ¹

Time series graph: How a single variable changes over time.

Total Disposable Personal Income in the United States, 1975–2017 (billions \$)

Year	Total Disposable Personal Income	Year	Total Disposable Personal Income	Year	Total Disposable Personal Income
1975	1,219	1991	4,485	2007	10,507
1976	1,326	1992	4,800	2008	10,994
1977	1,457	1993	5,000	2009	10,943
1978	1,630	1994	5,244	2010	11,238
1979	1,809	1995	5,533	2011	11,801
1980	2,018	1996	5,830	2012	12,404
1981	2,251	1997	6,149	2013	12,396
1982	2,425	1998	6,561	2014	13,033
1983	2,617	1999	6,876	2015	13,615
1984	2,904	2000	7,401	2016	13,969
1985	3,099	2001	7,752	2017	14,379
1986	3,288	2002	8,099		
1987	3,466	2003	8,466		
1988	3,770	2004	9,002		
1989	4,052	2005	9,401		
1990	4,312	2006	10,037		

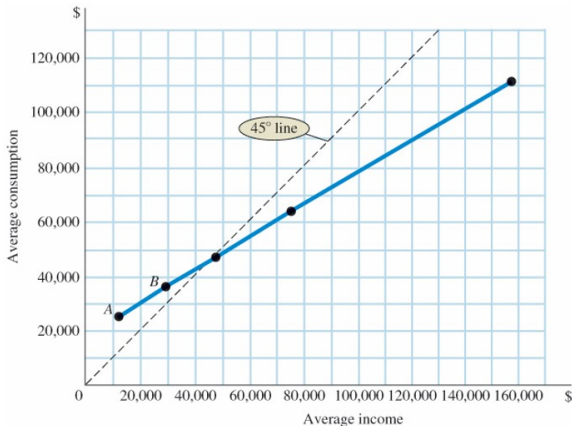


Source: U.S. Department of Commerce,
Bureau of Economic Analysis.

¹Total disposable income: The aggregation of after-tax incomes over all workers in the U.S.

Reading the Graph

- To help us read the graph: we need to draw a 45 degree line
- On the 45 degree line, all the points have: $Y=X$
- This 45 degree line does not represent any data.



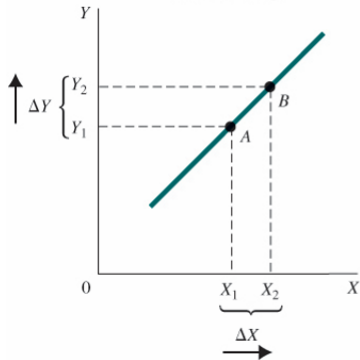
Reading the Graph

1. You should notice: Whether the line slopes upward or downward as you move from left to right.
 - Positive relationship: As X increasing, Y is also increasing
 - Negative relationship: As X increasing, Y is decreasing
2. **Slope:** A measurement that indicates whether the relationship between variables is positive or negative and how much of a response there is in Y when X changes.
 - We normally use Δ (delta) to refer to a change in a variable.

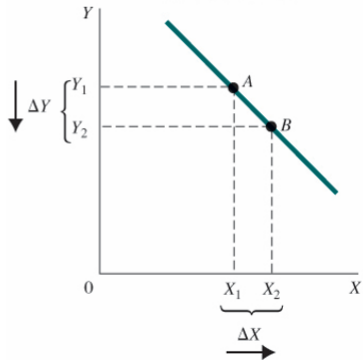
$$\text{Slope} = \frac{\Delta Y}{\Delta X} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

Reading the Graph

a. Positive slope



b. Negative slope



Reading the Graph

Properties:

$$\text{Slope} = \frac{\Delta Y}{\Delta X} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

- A straight line has a constant slope.
- A horizontal line has a zero slope.
- A vertical line has an infinite slope because ΔY is too big to be measured.

Example

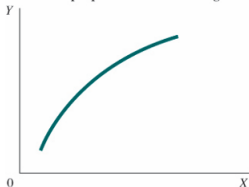
- Exercise: Please graph each of the following sets of numbers. Draw a line through the points and calculate the slope of each line.

X	Y	X	Y
1	25	0	0
2	20	10	10
3	15	20	20
4	10	30	10
5	5	40	0

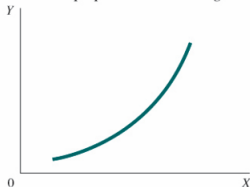
Reading the Graph

- The slope of a curve is continually changing.

a. Slope: positive and decreasing



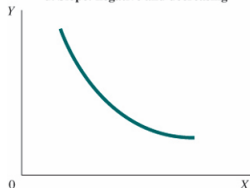
b. Slope: positive and increasing



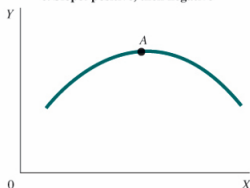
c. Slope: negative and increasing



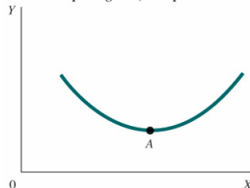
d. Slope: negative and decreasing



e. Slope: positive, then negative



f. Slope: negative, then positive



Time series graph



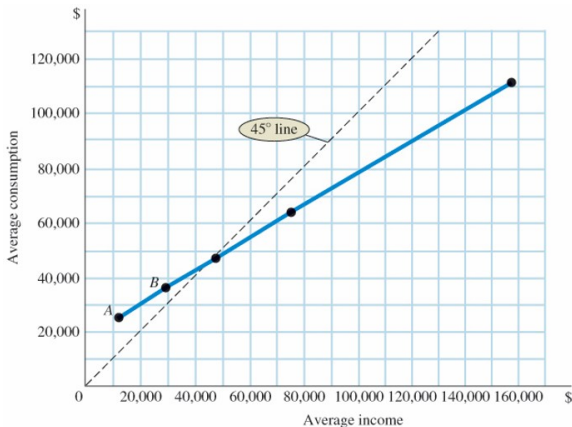
Example²: Please draw the graph between X and Y

	X: Average After-tax income (\$)	Y: Average Consumption expenditures (\$)
Bottom fifth	11,832	25,138
2nd fifth	29,423	36,770
3rd fifth	47,681	47,664
4th fifth	75,065	64,910
Top fifth	157,215	112,221

²Source: Consumer Expenditures in 2016, U.S. Bureau of Labor Statistics.

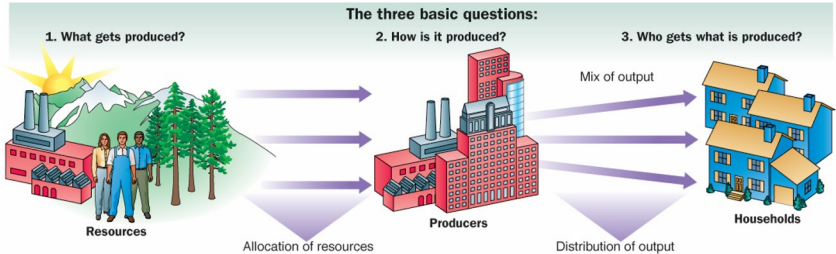
Two Variables Graph

- At point A, consumption equals \$25,138 and income equals \$11,832.
At point B, consumption equals \$36,770 and income equals \$29,423.



Lesson 3: Scarcity

Three Basic Questions



- Please watch the video, and try to answer following questions:
 - If you plan to produce and sell orange juice, which elements do you need to purchase?
 - <https://www.youtube.com/watch?v=bAigiyGzAkE> (5'09-6'38)

Basic concepts

- **Factors:** The inputs into production process. **Land, Labor (L), and capital (K)** are three key factors of production.
- **Capital:** Those goods produced by the economic system that are used as inputs to produce *other goods or services in the future*. (K)
 - Physical capital: buildings, machines for producing orange juice
- **Production:** The process that transforms scarce resources into useful goods and services.

$$\underbrace{F}_{\text{Outputs}} = \underbrace{f}_{\text{production}} \underbrace{(A, K, L)}_{\text{Inputs}}$$

- Example: (Cobb-Douglas Production function):

$$F = AK^\alpha L^{1-\alpha}$$

Goods

- **Goods:** It could be products or commodity, service, love, quiet environment, air, reputation.....
 - **Economic goods:** a type of goods that “Having more is always better than having less.”
 - Free goods: “Having it is always better than not-having it.”

Example

- Air is free goods for most of us
- Fresh air in a polluted city is economic goods for local residents.
- We focus on studying economic goods



Scarcity

- Economic goods are scarce (because of the definition: “More is always better than less”.)
- **Scarcity is not necessarily related to the amount of supply.**
- Example: Good eggs and bad eggs
 - The number of good eggs are usually more than the number of bad eggs
 - Everyone wants good eggs, so the good eggs could be scarcity
- Scarcity is determined by the **relative demands** for economic goods.



Scarcity

- Economic goods are scarce (because of the definition: “More is always better than less”.)
- **Scarcity is not necessarily related to the amount of supply.**
- Example: Good eggs and bad eggs
 - The number of good eggs are usually more than the number of bad eggs
 - Everyone wants good eggs, so the good eggs could be scarcity
- Scarcity is determined by the **relative demands** for economic goods.



Scarcity

- Economic goods are scarce (because of the definition: “More is always better than less”.)
- **Scarcity is not necessarily related to the amount of supply.**
- Example: Good eggs and bad eggs
 - The number of good eggs are usually more than the number of bad eggs
 - Everyone wants good eggs, so the good eggs could be scarcity
- Scarcity is determined by the **relative demands** for economic goods.



Lesson 4: Opportunity Costs

Opportunity Cost

- Scarcity, Trade-off, opportunity Costs
- **Opportunity cost:** The **best alternative** that we **give up** when we make a decision.
 - If the value of the best alternative does not change, then the opportunity cost does not change.
 - The changes of individual's behavior are influenced by two factors:
 - The value of the selected goods
 - The value of goods that I give up
- Economic costs = Accounting costs + opportunity costs

Opportunity Cost

- **Property 1:** *If the value of the best alternative does not change, then the opportunity cost does not change.*
- Example: (Cutting the hair)
 - Suppose that I prefer to work from Monday to Wednesday, but prefer not to work during weekend.
 - Last Wednesday, I went to the hair salon and spent one hour cutting my hair. The price of a basic haircut is \$80. I gave up one hour of working time to go to the salon, which could have brought me \$100. What is the economic cost of cutting my hair?
 - Suppose I went to the hair salon on Saturday and did not need to work. What is the economic cost of cutting my hair?
 - Under the second case, assume that the barber made a mistake, and I am not satisfied with my new hairstyle, does the economic cost of the haircut change?
 - No, but the value of haircut changes.

Opportunity Cost

- **Property 2:** *The changes of individual's behavior are influenced by two factors:*
 - *The value of the selected goods*
 - *The value of goods that I give up*
- In the hair salon's example, I am more likely to go to the hair salon during the weekend, instead of on Wednesday, because of the changes in my opportunity costs. (Changes of the goods that I give up)
- I am less likely to go to the hair salon if I realize that the barber is bad at cutting the hair. (Changes of the values of the selected goods)

Scarcity and Choice: One-Person Economy

- The simplest economy: One player (Bill)
 - Bill must decide what he wants to produce (wants vs. needs)
 - He must look at possibilities
 - Given that resources are limited, Bill must decide how to best use them to satisfy his hierarchy of wants.



One-Person Economy

- Suppose: Bill wants to {Hunt Meat, gather fruits}
- Given the scarcity of time and resources, if Bill decides to hunt then he will have less time to gather fruits.
- Bill faces a **Trade-off** between meat and fruits.
- Opportunity cost \Rightarrow Allocate time wisely

Two-Persons Economy

- Now suppose that another survivor of the crash, Colleen, appears on the island.
- Players: Bill and Colleen
- Actions: {Cut logs, gather foods}
- Assume that they have different preferences and different productivity.
- **Case 1:** Assume that Colleen is better than Bill both at cutting logs and gathering food.
 - Colleen: can gather 10 bushels of food per day, and can cut 10 logs per day
 - Bill: can gather only 8 bushels of food per day, and can cut only 4 logs per day.
- **Absolute Advantage:** A producer has an absolute advantage over another in the production of a good or a service if she can produce that product using fewer resources.
- Finding: Colleen has an absolute advantage over Bill.

Two-Persons Economy

- Bill: can gather only 8 bushels of food per day, and can cut only 4 logs per day.
 - For Bill, if he wants to produce 8 bushels of food, then he needs to give up cutting 4 logs.
 - For him, the opportunity cost of 8 bushels are 4 logs.
- Colleen: can gather 10 bushels of food per day, and can cut 10 logs per day
 - For Colleen, if she wants to produce one additional bushel of food, then she has to give up cutting one unit of log.
 - For Colleen, the opportunity cost of 8 bushels are 8 logs.
- **Comparative advantage:** A producer has a comparative advantage over another in the production of a good or service if he or she can produce that product *at a lower opportunity cost*.

Two-Persons Economy

- Why Colleen benefits from cooperating with Bill?
- Suppose: Colleen and Bill produce independently
- Assume: Each individual wants to consume an equal number of logs and food

a. Daily production with no specialization, assuming Colleen and Bill each want to consume an equal number of logs and food

	Wood (logs)	Food (bushels)
Colleen	5	5
Bill	$2\frac{2}{3}$	$2\frac{2}{3}$
Total	$7\frac{2}{3}$	$7\frac{2}{3}$

Two-Persons Economy

- Suppose: Colleen and Bill specialize and trade.

▼

**b. Daily Production
with Specialization**

	Wood (logs)	Food (bushels)
Colleen	10	0
Bill	0	8
Total	10	8

David Ricardo's Theory

- Bill and Colleen could be two countries
- Example: the U.K and the Portugal produced wine and clothes
- David Ricardo's Theory of Comparative advantage: Specialization and free trade will benefit all trading parties, even those that may be absolutely more efficient producers.(1817)
- Extension: Your career choice
- Suppose you are both the best physician and the best waiter/waitress in Athens.
- The opportunity cost of being a physician: the income for a waiter/waitress
- The opportunity cost of being a waiter/waitress: the income for a physician
- Suppose you are the best waitress/waiter but the worst physician.
- Since your opportunity cost of being a waitress is higher than other waitress, you still need to work as a physician. (comparative advantage)

Two-Persons Economy

COMPARATIVE VERSUS ABSOLUTE ADVANTAGE



Everyone has a comparative advantage in something, but may not have an absolute advantage



Summary

- Basic concepts: Capital, factors of production, production, inputs, outputs
- Scarcity, choice and opportunity cost
- David Ricardo's Theory of Comparative advantage:
 - Comparative advantage
 - Absolute advantage

Quiz for fun

1. Use your electronic devices to search this website: www.kahoot.it
2. Pin code
3. Create a nickname for yourself
4. Answer the question

Lesson 5: Theory of Comparative Advantage and the PPF

Two-Persons Economy

Absolute Advantage:

- Bill and Colleen
- {Cut lots, gather foods}

	Gathering food per day	Cutting logs per day
Colleen	10	10
Bill	8	4

- Finding: Colleen has an absolute advantage over Bill.

Two-Persons Economy

Comparative Advantage:

- **Comparative advantage:** A producer has a comparative advantage over another if she can produce that product **at a lower opportunity cost**.
- **Opportunity cost:** The best alternative that we give up.

	Gathering food per day	Cutting logs per day
Colleen	10 bushels	10 logs
Bill	8 bushels	4 logs

	The opportunity cost of producing 1 bushels of food	The opportunity cost of Cutting 1 logs per day
Colleen	? logs	? bushels
Bill	? logs	? bushels

- **Finding:** Bill has a comparative advantage than Colleen in the production food.

Two-Persons Economy

Comparative Advantage:

- **Comparative advantage:** A producer has a comparative advantage over another if she can produce that product at a lower opportunity cost.
- **Opportunity cost:** The best alternative that we give up.

	Gathering food per day	Cutting logs per day
Colleen	10 bushels	10 logs
Bill	8 bushels	4 logs

	The opportunity cost of producing 1 bushels of food	The opportunity cost of Cutting 1 logs per day
Colleen	1 logs	1 bushels
Bill	$\frac{1}{2}$ logs	2 bushels

- **Finding:** Bill has a comparative advantage than Colleen in the production food.

Two-Persons Economy

Comparative Advantage:

	The opportunity cost of producing 1 bushels of food	The opportunity cost of Cutting 1 logs per day
Colleen	1 logs	1 bushels
Bill	$\frac{1}{2}$ logs	2 bushels

	The opportunity cost of producing 8 bushels of food	The opportunity cost of Cutting 10 logs per day
Colleen	? logs	? bushels
Bill	? logs	? bushels

Two-Persons Economy

Comparative Advantage:

	The opportunity cost of producing 1 bushels of food	The opportunity cost of Cutting 1 logs per day
Colleen	1 logs	1 bushels
Bill	$\frac{1}{2}$ logs	2 bushels

	The opportunity cost of producing 8 bushels of food	The opportunity cost of Cutting 10 logs per day
Colleen	8 logs	10 bushels
Bill	4 logs	20 bushels

Two-Persons Economy

- Why Colleen benefits from cooperating with Bill?
- Suppose: Colleen and Bill produce independently
- Assume: Each individual wants to consume an equal number of logs and food

a. Daily production with no specialization, assuming Colleen and Bill each want to consume an equal number of logs and food

	Wood (logs)	Food (bushels)
Colleen	5	5
Bill	$2\frac{2}{3}$	$2\frac{2}{3}$
Total	$7\frac{2}{3}$	$7\frac{2}{3}$

Two-Persons Economy

- Suppose: Colleen and Bill specialize and trade.

▼

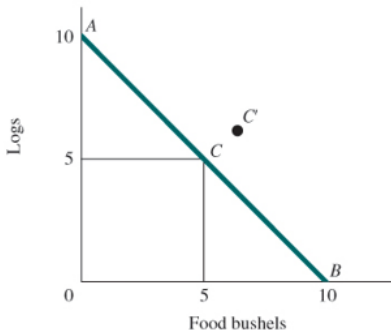
**b. Daily Production
with Specialization**

	Wood (logs)	Food (bushels)
Colleen	10	0
Bill	0	8
Total	10	8

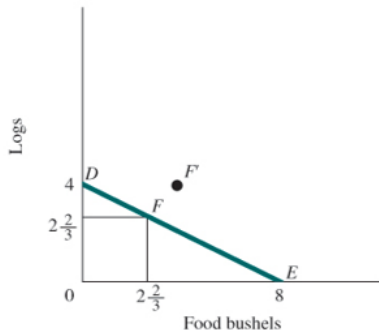
- Finding: By joining forces and specializing, the two have increased their production of both goods.

Graphical Presentation

a. Colleen's production possibilities



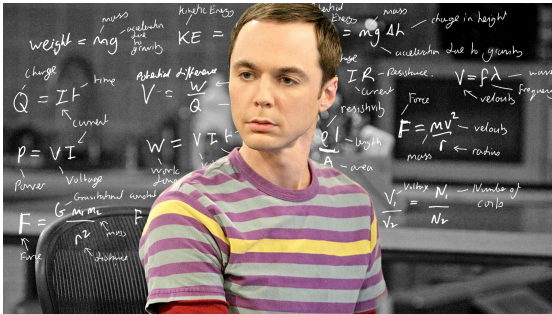
b. Bill's production possibilities



- X-axis: The amount of bushels that a person produced
- Y-axis: The amount of logs that one cut
- Line: shows all of the possible combinations of food and wood that one can produce alone

Theory of Comparative advantage

- **Theory of Comparative advantage:** Specialization and free trade will benefit all trading parties, even those that may be absolutely more efficient producers.
- What did we learn from the comparative advantage?



Example (Your career choice)

Case 1:

- Suppose you are both the best physician and the best waiter/waitress in Athens.
- You have the ? advantage over others.

Case 2:

- Suppose you are the best waitress/waiter but the worst physician.
- The opportunity cost of being a physician: the income for a waiter/waitress
- The opportunity cost of being a waiter/waitress: the income for a physician
- Which job will you choose based on the comparative advantage?
- Since your opportunity cost of being a waitress is higher than other waitress, you still need to work as a physician.

Production Possibility Frontier

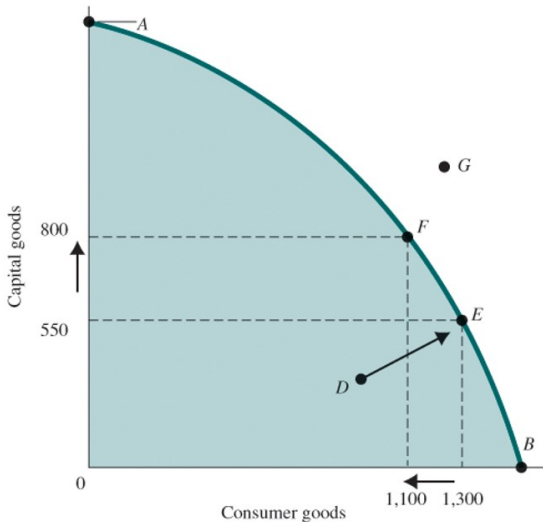
- **PPF**: is a graph that shows all the combinations of goods and services that can be produced if all of a society's resources are used **efficiently**.
- **Efficient**: No waste. (The society produced a given outputs with the least costs.)
- Graph's X-axis: The quantity of **capital goods** produced.
- Y-axis: The quantity of **consumer goods**.
- Capital goods: Anything that has already been produced that will be used to produce other valuable goods or services over time. (Q: Schooling years? Working experience?)
- Consumer goods: Goods produced for present consumption.
- Investment: the process of using resources to produce new capital.

$$K_{t+1} = K_t(1 - \delta) + I_t$$

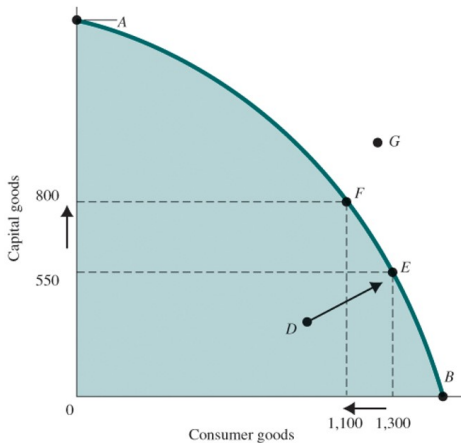
- Q: What is the opportunity cost of the investment?

Production Possibility Frontier

- How to read the graph?

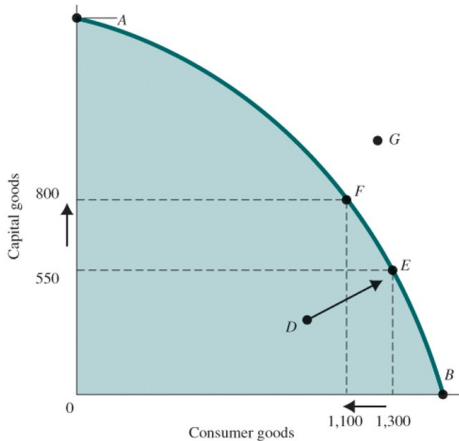


Production Possibility Frontier



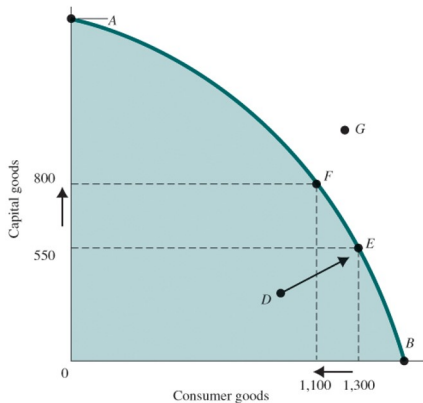
- Point A and Point B: Extreme cases
- Line AFEB is production possibility frontier.

Production Possibility Frontier



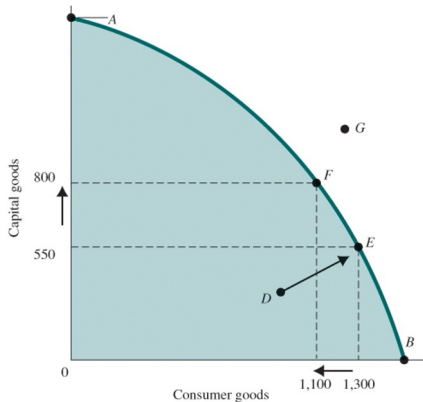
- Point D: Inefficient
- Point G: Can't be realized under current technology and resources.

Production Possibility Frontier



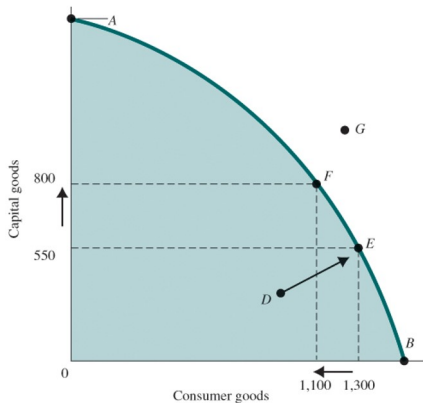
- Moving point from E to F: capital goods increases $800 - 550 = 250$, but the consumer goods decreases $1300 - 1100 = 200$.
- The opportunity cost of increasing 200 consumer goods: is to give up producing 250 capital goods

Production Possibility Frontier



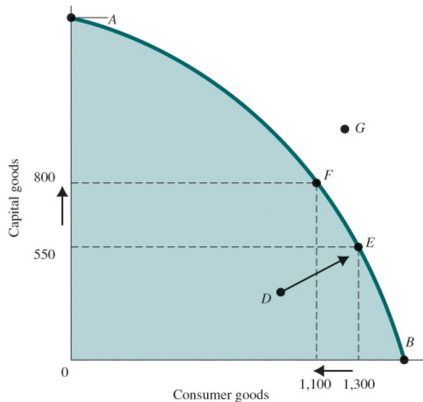
- The slope is **negative**.
- **Marginal rate of transformation (MRT)**: The slope of the production possibility frontier. It tells us **how much society has to give up of one output to get a unit of a second**.

Production Possibility Frontier



- The slope is **increasing**
- **The law of increasing opportunity cost:** It tells us: the more society tries to produce one goods rather than another, the harder it is.

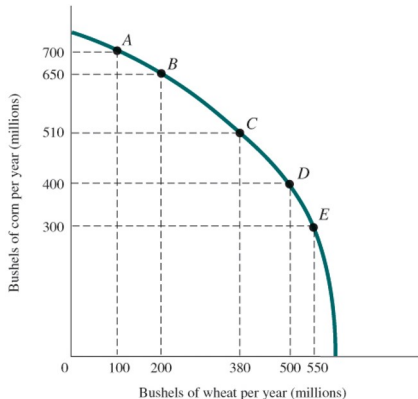
Production Possibility Frontier



- The slope is **increasing**
- **The law of increasing opportunity cost:** It tells us: the more society tries to produce one goods rather than another, the harder it is.

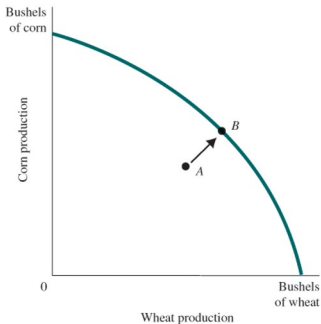
EX: The law of increasing opportunity cost

- Ohio and Kansas together produced 510 million bushels of corn and 380 million bushels of wheat.
- Below shows: (380, 510) and some hypothetical combinations of corn and wheat production

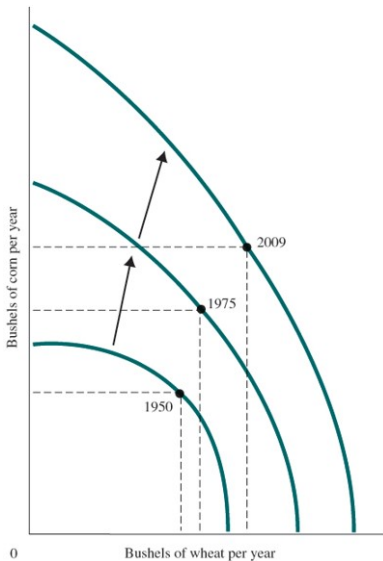


Production Possibility Frontier

- From A to B: Production becomes more efficient.
- Example: technology changes, innovation, application of new techniques.
- **Economic Growth:** An increase in the total output of an economy.



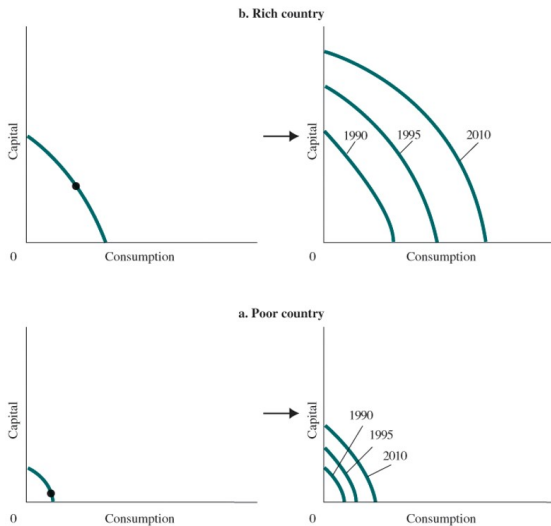
Economic Growth in the U.S.



The Dilemma of Poor Countries

- Discussion: The accumulation of capital and technological advances are two main sources for the economic growth. Then, according to the opportunity cost, could you explain: Why poor country have slower economic growth?
- Economic Growth \Leftarrow the accumulation of capital \Leftarrow Everyone needs to weigh consumer products and capital products given limited incomes \Leftarrow For people in the poor countries, consumer goods is much more important than capital goods, so people spend most of their income buying consumer goods to satisfy current consumption.
- Why people in the poor country spend most of their income buying consumer goods?
 - One of potential reasons: Low income level and high living costs
- Why does it happen?

The Dilemma of Poor Countries



Economic Systems

- Command economy: An economy in which a central government either directly or indirectly sets output targets, incomes, and prices.
- Impossible to calculate demands and supply
- Problems: Unrealistic goals, corruption

- Laissez-Faire Economy: An economy in which individual people and firms pursue their own self-interest without any central direction or regulation.
- Mixed systems
- **Market**: The institution through which buyers and sellers interact and engage in exchange.

Conclusion

Contents

- Comparative advantage
- Production possibility frontiers (PPF)
 - Marginal rate of transformation
 - Law of increasing opportunity cost
- The dilemma of poor countries
- Economic Systems: Command economy and Laissez-Faire economy

Announcements

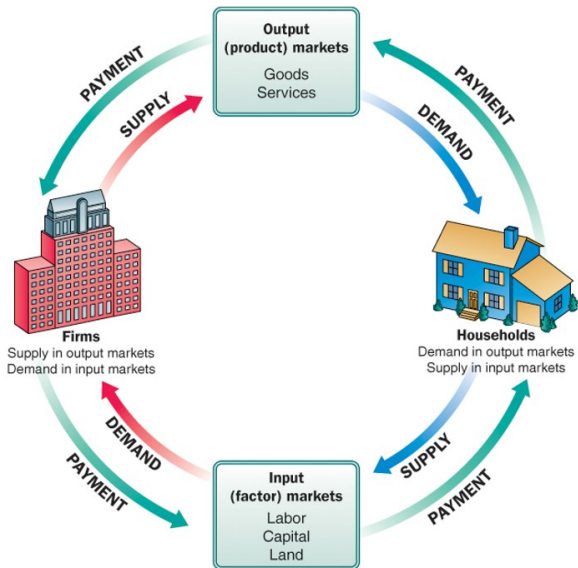
- Homework 2 is due on Monday 12:40 pm
- Late submission is not acceptable.
- MyLab Economics
- Order free test boxes: <https://www.covidtests.gov/>

Lesson 6: Demand

Players

- The basic decision-making units: Firms and Households
 - **Firms:** An organization that comes into being when a person or a group of people decides to produce a good or service to meet a perceived demand.
 - Resources transformation: From input to output
 - Most firms exist to make a profit for their owners but some do not.
 - Goal: **Firms make decision to maximize profits.**
 - **Households:** The consuming units in an economy.
 - It could be a single person living alone, or a married couple with children, or 15 unrelated people sharing a house.

Two Markets



The Input and Output Markets

Previous example: Producing the orange juice.

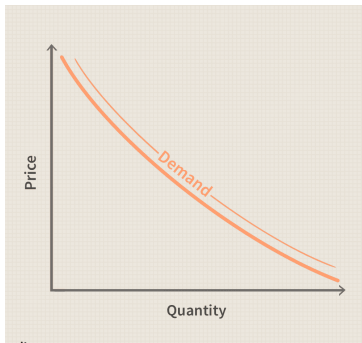
- Market: An institution through which buyers and sellers interact and engage in exchange.
- **Input market:** The market in which the resources used to produce goods and services are exchanged.
 - In Input market, households supply resources: Land, capital, labor.
 - Labor market: The input market in which households supply work to firms that demand labor.
 - Capital market: The input market in which households supply their savings, for interest or for claims to firms that demand funds to buy capital goods.
 - Land market: The input market in which households supply land or other real property in exchange.
- **Output market:** The market in which goods and services are exchanged.

The Input and Output Markets

- The circular flow of economic activities show that:
 - In the Input market, firm demands factors and household supplies factors.
 - In the output market, firm supplies goods or services and household demands goods or services
- Finding: Both firms and households could be producers, or consumers.
- Everyone in this market have demands for something.
- However, this class, we focus on household's demands in output market.

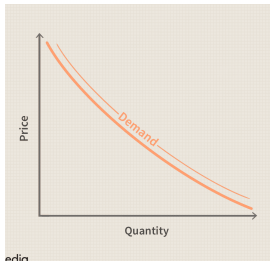
The Law of Demand

- **The law of demand:** The negative relationship between price and quantity demanded, during a given period of time, all other things remain constant.
 - Ceteris paribus (All else equal), as price rises, quantity demanded decreases.
 - Ceteris paribus, as price falls, quantity demanded increases.



The Law of Demand

- **The law of demand:**
 - Ceteris paribus (All else equal), as price rises, **quantity demanded** decreases.
 - Ceteris paribus, as price falls, quantity demanded increases.
- Independent variable (factor): Prices
- Dependent variable (outcome): Quantity demanded
- Notice: The demand curve is different from the curve that we read before.



Quantity Demanded

- **What is “quantity demanded”?**
- **Quantity demanded:** The amount of a product that a household *would buy* in a given period if it could buy all it wanted at the current market price.
 - The quantity demanded is invisible and could not be observed in practice.

The Law of Demand

- **What is the difference between “Demand” and “Quantity Demanded”?**
- **Only price** could change a household’s quantity demanded
- Any other factors except price could change a household’s demand (Income, wealth, expectation, tastes and preferences.....)

Example:

- It is common that demands for umbrellas increase in a rainy day.
- Weather changes our demands for umbrellas, but does not change our quantity demanded.
- If the seller raise the price of umbrellas from \$3 to \$10, then our quantity demanded will also change.
- The key point is to identify which factor causes the change: Price or other factors.

The Law of Demand

- What is “price”?
- Adam Smith: Each goods have two values
 - Use value: The highest amount of willingness to pay for using the goods.
 - Exchange value: The cost of exchanging this goods in a market.
- **Marginal use value:** is the highest amount of willingness to pay for one additional unit of the goods.

Marginal

- I would pay \$1 for 1 pen, and would pay \$2 for 2 pens. My marginal use value for this pen is $\$2 - \$1 = \$1$
- I would pay \$1 for 1 pen, and would pay \$1.5 for 2 pens. My marginal use value for this pen is ?
- If a consumer’s marginal use value is higher than the exchange value, then the consumer would increase quantity demanded.
- If a consumer’s marginal use value is lower than the exchange value, then the consumer would decrease quantity demanded.
- Finding: “Price” is a relative value.

Example

- Alex just graduated from college and work at a bank now. He got a car loan and purchased a used Mini Cooper.



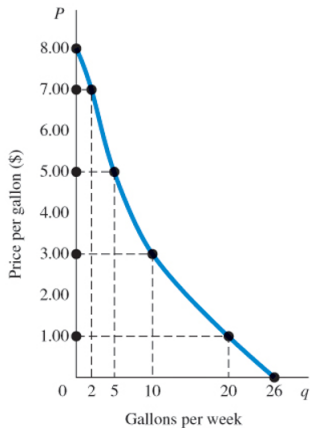
Example

- Alex has to decide how often he will drive to work, and how often he will visit his parents. Which factors do you think will influence his decision on driving himself?
- The price of gasoline, Alex's income, whether he likes to drive, the price of alternative fuels, weather.....
- The price of gasoline is the key factor
- Suppose: At a price of \$3 per gallon, Alex is willing to buy 10 gallons of gasoline per week. Now, because of an international crisis in the Middle east, the price of gasoline rise to \$5 per gallon, how does this influence Alex's demand for gasoline, assuming that all else equal?
- Alex's demand decreases.

Demand Schedule

Alex's Demand Schedule for Gasoline

Price (per Gallon)	Quantity Demanded (Gallons per Week)
\$8.00	0
7.00	2
6.00	3
5.00	5
4.00	7
3.00	10
2.00	14
1.00	20
0.00	26



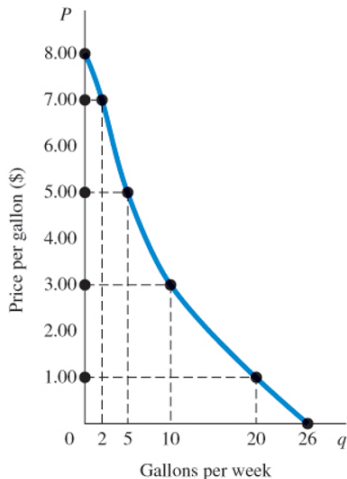
The Demand Curve

- Alfred Marshall proposed it in his textbook *Principles of Economics* (1890)
- Two types of movement for the demand curve:
 - Price of this goods \Rightarrow Movement along a demand curve
 - Any factors except price of this goods \Rightarrow Shift of demand curve

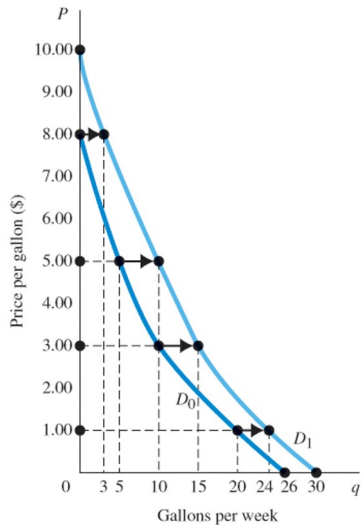
Movement along a demand curve

Alex's Demand Schedule for Gasoline

Price (per Gallon)	Quantity Demanded (Gallons per Week)
\$8.00	0
7.00	2
6.00	3
5.00	5
4.00	7
3.00	10
2.00	14
1.00	20
0.00	26



Shift of demand curve



Any other factors change demand

- There are other determinants of a household's demand:
 - Income (flow), Wealth (stock), Net worth
 - Price of other goods
 - Tastes and preferences (stable)
 - Expectations
 - Other factors

Demand: Income and Wealth

- **Income:** The sum of all a household's wages, salaries, profits, interest payments, rents, and other forms of earnings in a given period of time.
Flow variable
- **Wealth or Net Worth:** The total value of what a household owns minus what it owes.
stock variable
- How does income and wealth influence one's demand for the goods?
- **Normal goods:** Goods for which demand goes up when income is higher and for which demand goes down when income is lower.
- **Inferior goods:** Goods for which demand tends to fall when income rises.

Quiz for fun

1. Use your electronic devices to search this website: www.kahoot.it
2. Pin code
3. Create a nickname for yourself
4. Answer the question

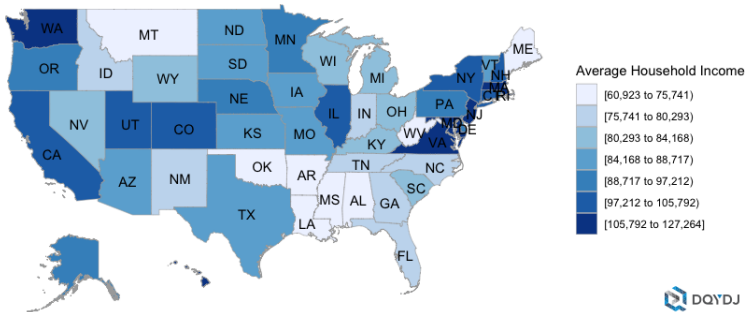
Factors influenced Demand: Income

- **Income:** The sum of all a household's wages, salaries, profits, interest payments, rents, and other forms of earnings in a given period of time.

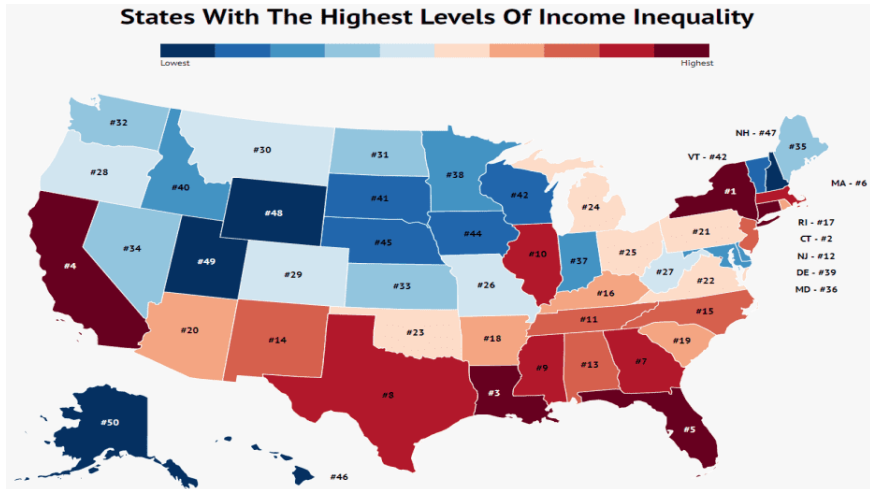
Flow variable

- For example, my income per month is \$1000, and I will receive the same amount of salary each month. It is a flow variable.

2019 Average Household Income by State - IPUMS-CPS University of Minnesota



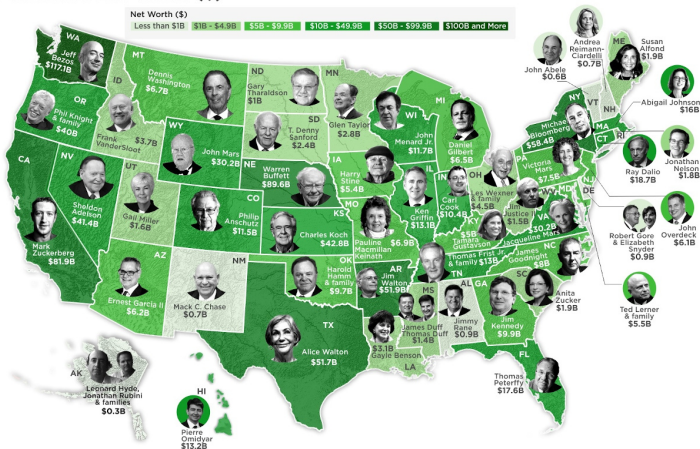
Factors influenced Demand: Income



Factors influenced Demand: Wealth

- **Wealth or Net Worth:** The total value of what a household owns minus what it owes. **stock variable**

Estimated Net Worth (\$)



Demand: Income and Wealth

- How does income and wealth influence one's demand for the goods?
- **Normal goods:** Goods for which demand goes up when income is higher and for which demand goes down when income is lower.
- **Inferior goods:** Goods for which demand tends to fall when income rises.
- Keep in mind: The normal goods and inferior goods could be different cross different persons. Because they are subjective.
- Example: Flight ticket.
 - Suppose that I have a strong demand for visiting my parents who live in China.
 - When **my income** changes from \$1000 to \$5000 per month, then **my demand** for flight ticket increases. Flight ticket is a normal goods.
 - When my income changes from \$1000 to \$1 billion per month, then my demand for flight tickets decreases, because now I could afford a airplane. Flight ticket is an inferior goods.

Demand: Prices of Other Goods and Services

- Households must apportion their incomes over many different goods and services, so **the price of any one good** can and does **affect the demand** for other goods.
- **Substitutes:** Goods that can serve as replacements for one another; when the price of one increases, demand for the other increases.
- **Perfect Substitutes:** Identical products.



- If the price of car increases, then the demand for the bus increases.

Demand: Prices of Other Goods and Services

- **Complements:** Goods that “go together”; a decrease in the price of one results in an increase in demand for the other and vice versa.



- If the price of toothbrush increases, then the demand for the toothpaste decreases.

Demand: Tastes and Preferences

- Tastes and preferences are heterogeneous over individuals.
- Most economists agree with it: If one's preferences change, then the demand changes.
- Question: Does the change in preferences really matter for explaining human being's behavior?
- The next problem: What cause one's change in preferences?
- Example: Five years ago, I did not like listening classical music. Now, I am a fan for the classical music. You could say, my preferences for the classical music change. Or more precisely, if you do a survey, then you may find that I have more new friends who like classical music, so the cultural environment that I lived in changed.
- Tastes and preferences should be constant.

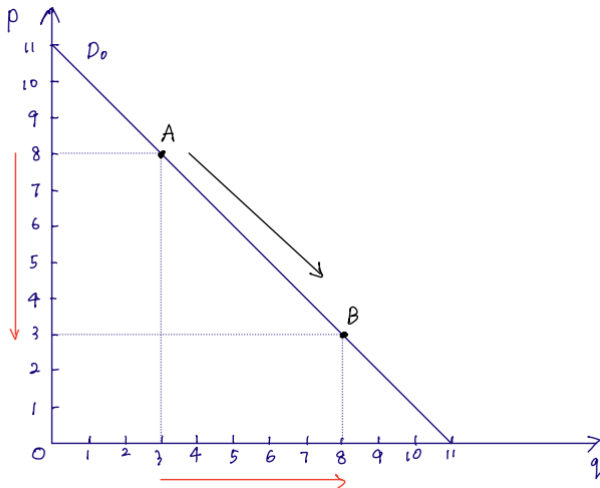
Demand: Expectations

- **Idea:** What you decide to buy today depends on today's price and your expectations about what your position will be in the future, or about the future changes in prices.
- **Example:** If you decide to buy a house, then you might need to think about your current income and future income, and future price for the house.

The Demand Curve

- Alfred Marshall proposed it in his textbook *Principles of Economics* (1890)
- Two types of movement for the demand curve:
 - Price of this goods \Rightarrow Movement along a demand curve
 - If Price changes, the quantity demanded will change.
 - Any factors except price of this goods \Rightarrow Shift of demand curve
 - Creating a new relationship between price and quantity demanded.
 - If the demand increases, all else equal, then the demand curve moves to right, vice versa.

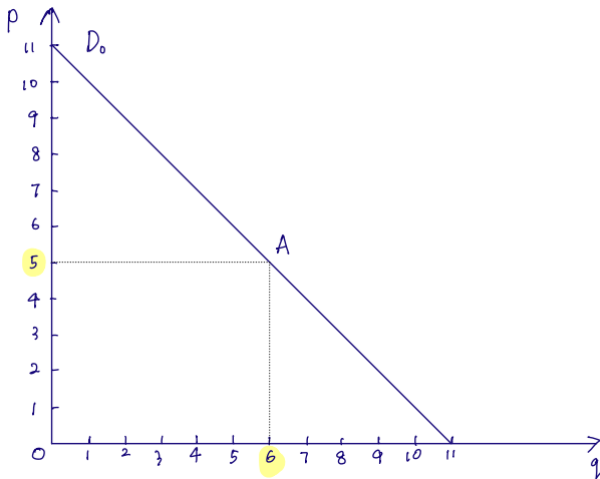
Movement along a demand curve



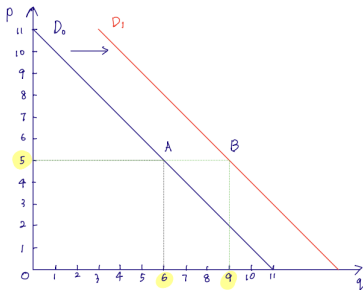
Movement along a demand curve

Shift of demand curve

- Suppose that I have demands for drinking coffee.



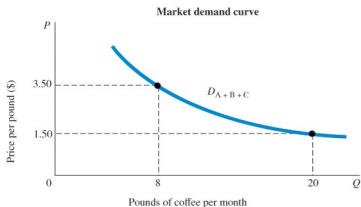
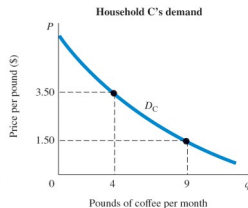
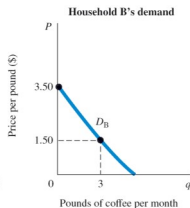
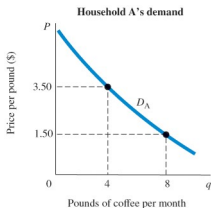
Shift of demand curve: Move to the right



- I prefer to drink coffee with milk, so milk and coffee are ?
- Complements for me.
- If milk's price goes down, then how does it change my demand for coffee?
- Milk's price $\downarrow \Rightarrow$ Milk's demand $\uparrow \Rightarrow$ Coffee's demand \uparrow

Market Demand

- **Market Demand:** The sum of all the quantities of a good or service demanded per period by all the households buying in the market for that good or service.



Price	Quantity (q) Demanded by			Total Quantity Demanded in the Market (Q)
	A	B	C	
\$3.50	4	0	4	= 8
1.50	8	3	9	= 20

How does the law of Demand explain human being's behavior?

- Michael usually drinks one cup of coffee each day, but today you found that he drinks two cups. You try to explain: Why his behavior changes?



How does the law of Demand explain human being's behavior?

- Your observation: Michael usually purchased one cup, but today he also purchased the second cup of coffee. (Buy more)
- You conclude: For Michael, it must be:
- Before, Michael did not purchase the 2nd cup because:

His marginal use value for the 2nd cup < The market price for the 2nd cup

- Today, Michael purchased the 2nd cup because:

His marginal use value for the 2nd cup > The market price for the 2nd cup

- The changes could be caused by:
 - Either the market price for the 2nd cup of coffee decreases \Rightarrow Demand curve moves along
 - Or Michael's marginal use value for the 2nd cup of coffee increases. \Rightarrow Demand curve shifts

How does the law of Demand explain human being's behavior?

- Your observation: Michael usually purchased one cup, but today he also purchased the second cup of coffee. (Buy more)
- You conclude: For Michael, it must be:
- Before, Michael did not purchase the 2nd cup because:

His marginal use value for the 2nd cup $<$ The market price for the 2nd cup

- Today, Michael purchased the 2nd cup because:

His marginal use value for the 2nd cup $>$ The market price for the 2nd cup

- The changes could be caused by:
 - Either the market price for the 2nd cup of coffee decreases \Rightarrow Demand curve moves along
 - Or Michael's marginal use value for the 2nd cup of coffee increases. \Rightarrow Demand curve shifts

How does the law of Demand explain human being's behavior?

- Your observation: Michael usually purchased one cup, but today he also purchased the second cup of coffee. (Buy more)
- You conclude: For Michael, it must be:
- Before, Michael did not purchase the 2nd cup because:

His marginal use value for the 2nd cup $<$ The market price for the 2nd cup

- Today, Michael purchased the 2nd cup because:

His marginal use value for the 2nd cup $>$ The market price for the 2nd cup

- The changes could be caused by:
 - Either the market price for the 2nd cup of coffee decreases \Rightarrow Demand curve moves along
 - Or Michael's marginal use value for the 2nd cup of coffee increases. \Rightarrow Demand curve shifts

Does the law of Demand fail?

- A stranger on the street tries to sell a diamond to me, who said that the diamond's price is \$30,000, and he needs cash, so he would like to sell at \$5,000. I did not buy it.
- A jewelry store sells the diamond at \$30,000. I purchased it.
- Does the law of demand fail?



Lesson 7: Supply

Example

- Why is the average price of a 12-pack of coca cola \$5 in 2019?
- Given the tastes, income, and substitute products in the U.S., there are a lot of people willing to pay at least \$5 for a 12-pack coca cola. How about the supply side? Does the seller willingness to sell at least \$5?

Visit the Coca-Cola Store

Coca-Cola Coke Soda, 12 Ounce (12 Cans)

★★★★★ - 148 ratings

\$19.99

Get Fast, Free Shipping with Amazon Prime

Origin	Made in USA
Flavor	Coke
Brand	Coca-Cola
Item Weight	9.95 Pounds

Package Information: Bottle

About this item

- Made in USA
- Coca-Cola 12 Pack
- 12 oz. cans
- 12 cans per pack

19¢

Get Fast, Free Shipping with Amazon Prime

FREE delivery Monday, January 31 if you spend \$25 on items shipped by Amazon. Order within 6 miles

Select delivery location

Only 2 left in stock - order soon.

Buy 1 W+

Add to Cart

Buy Now

Kroger Search: coca cola

Walmart Departments Services Search: coca cola

Save with W+

Shop Delivery In-day shipping

Popular Departm

Home > Search: coca cola

Filter Products

Ways to Shop

- In-store
- Pickup
- Delivery
- Ship

Departments

Brands

Nutrition

coca cola 171 results

Max Price \$19.99

\$5.00

Coca-Cola® Classic Soda - 12 cans / 12 fl oz
1 more size

Sign In to Add

In-store Pickup Delivery This

\$5.47

Coca-Cola Original Soda Pop, 12 Fl Oz, 12 Pack Cans

★★★★★ 143

Save with W+

Shop Delivery In-day shipping

The Law of Supply

- **The law of supply:** The positive relationship between price and quantity of a good supplied, during a given period of time, all other things remain constant.
 - All else equal, as price rises, quantity supplied increases.
 - Ceteris paribus, as price falls, quantity supplied decreases.
- **Quantity supplied:** *The amount of a product that a firm is willing and able to offer for sale at a particular price during a given time period.*

The Law of Supply

- Firm's willingness to offer depends on whether the firm believes it will be profitable.
- **Profit** = Total Revenue - Total Cost

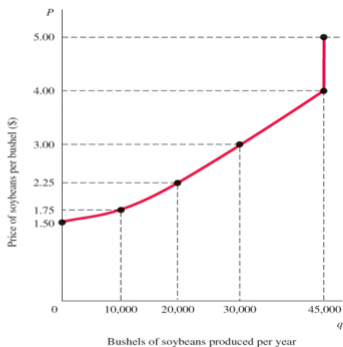
$$\pi = P * Q - C(Q) = P * Q - w * L - r * K$$

- where

$$Q = f(A, K, L)$$

The Law of Supply

Price (per Bushel)	Quantity Supplied (Bushels per Year)
\$1.50	0
1.75	10,000
2.25	20,000
3.00	30,000
4.00	45,000
5.00	45,000



Any other factors change supply

The law of supply: **The positive relationship between price and quantity supplied**, when all else equal.

1. The cost of producing the products
 - The price of required inputs
 - **Wage:** The price of hiring one labor force
 - **Interest rate:** The price of investing one unit of capital (Intangible capital: Stocks, bonds; tangible capital: Lands)
 - The technologies that can be used to produce the product
2. The prices of related products

1. The cost of producing the products

- How does the changes in cost influence the supply?
- Input prices for the goods $\uparrow \Rightarrow$ Costs of production $\uparrow \Rightarrow$ If the unit price for this goods does not change, then the supply for this goods \downarrow
- Example:
 - If the gasoline's price rises from \$20 to \$100 per gallon, and the payment to Uber drivers does not change. How does it influence Uber driver's supply for services?



1. The cost of producing the products

Example 2:

- Imagine you were an owner of a noodle restaurant.
- You set the unit price of noodle is \$10.
- In order to produce 1 unit a noodle, you need to hire at least 2 workers. To save money, you just hire 2 workers—Tom and Jerry.
- Now, if your state government raises the minimum wage from \$10 to \$100 per hour for every workers in the state.
- Assume: After this policy, you still hire Tom and Jerry, and your unit price for the noodle does not change. Anything else are equal except the wage.
- How does this policy influence your supply for the noodle?



2. The Price of related products

- The price of related products increases, then the supply of current product might decrease.
- Example: If a land can be used for either corn or soybean production, if soybean's price $\uparrow \Rightarrow$ Farmers might shift from corn production to soybeans production.

2. The Price of related products

- The price of related products increases, then the supply of current product might decrease.
- Example: If a land can be used for either corn or soybean production, if soybean's price $\uparrow \Rightarrow$ Farmers might shift from corn production to soybeans production.

The supply curve

- The supply curve reflects the positive relationship between price and quantity supplied when all else equal given a period.
- The supply curve: A relative supply between producer's marginal use value and product market price.
- The supply curve is like a mirror of the demand curve

The Supply Curve

Two types of movement for the supply curve:

- Price of this goods \Rightarrow Movement along a supply curve
 - If Price changes, the quantity supplied will change.
- Any factors except price of this goods \Rightarrow Shift of supply curve
 - Creating a new relationship between price and quantity supplied.
 - If the supply increases, all else equal, then the supply curve moves to right, vice versa.
 - If the **costs** increases, all else equal, the supply should decrease and the supply curve moves to left.

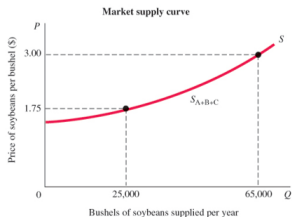
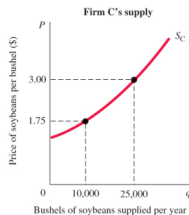
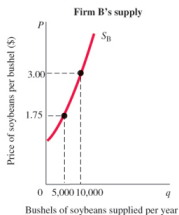
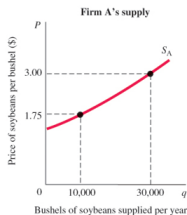
The Supply Curve

Two types of movement for the supply curve:

- Price of this goods \Rightarrow Movement along a supply curve
 - If Price changes, the quantity supplied will change.
- Any factors except price of this goods \Rightarrow Shift of supply curve
 - Creating a new relationship between price and quantity supplied.
 - If the supply increases, all else equal, then the supply curve moves to right, vice versa.
 - If the **costs** increases, all else equal, the supply should decrease and the supply curve moves to left.

Market Supply

- Market supply:** The sum of all that is supplied each period by all producers of a single product.



Price	Quantity (q) Supplied by			Total Quantity Supplied in the Market (Q)
	A	B	C	
\$3.00	30,000	+ 10,000	+ 25,000	= 65,000
1.75	10,000	+ 5,000	+ 10,000	= 25,000

Lesson 8: Market Equilibrium

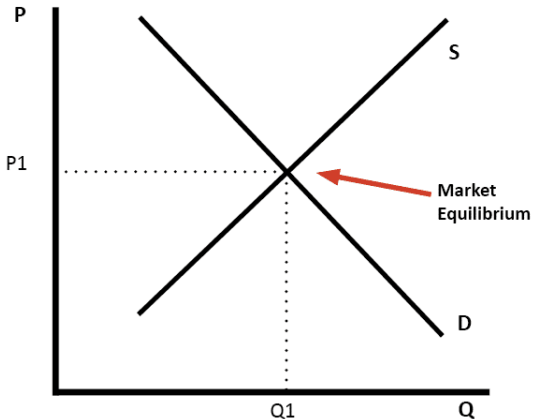
How does the trade happen?

- Trades for a goods happen because *everyone has different marginal use value for this goods.*
- This afternoon, after drinking 3 cups of coffee, Bob's marginal use value for the fourth cup of coffee is \$1.
- In the same afternoon, Alice's marginal use value for having one cup of coffee is \$5, but she does not have coffee.



Market Equilibrium

- **Equilibrium:** The condition that exists when **quantity supplied and quantity demanded are equal**.
- At equilibrium, there is *no tendency for price to change*.



Excess Demand: shortage

- **Excess demand or shortage:** The condition that exists when quantity demanded exceeds quantity supplied at the current price.
- When excess demand exists, there is a tendency for price to rise.
- When quantity demanded equals quantity supplied, excess demand is eliminated and the market is in equilibrium.

Excess Supply: Surplus

- **Excess supply or surplus:** The condition that exists when quantity supplied exceeds quantity demanded at the current price.
- When quantity supplied exceeds quantity demanded at the current price, the price tends to fall.
- When price falls, quantity supplied is likely to decrease, and quantity demanded is likely to increase until an equilibrium price is reached.

Market Equilibrium with equations

- Market demand function:

$$P = a - bQ_d$$

- where a and b are parameters, which are real numbers.
- Market supply function:

$$P = c + dQ_s$$

- where c and d are also parameters.
- Try to obtain equilibrium quantity and equilibrium price:

$$Q_d = \frac{(a - P)}{b}$$

$$Q_s = \frac{(P - c)}{d}$$

Market Equilibrium with equations

- By the definition of equilibrium:

$$Q_s = Q_d$$
$$\frac{(a - P)}{b} = \frac{(P - c)}{d}$$
$$P^* = \frac{da + cb}{b + d}$$

- After knowing P^* , we could also obtain Q_d^* and Q_s^* which are equal.

Example

- Suppose that the market demand is $Q_d = 100 - 20P$
- Market supply is $Q_s = 10 + 40P$
- What is the equilibrium price? In equilibrium, how many goods would be sold?
- 1st Step: Using the definition of “equilibrium”

$$Q_d = Q_s$$

- 2nd Step: Replace Q with its functional form

$$100 - 20P = 10 + 40P$$

- 3rd Step: Solve P

$$100 - 10 = 20P + 40P$$

$$90 = 60P$$

$$p^* = 1.5$$

- Last step: Solve Q

$$Q_s = 10 + 40 \times 1.5 = 70 = Q_d$$