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2022
EDITION



ECONOMICS

CRAM KIT

ECONOMICS



ALPACA-IN-CHIEF

Daniel Berdichevsky

DEMIDEC®



the World
Scholar's Cup®

ECONOMICS

CRAM KIT[®]

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BY
DEMIDEC STAFF

FOR JAC

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WHAT IS A CRAM KIT?

A Word from the Editor

WELCOME TO THE CRAM KIT

Dear Decathlete,

The handful of days before competition can be the most overwhelming. You don't have enough time to review everything, so you need to study strategically. Cram Kits are designed to help you achieve that goal—to offer you a quick snapshot of both the most testable and most easily forgotten facts in each event.

Not every fact in the guide is included in this cram kit - for that, you'll have to turn to the power guide for this subject. However, for the time-pressed (or time-efficient!) decathlete, this (relatively) short guide will get you through testing day.

THE CRAM KIT'S STRUCTURE

The main body of the Cram Kit is filled with charts and diagrams for efficient studying. You'll also find helpful quizzes to reinforce the information as you review.

The concluding Crunch Kit condenses the entire subject into a few final pages of must-know facts—followed by a series of glossary-like lists to help you organize key information. As the name suggests, it should prove especially useful at crunch time - the last frantic hour before you enter the testing room.

The Power Guide includes more extensive lists, written with an eye toward comprehensiveness rather than crunch-time effectiveness.

CRAMMING FOR SUCCESS

EXPLAINING THE OVERVIEW

SUMMARY

This year's economics curriculum is split into four sections, as usual:

- Section I covers the very basics of economics. 5 test questions should come from this section.
- Section II covers microeconomics topics. 20 test questions should come from this section.
- Section III covers macroeconomics topics. 15 test questions should come from this section.
- Section IV covers economics of water. 10 test questions should come from this section.

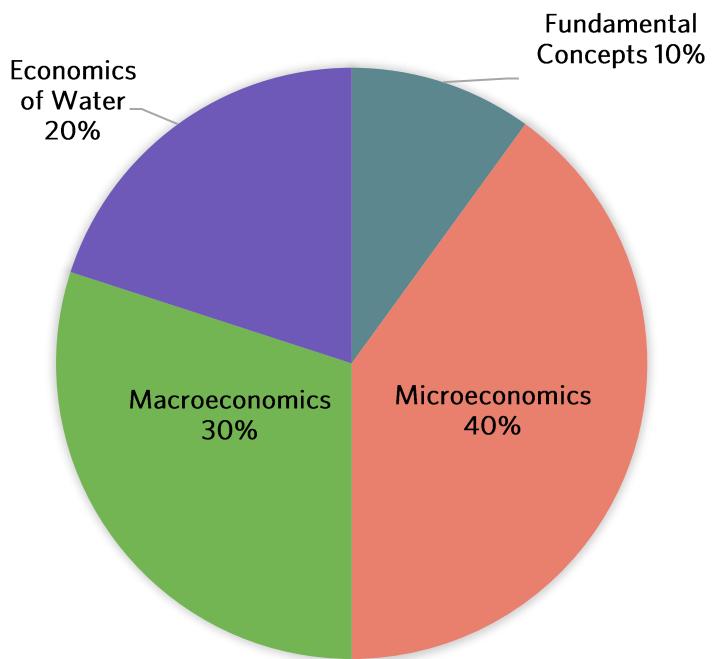
Techniques for studying/cramming economics vary depending on your level of experience with economics.:

If you are extremely comfortable with standard economics concepts at about an AP level: skim Sections I, II, and III of the USAD guide and the cram kit for USAD-specific facts (e.g. rent-seeking). Focus most of your energy on Section IV.

If you are new to economics and have at least two weeks, try to develop a conceptual understanding. Review sections I to III and apply your understanding with quizzes or case studies.

If you have less than two weeks, read Section I, cram as much as you can of Section II and III, and memorize people, key events, and important terms from Section IV.

PIECES OF THE ECONOMICS PIE



TIME IS TICKING!

If you have...

- A week left: read the USAD guide, draw all the graphs and read this cram kit
- A day left: review your weakest sections in the USAD guide and read this cram kit
- An hour left: skim this cram kit, carefully comb the crunch kit (ignore what you already know)



FUNDAMENTAL ECONOMIC CONCEPTS

Economic Thinking

ADMISSION TO THE CLUB

SO YOU WANT TO BE AN ECONOMIST?

Repeat after us:

There are no free lunches.

Then remember:

1. Resources are limited.
2. People have unlimited wants.
3. Hence, scarcity: not all wants can be fulfilled.
4. To get anything, we must give something else up.
5. The choice to give something up is a trade-off.

THE COST OF MAKING A CHOICE

We have to pay for our choices. We give up a choice we don't make for every choice we do make – a trade-off.

TYPES OF COSTS		
Type	Definition	Example
Opportunity cost	Value of the next-best choice	Value of sleep you lose when you cram
Implicit cost		
Accounting cost	What you tangibly pay to get something	Monetary cost of this Cram Kit
Explicit cost		
Economic cost	Opportunity + accounting cost	Sum of the above

RATIONALITY CHECKLIST

Economists assume humans behave rationally, i.e. they:

- A. Perform cost-benefit analysis
- B. Maximize utility, or happiness
- C. Think on the margin: what happens if I add one more?
- D. Account for all economic costs
- E. Engage in voluntary exchange *if it benefits them.*

Marginal analysis involves comparing the costs and benefits of doing *just a little more* of something.

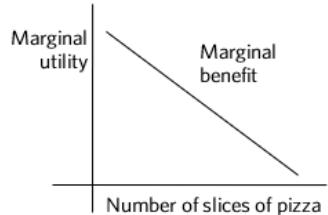
The marginal benefit of reading *one more page* of this Cram Kit might, for example, be one more question answered correctly at competition.

RATIONALITY AND SPECIALIZATION

HOW TO BE RATIONAL

An economic agent maximizes utility when marginal utility equals marginal cost.

Economists assume that marginal benefit decreases as quantity increases.
Eating your 42nd slice of pizza will not make you as happy as the first one did.



THE INVISIBLE HAND

In 1776, Adam Smith published *An Inquiry into the Nature and Causes of the Wealth of Nations*, establishing the field of economics and the idea of the "invisible hand" (the market regulates itself).

ABSOLUTE VS. COMPARATIVE ADVANTAGE

We engage in exchange because we get more by trading. Producing everything ourselves is less efficient.

An agent can be terrible at producing every good and have no absolute advantages versus a second agent, but he *must* have a comparative advantage in at least one good.

Absolute advantage

An agent has an absolute advantage for producing a good when he can produce that good more efficiently than other agents.

Comparative advantage

An agent has a comparative advantage for producing a good when he can produce that good at a *lower opportunity cost* than other agents.

QUICK QUIZ

QUESTIONS

1. The full cost of a decision is its _____.
2. Joe is in a hot dog competition. His 100th hot dog gives him far less utility than his 1st due to _____.
3. There are no free lunches in our world because of _____ and _____.

ANSWERS

1. economic cost; 2. diminishing returns; 3. limited resources, unlimited wants



MICROECONOMICS

Specialization, Trade, and Markets

WHY TRADE?

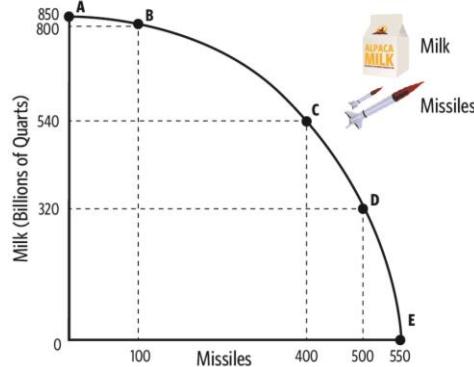
COMPARATIVE ADVANTAGE

Here's an out of this world example of comparative advantage. Say Laika can produce 80 dog treats or 20 spacesuits in one month. Buzz can produce 30 dog treats or 10 spacesuits in one month.

1. Laika has an absolute advantage in both goods
- Buzz has no absolute advantage
- Laika can produce more of either good than Buzz can
2. Laika gives up four dog treats for each spacesuit produced, while Buzz only gives up three
- Laika gives up 1/4 of a spacesuit per dog treat and Buzz 1/3 of a spacesuit
- Buzz gives up 3 dog treats per spacesuit and Laika 4 dog treats
3. Trade can benefit both
- Laika has a comparative advantage in producing dog treats and should specialize in producing dog treats
- Buzz has a comparative advantage in producing spacesuits and should specialize in producing spacesuits

PPFS

A production possibilities frontier (PPF) represents all combinations of output that are feasible.



- Producing more of one good requires a tradeoff: less production of the other good
- Any combination inside or on the curve is possible
- Only points **on** the curve are efficient
- Points outside the curve are impossible to produce but may be obtained through the benefits of trade
- The curve bows out to diminishing returns to scale
- Producing more milk increases the opportunity cost in terms of missiles
- Different slopes (different opportunity costs) imply comparative advantages
- A curve that is farther out indicates higher production and an absolute advantage

MARKETS

WE ALL COME TOGETHER

Markets occur when producers and consumers exchange a certain good or service voluntarily.

- Markets do not have to be explicitly created by a central body (like a government)
- Markets are not always highly organized
- As long as the transactions are voluntary, everyone involved will be better off

THE PRICE IS RIGHT

Trade occurs when buyers and sellers agree on a price.

- A market price conveys the value of a good to producers and consumers
- In perfect competition, the price represents the opportunity cost of a good's production
- Price also signals the value of the good to all producers and consumers

MODELING MARKETS

Adding up prices allows us to compare different goods. This process is called aggregation and allows firms and consumers to make good market decisions.

Models provide an aggregated view of markets. That of perfect competition model relies on several key assumptions. In reality, none of these assumptions hold, but we can understand imperfect competition by comparing it to the idealized model.

TRADE YOUR Q FOR AN A?

QUESTIONS

1. If an agent can produce more of a good than another agent with the same inputs, he has a(n) _____.
2. Comparative advantages arise from lower _____ of production.
3. On the curve above left, a producer who has an output of 800 quarts should produce _____ missiles.
4. Markets require _____ transactions but not necessarily _____ ones.

ANSWERS

1. absolute advantage; 2. opportunity costs; 3. 100; 4. voluntary; organized



MICROECONOMICS

Demand and Supply (1/2)

DEMAND AND SUPPLY

THE LAW OF DEMAND

The quantity demanded of a good increases when market price decreases and decreases when price increases. Price and quantity demanded are **negatively correlated**.

TERM	DEFINITION/ EXAMPLE										
Quantity demanded	The amount of a good consumers will demand at a given price A specific value, NOT the general relationship given by demand										
Demand	Overall relationship of price to quantity demanded										
Demand schedule: table of price v. quantity	<table border="1"> <thead> <tr> <th>Price</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>\$10</td> <td>15</td> </tr> <tr> <td>\$15</td> <td>10</td> </tr> <tr> <td>\$20</td> <td>5</td> </tr> <tr> <td>\$25</td> <td>0</td> </tr> </tbody> </table>	Price	Quantity	\$10	15	\$15	10	\$20	5	\$25	0
Price	Quantity										
\$10	15										
\$15	10										
\$20	5										
\$25	0										
Demand curve: curve mapping an interval of price against quantity	Price on y-axis, quantity on x-axis 										

THE LAW OF SUPPLY

The quantity of a good supplied increases when price increases and decreases when price decreases.

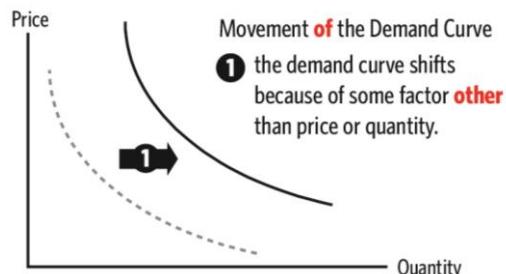
TERM	DEFINITION
Quantity supplied	How much of a good firms supply at a given price NOT the same as supply
Supply	The overall relationship given by the law of supply
Supply schedule	Table mapping values of prices to quantities supplied
Supply curve	Curve that represents prices against quantities supplied

CHANGES IN THE CURVE

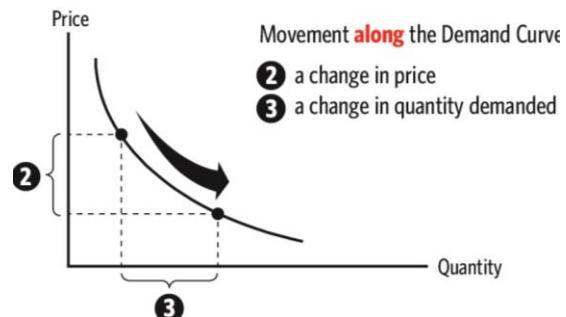
SHIFTS VS. MOVEMENTS

The distinction between 'movement of the curve' and 'movement along the curve' is very important.

1. The phrase 'demand increased' means the curve **shifted** due to non-price, non-quantity reasons. Quantity demanded has changed at **every** price.

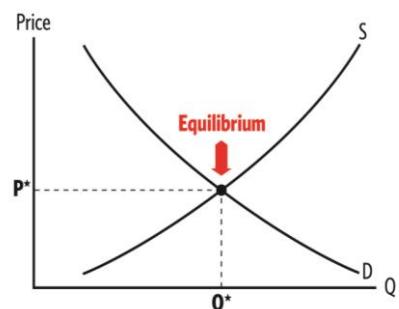


2. Price or quantity changes result in movement **along** the curve. The market moves from price-quantity combination to another.



THE INVISIBLE HAND

For demand, quantity and price are negatively correlated. For supply, the variables are positively correlated. Supply and demand thus meet at exactly one point that is the market equilibrium: P^* and Q^* .



I DEMAND A QUIZ

QUESTIONS

1. For demand, if price increases, _____.
2. A change in Q_D for every price implies a _____.

ANSWERS

1. Q_D decreases; 2. shift of the demand curve



MICROECONOMICS

Demand and Supply (2/2)

DEMAND AND SUPPLY

SURPLUS

SHIFTS IN THE CURVE

Demand curves can shift due to factors external to the market, or exogenous factors.

INCOME	
Normal goods	Inferior goods
Computers, yachts, calculators	Dollar store goods, used textbooks
Increased income → higher demand	Increased income → lower demand
PRICES OF RELATED GOODS	
Substitutes	Complements
Goods that can replace one another—7-Up and Sprite	Goods that combine for consumption—peanut butter and jelly
Increased price of one → higher demand for substitute	Increased price of one → lower demand for complement
CONSUMER-SIDE FACTORS	
More consumers	Expectation of pay cut
Good is in fashion	
Higher demand	Lower demand

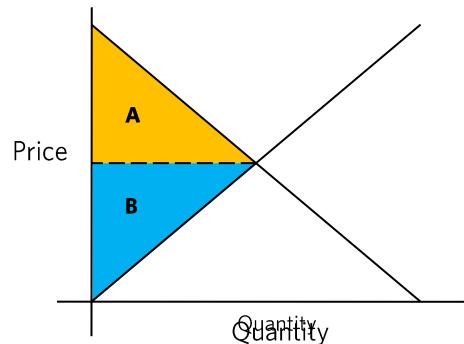
FACTORS AFFECTING SUPPLY

Supply depends on a different set of factors.

Factor	Impact	Supply
Increased costs of production factors	Higher costs	Lower supply
Technological advances	Lower costs	
Expectations of lower future prices	Higher current prices	Higher supply
Increased number of firms	-	

SURPLUS

Some consumers would have been willing to pay more than they did. Some suppliers would have sold for less. Their "savings" or "extra" profit is known as surplus.



- Triangle A: **consumer surplus**, the difference between how much consumers will pay and market price
- Triangle B is **producer surplus**: the difference between the price at which firms will sell their product and the market price

Market equilibrium maximizes **market surplus**, or the sum of producer and consumer surplus.

EFFECTS OF SHIFTS

ALL TOGETHER NOW

Many market changes will affect both supply and demand. An ↑ means an increase, ↓ means a decrease.

Shift Result Result: Surplus

Supply	Demand	P	Q	Seller	Buyer	Total
↑	N/A	↓	↑	?	↑	↑
↓	N/A	↑	↓	?	↓	↓
N/A	↑	↑	↑	↑	?	↑
N/A	↓	↓	↓	↓	?	↓
↑	↑	?	↑	↑	↑	↑
↓	↓	?	↓	↓	↓	↓
↑	↓	↓	?	?	?	?
↓	↑	↑	?	?	?	?



MICROECONOMICS

Elasticity and Price Controls

ELASTICITY BASICS

PRICE ELASTICITY...

Price elasticity refers to how much the quantity demanded or supplied changes in response to changes in the good's price. Here, elasticity is with respect to price.

$$E = \left| \frac{\% \text{ change in } q}{\% \text{ change in } p} \right| \approx \left| \frac{(q_F - q_I) \div q_I}{(p_F - p_I) \div p_I} \right|$$

- E = price elasticity of demand/ supply
- p = price; p_F = final price; p_I = initial price
- q = quantity; q_F = final quantity; q_I = initial quantity

DEFINITIONS

- E = 0: *Perfectly inelastic*, vertical line; change in variable B does not affect variable A at all
- $0 < E < 1$: *Inelastic*; steep line; change in variable B causes a smaller change in variable A
- E = 1: *Unit elastic*; convex curve; change in variable B causes an equal change in variable A
- $E > 1$: *Elastic*; shallow line, change in variable B causes a larger change in variable A
- E = ∞ : *Perfectly elastic*; horizontal line; changing variable B infinitely affects variable A

FACTORS THAT AFFECT PRICE ELASTICITY

<u>DEMAND</u>	
Degree of substitution	Goods with close substitutes have high elasticity of demand
Necessity	Necessities are inelastic; luxuries elastic
Time frame	In the short run, goods are inelastic
Scope of market	A larger market is more inelastic since fewer substitutes are available

<u>SUPPLY</u>	
Inputs	Scarcer inputs > more inelastic supply
Time frame	In the short run, supply is inelastic: firms cannot reallocate resources
Barriers to entry	Lower barriers to entry > more elastic supply

REVENUE AND ELASTICITY

REVENUE AND ELASTICITY

Revenue is what the firm earns from selling its goods. It equals price of good x quantity

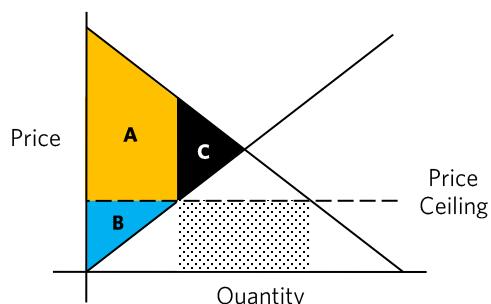
Price elastic good	Price inelastic good	Unit elastic good
▪ Increase in price → decrease in revenue	▪ Increase in price → increase in revenue	▪ Increase in price → no change in revenue

PRICE CONTROLS

PRICE CEILINGS AND FLOORS

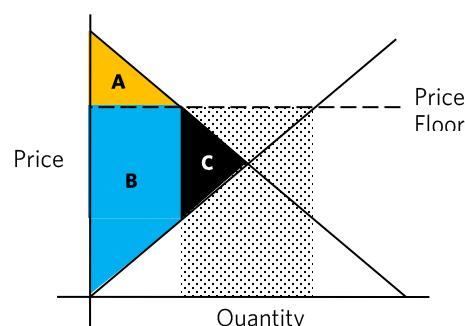
A price ceiling below equilibrium or a price floor above equilibrium is inefficient and leads to deadweight loss.

Price ceilings set a maximum legal price on a good. If this price is below the equilibrium, the ceiling is binding.



- Trapezoid A is the new **consumer surplus**
- Triangle B is the new **producer surplus**
- Triangle C is the **deadweight loss**
- The width of the shaded rectangle is the **shortage**
- Note that A + B + C = equilibrium market surplus

Price floors set a minimum price. Here the width of the shaded rectangle represents **surplus** goods:





MICROECONOMICS

Taxation and Trade

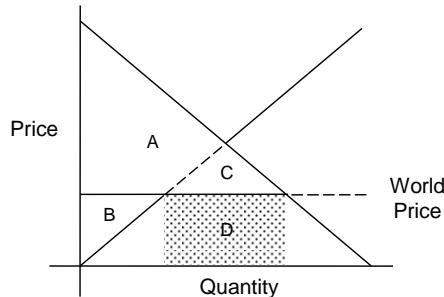
TRADE

OVERPOWERED BY THE WORLD

We assume the domestic economy is small relative to the world economy and cannot influence the world price. Since world price is fixed in the domestic market, it acts like a price control. The world market either buys the surplus or supplies the shortage.

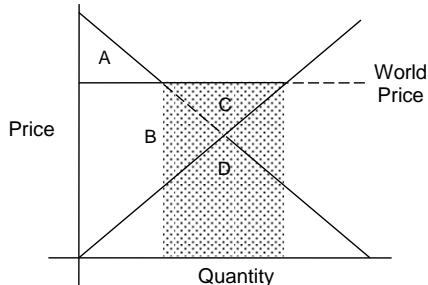
AN IMPORTING ECONOMY

- A: consumer surplus
- B: producer surplus
- C: gains from trade
- D: value of goods imported



AN EXPORTING ECONOMY

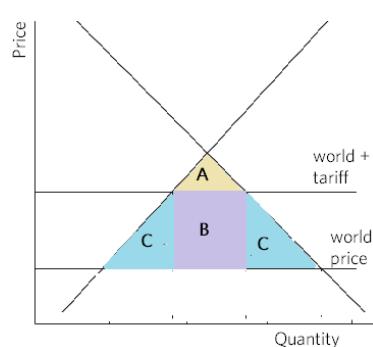
- A: consumer surplus
- B: producer surplus
- C: gains from trade
- D: value of goods exported



TARIFFS, IMPORT DUTIES, AND OTHER NASTIES

A tariff is a tax on imports. It increases producer surplus at the expense of consumer surplus and efficiency.

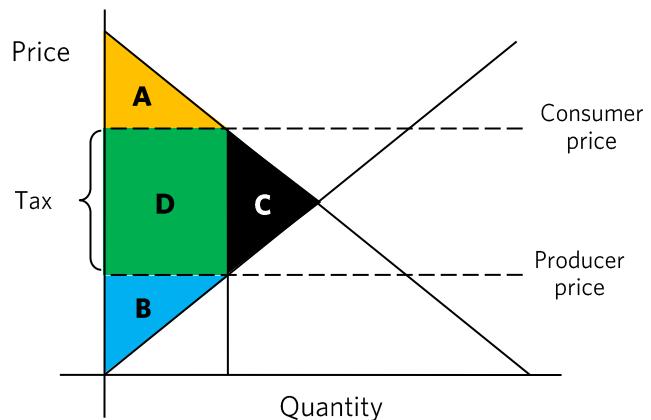
- A: gains from trade with import tax
- B: tax revenue
- C: deadweight losses
- Without a tax, gains from trade would be A + B + C



TAXATION

ONLY ON THE MARGIN

Marginal taxes (taxes per unit) make consumers pay more than what producers receive. The government receives the difference (the size of the tax). Taxes distort how prices signal value, creating inefficiency.



A, B	consumer and producer surplus
C	deadweight loss caused by taxation
D	tax revenue (market quantity * revenue)

Note that marginal taxation is equivalent to holding quantity at a fixed value (like a quantity ceiling).

ELASTICITY AND TAXATION

- Flatter curves increase C and reduce D
- Markets with elastic demand and supply curves suffer most from taxation and provide least revenue

Supply more inelastic than demand

Demand more inelastic than supply

Demand adjusts more easily

Supply adjusts more easily

Firms bear more of tax

Consumers bear more of tax

MINI QUIZ

Name four factors that affect price elasticity of demand.

ANSWER

Degree of substitution; necessity; time frame; scope of market



MICROECONOMICS

Firms and Markets

FIRM DECISION-MAKING

THE P & L SHEET

Willingness to supply depends on total cost, including:

- **Fixed costs:** Independent of output
- **Variable costs:** Dependent on quantity produced

All inputs have a price (e.g. labor's price is wages). When an input's price increases, a firm substitutes away from it.

PROFIT MAXIMIZATION

All firms are assumed to seek to maximize profits. They thus produce up to where $MC = MR$.

- Marginal cost (MC): cost of producing one last unit
- Marginal revenue (MR): revenue from selling one last unit

Marginal costs first decrease and then increase as the result of diminishing returns to scale. Variable costs increase after a certain point as adding inputs yields less and less. Firms can earn three types of profit:

Accounting profit

Total revenue minus accounting costs; producers attempt to maximize this

Economic profit

Total revenue minus full economic costs (including opportunity costs)

Normal profit

Zero economic profit, which firms make in the long run in a competitive market

THE FIRM'S MARKET

This analysis of the firm relies on the assumption of perfect competition, an ideal model involving:

- Rational behavior: firms and buyers maximize utility
- Perfect information: everyone knows the price
- Zero transaction costs and entry/exist
- Identical product for all producers
- Buyers and sellers as price takers

Markets with imperfect competition are inefficient and create deadweight loss. Firms have market power, the ability to influence price. They face a downward sloping demand curve

IMPERFECT COMPETITION

MONOPOLIES

Only one firm supplies and thus faces the entire demand curve. It has full power to set prices. Barriers to entry lead to monopolies :

- ✓ Ownership of a key resource (railroads)
- ✓ Government-created barriers (patent)
- ✓ Natural monopolies (electricity)

Monopolies lead to social inefficiency:

- ✓ Monopolies create artificial scarcity
- ✓ Some consumer surplus becomes producer surplus, but some vanishes as deadweight loss
- ✓ Monopolists lack incentive to raise standards

The United States government can use regulation or public ownership to break up monopolies. The Sherman Anti-Trust Act provides for these actions.

OLIGOPOLIES

Oligopolies have only a few firms. Firms face non-price competition. **Collusion** occurs when firms cooperate to raise market prices artificially. A group of firms that colludes is a **cartel**, illegal under anti-trust law. The incentive to cheat in a cartel is strong, so cartels tend to break down even without government intervention.

Examples: Market for mobile phone service, OPEC

MONOPOLISTIC COMPETITION

This type of market has lower barriers to entry. Many firms exist and compete by differentiating their products. They engage in non-price competition (e.g. advertising) The **diversification** of products gives consumers more choices. However, since market price exceeds marginal cost, the markets will experience social inefficiency.

Examples: Blue jeans, restaurants, toothbrushes

NOT ONE PRICE FOR ALL

PRICE DISCRIMINATION

Price discrimination involves selling the same product to different consumers at different prices—such as airline seats or movie tickets.

This practice increases producer surplus at the expense of consumer surplus. Monopolies price discriminate to capture new consumers without losing current ones.



MICROECONOMICS

Market Failure and Institutions

MARKET FAILURES & PROPERTY RIGHTS

BREAKDOWNS

Market failures occur when competitive markets fail to produce socially desirable outcomes. The two main forms are linked to externalities and public goods.

Externalities are costs or benefits associated with a decision not factored into the decision-making process. They do not affect the decision maker directly.



Negative externalities

Harm others
Costs of an action that are not passed along to the actor
The actor will perform more of the action than is optimal



Positive externalities

Benefit others
Benefits of an action not felt by the actor
The actor will perform less of the action than is optimal

SOLUTIONS

One way to address externalities is to internalize them, by incorporating the cost of the externality into the market.

For instance, if companies are taxed for each pound of pollution they emit—and the tax is set to equal the cost of that pollution to society—companies will make choices based on true social cost.

The Coase theorem states that as long as the parties involved in a dispute can negotiate and property rights are clearly defined, the private market can settle any disputes.

MINE, NOT YOURS

Property rights dictate who can and cannot use a good.

- The **rivalry** of a good is how much one person's use of a good prevents another person from using it.
- The **excludability** of a good is the ease of preventing someone from using it.

	EXCLUDABLE	NON-EXCLUDABLE
RIVAL	Private Goods (food, clothes, cars)	Collective goods (sidewalks, fishing ponds)
NON-RIVAL	Common goods (electricity, cable television)	Public Goods (national defense, air)

ENTREPRENEURS & CREATIVE DESTRUCTION

INNOVATION

Entrepreneurs can earn economic profits by taking risks as the first to sell a good or improve a service. It destroys market imperfections and therefore raises welfare.

Economist Joseph Schumpeter described the impact of entrepreneurs as creative destruction— replacing the old and inefficient with the new and improved.

Governments can incentivize this innovation:

- Copyright:** protection for creators of artistic media
- Patent:** rights awarded to inventors so that no one else can copy their inventions for a period of time

INSTITUTIONS

INSTITUTIONS AND ORGANIZATIONS

Economic actors tend to organize into groups.

INSTITUTIONS	ORGANIZATIONS
Formal or informal rules that structure interaction EX: Social norms, most markets, laws	More formal than institutions EX: Stock exchanges, corporations

The government alone can tax citizens and legitimately exercise force. Courts rely on the threat of force to enforce contracts. Without the rule of law, market economies break down.

DEMOCRATIC INEFFICIENCIES

- Pork barrel politics:** The tendency of elected officials to steer money to their home communities
- Logrolling:** Vote trading among elected officials, usually to get support for pet projects
- Rent seeking:** Socially unproductive activities that redirect, not create, economic benefits (lobbying)

MATCH THIS:

- | | |
|------------------------------|---------------|
| 1. Non-excludable, rival | A. Private |
| 2. Excludable, rival | B. Public |
| 3. Non-excludable, non-rival | C. Common |
| 4. Excludable, non-rival | D. Collective |

ANSWERS

1. D; 2. A; 3. B; 4. C



MACROECONOMICS

Basics and Unemployment

MACROECONOMICS

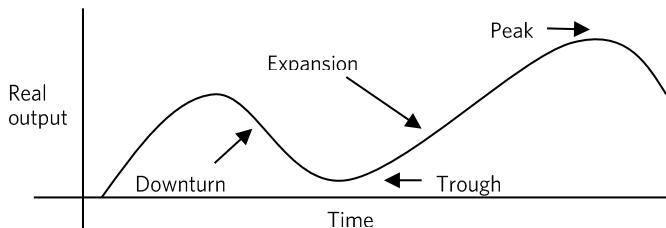
WHAT IS MACROECONOMICS?

Macroeconomics is concerned with two main issues:

1. Factors affecting the long run (e.g. standard of living)
2. The causes and consequences of short-run economic fluctuations (especially unemployment and inflation)

THE BUSINESS CYCLE

Real output fluctuates cyclically, alternating periods of growth and decline. Note it trends upwards over time.



TERM	DEFINITION
Long-run	period of market equilibrium
Short-run	period in effects such as price stickiness can prevent equilibrium
Expansion	Increase in real GDP to a peak
Downturn	Decrease in real GDP to a trough
Recession	Downturn of at least two quarters
Depression	Steep and prolonged recession

THE LABOR FORCE

The labor force includes everyone who has a job (employed) or actively sought one in the last four weeks (unemployed). It does NOT include:

- Those younger than 16 or retired
- People in jail, in the military, or at home
- Discouraged workers

Average labor productivity = $\frac{\text{GDP}}{\text{number of workers}}$. It measures how much the typical worker can produce.

Labor productivity depends on several factors: physical capital (e.g. machinery); human capital (skills, experience); natural resources; technology; politics

UNEMPLOYMENT

NOT FIRED, LAID OFF

Unemployment is – for USAD – classed into three forms.

Structural

- Mismatch of skills demanded and skills supplied
- Spurred by changes in technology, consumer taste
- Would be zero if retraining was instant and free
- Factors into the natural rate of unemployment

Cyclical

- Unemployment resulting from the business cycle
- Increases in recessions; decreases in expansions
- Does not factor into natural rate of unemployment

Frictional

- Caused by time-lag between jobs
- Inevitable; part of natural rate of unemployment

GDP

GROSS DOMESTIC PRODUCT (GDP)

GDP is the market value of all final goods and services produced within a country in a given period of time.

"the market value"

- Total value of different goods (add up dollar values)

"of all final goods and services"

- Only final goods are counted
- Capital goods counted the year they are produced

"produced within a country"

- All goods made in domestically, even if not by a domestic firm

"in a given period of time"

- Typically a quarter or year

GDP can be defined in three ways that are all equal.
Total production = total expenditure (consumption) = total income



MACROECONOMICS

GDP (1/2)

GDP

THE GDP EQUATION

By definition $Y = C + I + G + NX$ (Y is short for GDP).

COMPONENTS	
Consumption (C): purchases of final goods by consumers	Durables: long-lived goods Nondurables: goods used up quickly Services: intangible goods
Investment (I): firm spending on capital, technologies, and real estate	Business fixed: capital equipment Residential fixed: new homes, apartment buildings Inventories: unsold goods placed in storage for later sale
Government spending (G)	Everything the government pays for labor, goods, and services
Net exports (NX): exports minus imports	Surplus: Exports > imports; GDP↑ Deficit: Imports > exports; GDP ↓

WHAT'S NOT INCLUDED IN GDP

- **Intermediate goods:** goods used to produce other goods (value is reflected in its final good)
- **Goods not sold on the open market:** "black market" goods; goods produced for personal consumption
- **Used goods:** value was counted when sold new
- **Transfer payments:** moving money between the government and people (e.g. Social Security benefits)

MISSING: ECONOMIC ACTIVITY

- It can be difficult to determine a "final" good
- It excludes anything not exchanged in 'official' markets (say, all housework)
- GDP ignores the fact that certain activities deplete natural resources, pollute, or have other costs

TRICKIER TECHNICALITIES

- Homes are personal investment, NOT consumption
- If a good does not sell in the given period, it enters a firm's inventory and is counted as investment
- A good in inventory sold in a later year does NOT enter that year's GDP; it was counted as inventory

GDP AND PRICE LEVELS

INFLATION AND GDP

Inflation is an increase in the aggregate price level or, equivalently, a decrease in the value of money.

REAL GDP	NOMINAL GDP
Using base year prices; indicates real growth	Using current prices; includes inflation

1. Real GDP per capita = real GDP per worker multiplied by the fraction of the population employed
2. Average labor productivity explains most differences in GDP per capita

MEASURING PRICES

The Bureau of Labor Statistics calculates the Consumer Price Index (CPI) each month by comparing the prices of a basket of goods.

$$\text{CPI formula: } \text{CPI}_{\text{year } t} = \frac{\text{cost of basket}_{\text{year } t}}{\text{cost of basket}_{\text{base year}}} \times 100$$

- In 1996, Michael Boskin found the CPI overstated the rate of price inflation by 1.3% a year.

ADVANTAGES	DISADVANTAGES
Used to measure cost of living (e.g. for Social Security benefits)	New goods and services enter the market often
Captures changes in price for basic consumer goods	Does not account for substitution bias (consumers switch away from pricier goods)
Makes inflation rate easy to calculate	Does not account for changes in quality

The GDP deflator corrects for inflation in nominal GDP.

$$\text{GDP deflator} = \frac{\text{nominal GDP}}{\text{real GDP}} \times 100$$

Compared to the CPI, the GDP deflator is less volatile. The GDP deflator differs from the CPI in two main ways.

- It has only domestically produced goods; CPI includes imports
- The deflator weights prices by production to adjust to changing consumption patterns



MACROECONOMICS

Money

THE MONEY SUPPLY

MONEY TALKS

Money is something accepted as payment for goods and for the settlement of debts. It functions as a:

- **Medium of exchange:** Eliminates the need to barter
- **Unit of account:** Measures relative value of goods
- **Store of value:** Lets us maintain wealth over time

TYPES OF MONEY

Commodity money

- Has value outside of just being money, e.g. gold, or cigarettes in jail

Fiat money

- Valuable because the government says so and we believe it

THE MONEY SUPPLY

The money supply is all liquid assets in an economy that can be exchanged for goods. An economy's money supply comes from the interaction of the public, banks, and the Federal Reserve.

Liquidity refers to how easily money can be converted. M0 is the most liquid, M2 the least liquid.



M0

Cash and coins

- Most liquid category



M1

- M0 +
- Demand, checking deposits
- Other checkable deposits
- Nonbank travelers' checks



M2

- M1 +
- Savings deposits
- CDs
- money market funds

THE TRADE IN MONEY

- **Saving:** Difference between earned and spent
- **Investment:** Purchase of new capital equipment
- **Financial institutions:** Coordinate saving and investment decisions in financial markets
- **Financial intermediary:** actor that links two other parties in a financial transaction

EX: Banks receive deposits made by people who wish to save. Banks pay their depositors a rate of interest and charge borrowers an even higher rate for loans.

THE FED

INVESTMENT OPTIONS

BONDS

STOCKS

Definition	Certificate of what the borrower owes the bond holder	Share of ownership in a firm
Class	Debt finance	Equity finance
Profit source	Purchaser receives principal + interest	Increase in stock value; dividends
Risks	Interest rates change; borrower may default	Riskier
Other	Date of maturity = date repaid	Sold on stock exchanges

Mutual funds allow investors to buy into a diverse pool of stocks and bonds in a single investment vehicle.

- Diversification means mutual funds are less risky and volatile than individual stocks
- Mutual funds are managed by experts

THE FED

THE FEDERAL RESERVE

The Federal Reserve is the United States' central bank:

- Contains 12 district banks
- Sets monetary policy and manages banks
- Lender of last resort to other banks, to help maintain the stability of the banking system

FEDERAL RESERVE BOARD OF GOVERNORS

- Located in Washington, D.C.
- Directed by a presidentially appointed chairman
- Members appointed by the President, approved by Senate and serve 14-year terms

FEDERAL OPEN MARKET COMMITTEE (FOMC)

- Manages money supply and open market operations
- Made up of seven rotating governors of the Fed
- President of the New York district bank
- Presidents of four other district banks



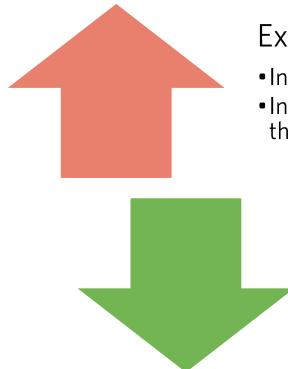
MACROECONOMICS

Monetary Policy and Financial Markets

MONETARY POLICY

MONETARY POLICY

The Federal Reserve can use monetary policy to stimulate or slow down the economy.



Expansionary

- Increases money supply
- Increases aggregate demand in the short run (risks inflation)

Contractionary

- Decreases money supply
- Lower aggregate demand in the short run

Monetary policy has three goals: price stability, full employment, and economic growth. Policy makers cannot achieve all three goals simultaneously.

METHODS OF ENACTING MONETARY POLICY

OPEN MARKET OPERATIONS	
Buying securities injects money into the economy	Selling securities takes money out of circulation
DISCOUNT RATE	FEDERAL FUNDS RATE
Interest rate the Fed charges banks for loans	Overnight rate charged on loans between banks
Changed infrequently by the board of governors	Not directly set by the Fed, but influenced
Increasing the interest rate decreases money supply	
RESERVE REQUIREMENT (RR)	
The board sets the reserve requirement, which dictates how much of its deposits a bank must hold in reserve	
Increasing RR decreases money supply	Money Multiplier = $\frac{1}{RR}$

BANK RUNS

A bank run occurs when depositors rush to a bank to withdraw their deposits. Banks only hold reserves equal to a fraction of their liabilities—so even solvent banks will be unable to pay all their depositors right away.

SAVINGS AND INVESTMENT IN AGGREGATE

ONE MORE EQUATION

Assume the economy in question is closed to trade.

$$GDP = Y = C + I + G$$

$$I = Y - C - G = \text{national savings} = S$$

INTERNATIONAL CAPITAL FLOWS

In an open economy, domestic savings do not need to equal domestic investment due to these capital flows.

- **Foreign direct investment:** A company or individual acquires and *manages* assets in a foreign country—such as an airport in Belgium run by the British
- **Portfolio investment:** An individual or company purchases stock or bonds issued by a foreign corporation but does not directly manage it

NET CAPITAL OUTPUT

Net capital output (NCO) equals the purchase of foreign capital or financial assets by domestic residents minus foreign purchase of domestic assets.

In an open economy, $NCO = NX$

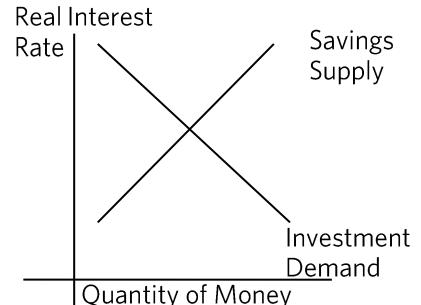
In a closed economy, $S = I$; in an open one, $S = I + NCO$

Hence: savings can differ from investment only as much as the difference is offset by net capital outflow.

FINANCIAL MARKETS

FINANCIAL MARKETS

The financial market features the supply of savings and the demand for savings (or investment). Equilibrium is reached by adjusting the real interest rate.



The real interest rate is the price of a loan.

It determines or how much borrowers pay for a loan and how much savers earn for loaning their money.

Savings Supply
Demand

Effect of interest rate

- higher real interest rate \Rightarrow more saving
- lower real interest rate \Rightarrow more investment



MACROECONOMICS

The Money Market and Economic Production

THE MONEY MARKET

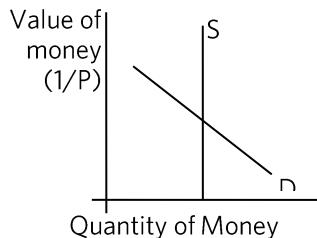
THE MONEY MARKET

The aggregate price level is the level of prices for the entire economy. The value of money is determined by the interaction of supply and demand.

MONEY SUPPLY	MONEY DEMAND
Depends on decisions of the Federal Reserve and banks	Depends on how much wealth people want to hold as money
Inelastic in the short run: it is set by the Federal Reserve	Relates to the volume and prices of transactions If the real level of economic activity stays the same, doubling prices should double demand for money

The long run is the time taken to reach equilibrium in the market for money.

As the price level falls, people need less money to purchase goods. The value of money increases.



THE EQUATION OF EXCHANGE

$$MV = PQ$$

M = the money supply

P = the aggregate price level

V = velocity (how often a bill is used in a year)

Q = total output

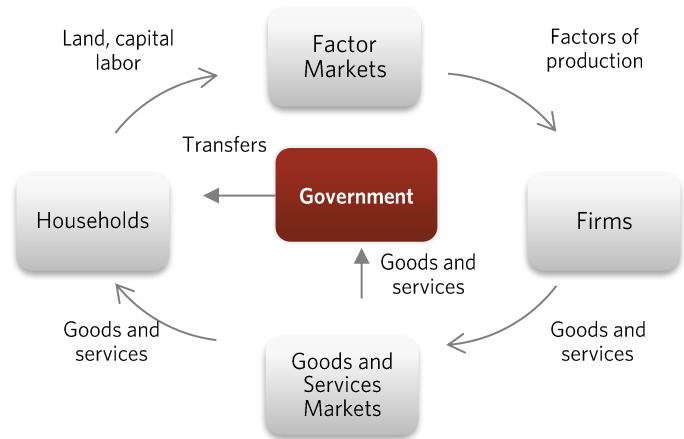
- V and Q are generally held constant
- Increase in M will lead to increase in P (inflation)
- Of the variables, P is dependent
- V and Y are usually fixed for the long run, so changes in P depend on changes in M
- Amount of money spent = amount of money used
- $PY = \text{nominal GDP} = MV$

Long-run neutrality of money is an implication of this equation of exchange. The concept holds that changes in the money supply have no bearing on real quantities.

ROUND & ROUND

THE CIRCULAR FLOW MODEL

The circular flow model shows how actors in an economy interact. Goods and services go clockwise while money goes counter-clockwise.



Assuming no international trade, the flow equals GDP.

- Total flow in money diagram = nominal GDP
- Total flow in goods and services diagram = real GDP
- New wealth enters the cycle through households
- Households provide the human labor used to work
- Land-owning individuals rent their land to businesses

ROUND AND ROUND

TWO PART STRUCTURE

Potential output is that which the economy could produce when using all its resources at normal rates.

Output gap = $Y - Y^*$ (actual output - potential output)

When an output gap exists, the economy's resources are not being fully utilized, such as in a recession. An economy at full output has the **natural rate of unemployment**.

- **Okun's law:** 1% rise in unemployment above the natural rate \Rightarrow a 2% drop in real GDP.

SHORT STINTS

Short term departures of the economy from equilibrium can be modeled in terms of short-run equilibriums.

- **Inflationary gap:** Short-run equilibrium output exceeds long-run output; the economy "overheats"
- **Deflationary gap:** Short-run equilibrium output is less than long-run output



MACROECONOMICS

Aggregate Supply and Demand; Fiscal Policy

AGGREGATE SUPPLY

AGGREGATE DEMAND AND SUPPLY

Aggregate demand and supply relate expenditures or production to the aggregate price level. Just like the microeconomic demand curve, the AD curve slopes downward – but for different reasons.

- Wealth effect: Decreases in the price level lead to increases in consumption: real income has increased.
- Interest effect: Decreases in the price level lead to decreases in the interest rate, which increases investment by decreasing its opportunity cost.
- Foreign exchange effect: Decreases in the price level make domestically produced goods cheaper in the international market, increasing net exports.

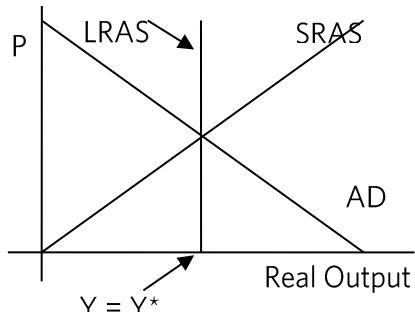
AGGREGATE DEMAND CURVE: CHANGES

Reasons for changes in aggregate demand come from each of the components of GDP (C, I, G, X).

- | | |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Consumption | ▪ Tax cuts, transfer payments
▪ Consumer sentiment
▪ Changes in wealth due to the stock market
▪ Expectations re: future prices |
| Investment | ▪ Changes in interest rate or expectations |
| Government | ▪ Direct spending (<i>not</i> transfers) |
| Net exports | ▪ Changes in the income of foreign entities/ exchange rate |

AGGREGATE SUPPLY

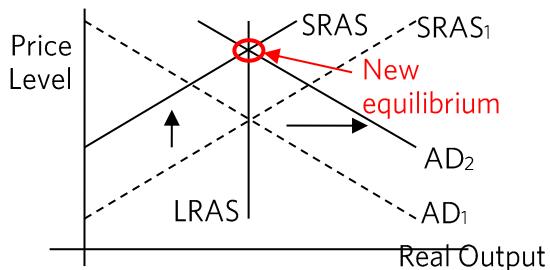
- Long run aggregate supply is fixed at Y^*
- LRAS is not affected by changes in the price level
- Aggregate supply slopes upward to reflect the relationship between price changes and anticipated sales
- Long-run equilibrium: intersection of SRAS, LRAS, $Y=Y^*$, AD



AGGREGATE SUPPLY AND DEMAND

EFFECTS OF SHIFTS: AN EXAMPLE

- Simple government spending does not cause growth as spending only temporarily increases AD
- An increase in aggregate demand will lead to a higher price level and output in the short run
- In the long run, aggregate supply will shift inwards



LRAS V SRAS

- Firms respond to demand changes by altering output, not price; short-run output depends on AD
- Changes in the *expected aggregate price level* shift in SRAS; at the expected level $SRAS = Y^*$
- *Aggregate supply shocks* shift the AS curve (example: the 1973 OPEC oil embargo)
- Long run changes affect *potential* output, e.g. population growth, capital stock increase, technology

FISCAL POLICY

WHAT IS FISCAL POLICY?

Fiscal policy is the use of government spending and taxation to intervene in the economy.

Type	Contractionary	Expansionary
Main goal	Decrease AD, curb inflation	Increase AD in a recession
Examples	Tax increases; spending cuts	Tax cuts; spending increases
Type	Direct	Indirect
Definition	Direct spending	Taxes/subsidies

POTENTIAL DOWNSIDES

- Government loans drive interest rates up, making private loans more expensive (crowding out)
- Most information about the economy lags, so policy makers may mistime interventions.



WATER

Introductions & A Glance

IT'S IMPORTANT

FIRST: A BIT OF BACKGROUND

Everyone needs water every day. But it's also something that can be owned, rented, bought, sold, and traded. In other words, while it's vital for people—it's also an economic commodity.

Water Inequality

- Different parts of the world have different amounts of access to water
- This difference means that the "price" of water is different in different parts of the world
- This price differences comes about due to scarcity value—the idea that things are valuable because of their rarity.

Markets: A (Very) Brief Introduction

- Water can be bought and sold in a variety of different ways
- Codifying who owns water, and how one can own it, is critical for examining water markets

WATER USAGE

FARMING, DRINKING, AND PRODUCTION

Water usage can be broken down into four groups: agricultural, urban, commercial, and environmental.

KINDS OF USAGE	
Agricultural	<ul style="list-style-type: none">Comprises the vast majority of worldwide water usageIrrigation represents 70% of worldwide water usage and is critical for Green Revolution agricultural strategies
Urban	<ul style="list-style-type: none">Usage in cities, including drinking, bathing, and waste management
Commercial	<ul style="list-style-type: none">Refers to usage in factories and for other industrial purposesOften results in the negative externality of pollution
Environmental	<ul style="list-style-type: none">Historically referred to leftover waterNow refers to water that provides an ecosystem service

WATER LAW

Economic institutions are the "rules of the game" control the different ways that people can trade water. These can be thought of as water law. It can take different forms:

Spanish Water Law	Customs based on prior usage
English Common Law	Relies only on legal precedent
Riparian Doctrine	Water is allocated equally along the body of water
Prior A.	Prior Appropriation refers to granting users a fixed quantity of flow from a source

These are not comprehensive, and there are more ways to allocate water rights than just these four. However, all formal allocations rely on some form of property rights.

An aside: groundwater rights are also different, as pumping can often drain the resources of neighbors.

URBAN USAGE

CITY LAW

Often, urban water use is governed by a single company in a regulated monopoly, or by a local government.

Regulated Monopoly

- Monopolies can be helpful because there are often increases in efficiency at scale -- producing more water means that the process is more efficient.
- A regulated monopoly is one that has limits set on it, generally in the form of the price that it can set

Local Government

- Other times, local governments are in charge of the supply of water



WATER

Buying & Scheming

BUYING WATER FROM A COMPANY?

ECONOMIC INTUITION

When anyone buys a good, economists argue that they make choices on the margin—that they decide whether to purchase something based comparing the marginal benefit to that good to the marginal cost of it.



DOES THIS HAPPEN FOR WATER?

So—it *should*. In practice, though, water companies don't always release information to consumers, so people can't always consciously make decisions on the margins.

Often, bills only show total cost, so consumers only have average cost, not marginal cost.

Average Cost

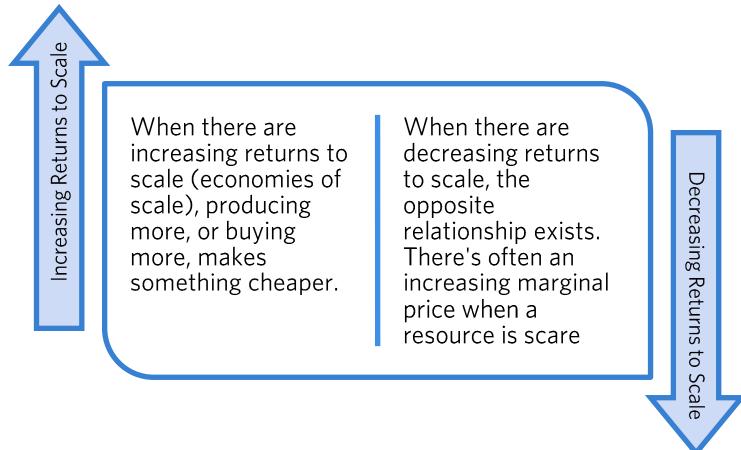
- The unit price on average. Calculated by taking the total cost and dividing by number.

Marginal Cost

- The cost of the "next" unit. Often unknown, or set by the producer.

ECONOMIES OF SCALE AND DISECONOMIES OF SCALE

Goods don't always have a set price. That is, marginal price per unit is often different than average price per unit at the stopping point.



WATER PRICING

SCHEMES...

However, though they don't publicize it, water companies *do* change the cost of water depending on how much someone uses. It can affect their behavior, subtly.

SCHEME	BEHAVIOR
Flat fee: each unit costs nothing extra	Consumers use as much as they want to
Constant marginal price: each unit costs the same as the last	Consumers conserve water, as using more means paying more
Decreasing block rate: each unit is cheaper than the last	Consumers are pushed to use more water (but are still charged per-unit, so use less than under a flat fee scheme)
Increasing block rate: each unit is costlier than the last	Consumers are pushed to use less water (but are pushed more strongly than under CMP schemes, and use less)

ELASTICITY

Though the economic analysis before is useful, it is perhaps more important to note that water is *vital*.

BROTHER, WHERE ARE MY LÖÖPS?

If the price of fruit loops goes up by \$25, people will not buy fruit loops anymore – there are many substitute goods that people will buy instead.

Water, though, is different. If the price of water increases, people will still buy water at that price, because they need it.

All of this is to say that, sometimes, considerations of marginal cost go out of the window when it comes to water. Indeed, one study estimated that the elasticity of demand for water was .41, meaning that it is inelastic.



WATER

Selling & Smelting

MARKETS

SUPPLY & DEMAND

Marginal Cost = Marginal Benefit

This is an *important* equation. The marginal cost of water comes from the supply side, and the marginal benefit of water comes from the demand side.

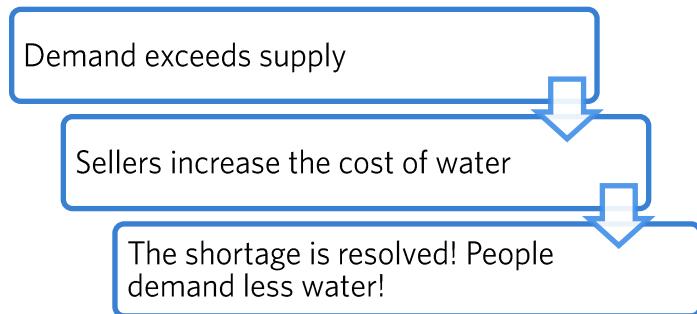


Each unit of water is demanded less than the one before, due to the law of diminishing marginal returns. And each unit of water extracted costs more than the one before, due to increasing returns to scale.

HOW CAN MARKETS FAIL AND FIX THEMSELVES?

If water is scarce, the value of water is more than the cost of extraction. In competitive markets, price is set at marginal cost, meaning that there would be a shortage.

The market should respond to this, increasing price and thus resolving the shortage, as consumers would demand less water at the higher price.



In the real world, though, water can be difficult to trade, or inelastic, meaning that this does not always work.

OBSTACLES TO MARKET CORRECTION

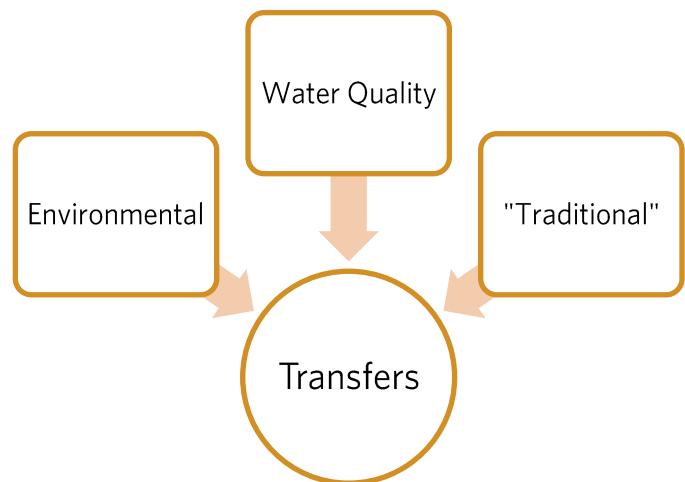
- Water demand is inelastic, meaning people still demand too much
- Water has a price cap installed by a government, meaning producers can't raise prices

TRANSFERS

TRADING WATER

Historically, it was exceptionally difficult to move water from place to place. Water is heavy, and moving it incurred great costs. With the advent of pipeline infrastructure, though, this is less of a problem. Water can be moved from places where it is abundant to places where it is scarce.

Water can also be transferred in a variety of ways:



MECHANICS OF TRANSFERS

- Environmental: people can purchase rights to instream flows, meaning that downriver flow expands
- Water Quality: companies pursue a cap-and-trade strategy that allows them to trade rights to pollute
- Traditional: Individuals gain from trading water rights

TEST YO' SELF

QUESTIONS

1. What is the law of diminishing marginal returns?
2. Is water elastic or inelastic?
3. Where is most water used?

ANSWERS

1. Each unit is less valuable than the prior.
2. Inelastic.
3. For Irrigation

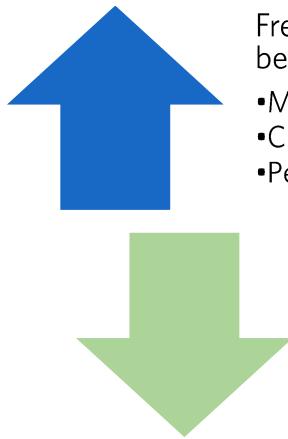


WATER Pollution & Reform

WHY THE NEED?

EXTERNALITIES (USUALLY NEGATIVE)

An externality is a term that describes benefits or costs from a transaction that are uncompensated. Pollution is an often-cited example – and is relevant for water.



- Free market production benefits
 - Make money
 - Create jobs
 - People get goods
- Free market production harms
 - Can't control corporate dumping
 - Environmental impacts
 - People pay the price of these impacts

MARKET FAILURE

Without any sort of regulation, firms do not have incentives to care about pollution. They will always produce as the productively efficient level, which is not the same thing as the socially efficient level.

Productive Efficiency	<p>When firms produce at the profit-maximizing level</p> <p>As they don't endure financial harms because of pollution, they don't care about it</p>
Social Efficiency	<p>When firms produce at the best-level for all of society</p> <p>Because people care about pollution, their utility is higher when there is less.</p>

These externalities can be described as market failure, which, more broadly, describes when there is an inefficient allocation of resources.

- **People** would be willing to pay more to live with less pollution, they're just never given the chance
- **Firms** impose a cost on people that they cannot control
- **Third Parties** must live with pollution that they are not a part of

REGULATORY STATE

WHY REGULATE?

Regulation is popular among people – and governments can try to find the optimal amount of pollution by solving an economics question:

$$\text{Marginal Cost} = \text{Marginal Benefit}$$

But, when it comes to pollution, these terms can become a bit more nuanced: in this case, it is the marginal cost of polluting one fewer unit with the marginal benefit that society gets from not having that unit of pollution.

$$\text{Marginal Control Cost} = \text{Social Marginal Damage}$$

Policymakers can use this decision to estimate the optimal level of pollution – and find a middle ground between firm's profits and pollution reduction.

TYPES OF REGULATION

HOW REGULATE?

There are a few different strategies that are common, but they generally fall into two groups

Prescriptive Regulations
<ul style="list-style-type: none"> • Pre-sets which firms need to pollute less and tells them how much less to pollute • Requires significant knowledge about the firm's operation and the industry • Can assure decreased pollution if done correctly and if firms are complying. • An example might simply be telling a firm to produce less than they are at present.
Economic Regulations
<ul style="list-style-type: none"> • Sets policies that shift the incentives of firms away from pollution • Does not require knowledge of firms—the incentive operates in the same way on them all • Hard to estimate social cost of pollution to set economic incentives properly; political opposition often intense • No verification needed; only need to measure pollution levels • An example might be a Pigouvian tax system, which would mandate that firms pay a tax on every unit of pollution that they produce



WATER

Case Studies 1/2

CASE STUDIES

SOUTH-NORTH WATER TRANSFER PROJECT

China's South-North Water Transfer project aims to move up to 48 billion cubic meters annually of freshwater from the moist south to the arid (but populated) north. SDA NM

population and agricultural centers

Yellow River

freshwater resources

Yangtze River

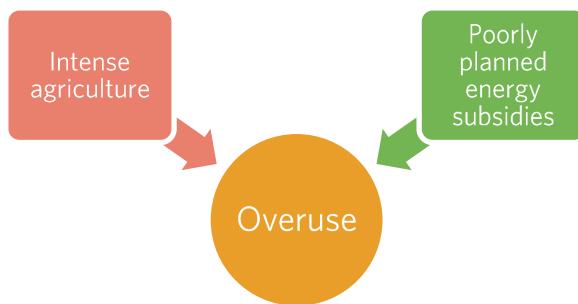


ROADBLOCKS AND CONCERN

- Water quality
- Agricultural and industrial pollution
- Resettlement of more than 300,000 people

PUMPING AND SUBSIDIES IN INDIA

Groundwater is crucial to India's economy. Since the 1970s, subsidies have reduced pumping costs to zero. The availability of water has reduced famine and lifted many families out of poverty but has led to overuse.



IRRIGATION IN THE UNITED STATES

On the east of the 98th meridian are well-watered lands; on the west is a semi-arid climate. Groundwater irrigation has brought millions of acres of the west under cultivation.

1936	Completion of Hoover Dam
1940	20 million acres of the West and Great Plains under irrigation
1940s	Widespread use of groundwater irrigation increases crop production by \$19 billion
1978	40 million acres under irrigation

CASE STUDIES

SALINE LAKE DEPLETION

A watershed that drains into an enclosed basin rather than the ocean forms a saline lake. Human intervention can easily damage the ecosystems of these shallow lakes.

Problem: Property rights to the environment are difficult to define.

- Diversions for cotton agriculture have shrunk the Aral Sea by 74% in area and 90% in volume. Salinity has increased so much that a commercial fishery has collapsed.
- In Utah, the surface of the Great Salt Lake has shrunk by 50% and will require a 29% increase in inflows to restore its ecosystems.
- The Los Angeles Aqueduct diverted so much water that it entirely dried up Owens Lake.

RESTORING THE LAKES

- In Central Asia, a smaller lake was constructed to receive the decreased flow.
- Expensive litigation forced Los Angeles to reduce its diversions to protect California's Mono Lake.

EXTREME WATER SCARCITY IN CHILE

The Antofagasta Region of Chile is one of the world's driest regions.

Problem	Solution
The region is the world's largest copper producer, and the mines require large quantities of water.	Mining firms purchase water rights from farmers, a less costly and more convenient solution than desalination.

MARKET SOLUTIONS

This market-based solution shows that markets can lead to large gains from trade for both industrial and agricultural users.



WATER

Case Studies 2/2

CASE STUDIES

CLEANING UP COAL ASH

Burning coal creates coal ash, which can contaminate water with heavy metals.

APPROACHES FOR CLEAN UP COAL ASH

- Cap-in-place (covering and leaving the ash)
- Recycling
- Temporary removal and lining of storage areas
- Transportation to off-site lined facilities

Virginia's Dominion Energy estimates a clean-up cost of \$2.4 to \$5.6 billion over the course of 15 years.

BENEFIT-COST ANALYSIS

Are the total costs of removal lower than the benefits of reduced contamination and improved health?

INVASIVE SPECIES IN THE GREAT LAKES

Zebra mussels entered the Great Lakes in the ballast water of cargo ships in the 1980s. Other sources of pollution can be controlled at the source; invasive species cannot. Researchers have tried several solutions:

Biological	▪ Use of salmon to control invasive alewife population
Mechanical	▪ Electric barrier meant to keep out Asian carp
Chemical	▪ Chemicals used to control sea lamprey population

THE FLINT WATER CRISIS

Officials in Flint, Michigan tried to save money by switching water supplies and ended up poisoning their citizens when lead from old pipes leached into the water.

\$5 million	Amount officials hoped to save
\$20 million	Amount that residents have spent to avoid using piped water
\$345 to \$500 million	Value by which Flint houses fell
\$343 million (min.)	State and federal spending on the crisis

CASE STUDIES

NORTH CAROLINA

In North Carolina, phosphorus and nitrogen pollute water and lead to eutrophication.

EUTROPHICATION

Eutrophication occurs when excess nutrients cause algal blooms, which suck up the oxygen in a water body and kill off animals.

WATER QUALITY TRADING MARKETS

The North Carolina Department of Environmental Quality (NCDEQ) oversees water quality trading markets. Polluters can trade their allotted nutrient amounts with other polluters.

- Trades must take place within the same watershed
- Only seven have occurred since 2004

PRIVATE MITIGATION BANKS

Private firms restore and preserve water bodies and then sell credits to polluters.

- These are more successful than water quality trading markets
- They usually construct and enhance riparian regions near bodies of water
- Urban development projects buy the credits to offset the pollution they send into rivers via new stormwater systems

FINAL QUIZ

QUESTIONS

1. How do people decide how much of something to buy?
2. What are taxes that push firms to not pollute called?
3. What body of water in Central Asia has almost completely disappeared because of irrigation?

ANSWERS

1. They set Marginal Cost = Marginal Benefit
2. Pigouvian Taxes ; 3. The Aral Sea



CRUNCH KIT

Economics in Four Pages (Page 1)

BASICS OF ECONOMICS

- Human wants are unlimited, but goods are scarce
- Nothing is ever truly free
- To get one thing, we must give up another
- Humans behave rationally in economics
- Economic costs include *opportunity* and *accounting*
- Accounting cost: tangible cost
- Opportunity cost: value of the next-best alternative

RATIONALITY

- Marginal cost: cost of producing/consuming "one more"
- Marginal benefit: gain from producing/consuming "one more"
- Diminishing returns: marginal benefit decreases as quantity increases
- Rational agents will produce or consume a good until marginal cost = marginal benefit/revenue ($MC = MR$)
- Rational consumers maximize their utility, or satisfaction; rational firms maximize their profits

TYPES OF ECONOMICS

- Positive: "What is" (taxes are 20%)
- Normative: "What should be" (taxes should be lower)
- Microeconomics: focuses on individual decision making; individuals to markets
- Macroeconomics: focuses on the economy as a whole; tracks economy wide variables

COMPARATIVE ADVANTAGE

- Comparative advantage: being able to produce a good at a lower opportunity cost than anyone else
- Absolute advantage: being able to produce a good more efficiently than everyone else
- An individual can have an absolute advantage in everything, but not a comparative advantage in everything
- Agents should specialize in what they have a comparative advantage for, and then everyone will benefit from trade

PRODUCTION POSSIBILITIES FRONTIER (PPF)

- A PPF shows all the ways an economy can produce goods
- Each axis features a good; the PPF measure trade-offs between these two goods
- All points outside the curve are impossible to produce at
- Points inside the curve are possible but inefficient and do not use all available resources

PARETO EFFICIENCY

- Impossible to improve well-being without hurting someone else
- No way to judge the superiority of one distribution over another

THREE FUNDAMENTAL QUESTIONS OF ECONOMICS

- How much should be produced?
- Who should produce the good?
- Who should receive the good?

PERFECTLY COMPETITIVE MARKETS

- The good being sold must be highly standardized
- Large number of buyers and sellers
- Everyone is well informed about the market price
- No barriers to entry exist; firms enter and exit easily
- Everyone is a price taker
- Price represents opportunity cost of good's production

DEMAND

- Law of demand: the quantity demanded of a good decreases when the price increases and vice versa
- Demand: this relationship between prices and quantities for a particular market
- Quantity demanded: amount demanded at each price
- Demand shifts: income, substitutes, complements, the number of consumers, consumer tastes, expectations

SUPPLY

- Law of supply: quantity supplied of a good increases when the price increases and vice versa
- Supply: relationship between prices and quantities for a particular market
- Quantity supplied: the amount supplied at a given price
- Supply shifts: factor costs, technology, expectations of future prices, number of producers, and regulations
- Changes in demand or supply cause a shift of the curve; quantity changes at every price
- Change in quantity demanded or supplied causes a movement along the curve

MICROECONOMIC EQUILIBRIUM

- Equilibrium: intersection of supply and demand
- Consumer surplus: difference between how much consumers are willing to pay and the market price
- Producer surplus: difference between the price at which firms are willing to sell and the market price
- Equilibrium maximizes consumer and producer surplus

ELASTICITY

- % change in quantity over % change in price
- Price elastic demand: has close substitutes, luxuries
- Price inelastic demand: necessities
- Price elastic supply: long run
- Price inelastic supply: short run, scarce good
- Factors affecting demand elasticity: substitutes, necessities, scope of market, time horizon
- Factors affecting supply elasticity: scarcity of inputs, presence of barriers to entry, time horizon
- Elasticity = 0: perfectly inelastic
- $0 < \text{Elasticity} < 1$: price inelastic
- Elasticity = 1: unit elastic
- Elasticity > 1 : elastic
- Elasticity = ∞ : perfectly inelastic



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Economics in Four Pages (Page 2)

ECONOMIC AND ACCOUNTING PROFIT

- Total revenue: amount a firm receives from selling its goods
- Total cost: costs of a firm supplying its goods
- Accounting cost: actual monetary cost
- Accounting profit: straight monetary profit earned
- Economic cost: both monetary (accounting) cost and the opportunity cost of the resources used
- Economic profit: monetary profit minus opportunity cost; always equal to zero in the long run

FIRMS AND COSTS

- Fixed costs: costs that a firm must pay regardless of how much it produces (rent, utilities); only fixed in short run
- Variable costs change with the amount produced
- Average cost: the sum of fixed costs and total variable costs, divided by the total number of units produced
- After a certain point, marginal costs stop decreasing and begin increasing—diminishing returns to scale
- In the long run, all costs are variable

PRICE CONTROLS

- Price ceilings set a maximum; price floors set a minimum
- Deadweight loss: lost efficiency due the market not being in equilibrium
- Binding price controls ALWAYS have deadweight losses
- Price controls transfer surplus
- Taxes distort the market, transferring surplus from the market to the government at the expense of efficiency
- The more inelastic party always bears more of the tax
- Revenue equals price times quantity

MARKET FAILURES

- A market failure is when competitive markets fail to produce socially desirable outcomes
- Two types are externalities and public goods

EXTERNALITIES

- Externalities are costs or benefits that affect a third party uninvolved in the activity or transaction in question
- Individuals do not factor externalities into their decisions
- Negative externalities harm third parties; the tendency is to overproduce them
- Positive externalities benefit third parties; there are not enough of them
- Coase Theorem: resolve externalities as long as property rights are defined and parties can negotiate

PUBLIC GOODS

- A rival good, when it is consumed, can no longer be consumed by anyone else
- People have limited access to excludable goods
- Private goods are both rival and excludable
- Public goods are neither
- Collective goods are non-rival and excludable

PUBLIC GOODS

- Common resources are non-excludable and rival
- The tragedy of the commons occurs when people overuse a resource because no one owns it

MARKET POWER

- A firm with a downward sloping demand curve has market power; they can choose their price
- The combinations of price and quantity available to choose from are determined by the market demand

MONOPOLY

- Market with only one firm
- Produce less than what consumers demand, and sell it at higher than the market price
- Arise due to the presence of barriers to entry
- Price discrimination: charging different customers different prices; a monopoly can capture more of the consumer surplus for the firm

OLIGOPOLY

- Market with only a few firms
- Collusion: when firms cooperate to artificially raise market prices by restricting supply
- Cartel: group of firms that collude
- Cartels often break up due to an incentive to cheat

MONOPOLISTIC COMPETITION

- Firms compete through product differentiation, not price competition
- Few barriers to entry exist

INSTITUTIONS, ORGANIZATIONS, AND GOVERNMENT

- Institutions: formal or informal rules that guide human interactions
- Organizations are like institutions but more formal
- Governments can tax their citizens and use force
- Pork barrel politics: elected officials tend to steer money to their constituents by introducing projects
- Logrolling: vote trading among elected officials
- Rent seeking: socially unproductive activities that simply direct economic benefits

GROSS DOMESTIC PRODUCT (GDP)

- Market value of all final goods and services produced within a country in a given period of time
- $$GDP = Y = C + I + G + NX$$
- Consumption: consumer spending on final goods
- Investment: value of all money spent on capital or technology
- Government expenditures
- Net exports: exports minus imports
- Business cycle: fluctuations in GDP
- Average labor productivity: $GDP / \# \text{ workers employed}$



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Economics in Four Pages (Page 3)

MACROECONOMIC MODELLING

- Circular flow model: households own factors of production; firms rent factors and produce goods, which households buy; two markets: goods and factor
- Aggregate demand (AD): quantity of goods demanded by an economy at different price levels, slopes downward
- Aggregate supply (AS): potential supply of goods and services in an economy at different price levels
- SRAS slopes upwards; LRAS: fixed at full employment output; vertical line; independent of price level
- Short run equilibrium: intersection of SRAS and AD; long run equilibrium is at the intersection of all three curves

UNEMPLOYMENT

- Labor force: all individuals 16 or over, not in prison or armed forces, and actively looking for work or has a job
- Employment rate: percentage of labor force with a job
- Participation rate: % of population in the labor force
- Structural unemployment: due to large shifts in economy; mismatch between skills demanded and skills supplied
- Cyclical unemployment: caused by the business cycle
- Frictional unemployment: due to time-lag between jobs
- Unemployment rate calculated every month by the BLS
- Natural rate of unemployment: never 100%; structural + frictional unemployment
- Okun's Law: 1% rise in unemployment = GDP drops 2%

MONEY

- A medium of exchange, unit of account, and store of value
- Commodity money: money with intrinsic value
- Fiat money: intrinsically worthless; state makes it valuable
- Inflation: rise in price level; decrease in purchasing power of money; measured by the CPI and GDP deflator
- Liquidity: how easily an asset can be converted to currency
- Savings: income that is not spent
- Investment: purchase of new capital equipment
- Bond: a certificate of indebtedness
- Stock: ownership of a portion of a company
- Net capital outflow: domestic purchase of foreign capital minus foreign purchase of domestic assets

GOVERNMENT POLICY

- Fiscal policy: government spending or taxes influences AD
- Contractionary: increasing taxes, decreasing spending
- Expansionary: decreasing taxes, increasing spending
- Open market operations: FOMC buys or sells securities
- Reserve ratio: fraction of deposits banks must not loan out
- Discount rate: interest rate the Fed charges to banks
- Contractionary: sell securities, increase RR / discount rate
- Expansionary: buy securities, decrease RR/ discount rate
- Quantity theory of money: $MV = PY$

ECONOMICS OF WATER

- Water is a necessity of life but it is also a commodity
- Different parts of the world have different amounts of access to freshwater, so the price of water varies
- This price difference comes about due to scarcity value: the idea that things are valuable because of their rarity
- Codifying who owns water and how it can be owned is critical, as are the economic institutions that control the different ways that people can trade water
- In riparian doctrine, water is allocated equally along the body of water
- Prior appropriation refers to granting users a fixed quantity of flow from a source based on order of access
- Groundwater rights present a different set of problems, as pumping can often drain the resources of neighbors

WATER USAGE

- Water usage can be broken down into agricultural, commercial, urban, and environmental
- Most water (70%) worldwide is used for agriculture
- Urban water refers to any city usage, including drinking, bathing, and waste management
- Commercial water usage, usage in factories and other industrial purposes, often causes pollution
- Environmental water usage used to refer to leftover water and now refers to water that provides an ecosystem service
- Urban water use is often governed by a monopoly, which improves efficiency
- Sometimes local governments control the water supply

PRICING WATER

- People do not always make choices on the margin when it comes to water use, because water companies do not always release information to consumers
- Under a flat fee, consumers pay one price and consumers can use as much as they want
- Under constant marginal pricing, each unit costs the same as the last and consumers will conserve water
- Under a decreasing block rate, each unit is cheaper than the last and consumers are incentivized to use more
- Under an increasing block rate, each unit is costlier than the last and consumers are pushed to use less water
- The elasticity of demand for water is .41, meaning that it is inelastic and people demand too much
- The marginal cost of water comes from the supply side and the marginal benefit comes from the demand side
- Each unit of water is demanded less than the one before, due to the law of diminishing marginal returns
- Each unit of water extracted costs more than the one before, due to increasing returns to scale.
- Because water can be difficult to trade and inelastic, it does not always follow expectations
- A government price cap limits water prices



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Economics in Four Pages (Page 4)

- Water has historically been difficult to move, but pipelines are making it easier
- Other water trading strategies include purchasing rights to instream flows and pursuing a cap-and-trade strategy that allows companies to trade rights to pollute

EXTERNALITIES

- Without regulation, firms will always produce as the productively efficient level, which is not the same thing as the socially efficient level.
- These externalities can be described as market failure, which, more broadly, describes when there is an inefficient allocation of resources
- People would be willing to pay more to live with less pollution; firms impose a cost on people that they cannot control; and third parties must live with pollution
- Governments can try to find the optimal amount of pollution, where marginal cost equals marginal benefit
- They compare the marginal cost of polluting one fewer unit with the marginal benefit that society gets from not having that unit of pollution.
- Marginal control cost is the same as social marginal damage

HOW TO REGULATE

- Prescriptive regulations re-set which firms need to pollute less and tells them how much less to pollute
- An example might simply be telling a firm to produce less than they are at present
- Economic regulations set policies that shift the incentives of firms away from pollution
- The incentive operates in the same way on all firms but it is hard to estimate social cost of pollution to set economic incentives properly and political opposition is often intense
- An example might be a Pigouvian tax system, which would mandate that firms pay a tax on every unit of pollution that they produce

CHINA'S SOUTH-NORTH WATER TRANSFER PROJECT

- China's South-North Water Transfer project aims to move up to 48 billion cubic meters annually of freshwater from the moist south to the arid (but populated) north
- It will transfer water from the Yangtze to the Yellow River
- Concerns include water quality, agricultural and industrial pollution, and the resettlement of more than 300,000 people

PUMPING AND SUBSIDIES IN INDIA

- Groundwater is crucial to India's economy. Since the 1970s, subsidies have reduced pumping costs to zero
- The availability of water has reduced famine and lifted many families out of poverty but has led to overuse.

IRRIGATION IN THE AMERICAN WEST

- Groundwater irrigation has brought millions of acres of the dry west under cultivation starting from the 1936 completion of the Hoover Dam

SALINE LAKES

- A watershed that drains into an enclosed basin rather than the ocean forms a saline lake, with an ecosystem particularly vulnerable to human intervention
- Diversions for cotton agriculture have shrunk the Aral Sea by 74% in area and 90% in volume and collapsed commercial fisheries
- In Utah, the surface of the Great Salt Lake has shrunk by 50% and will require a 29% increase in inflows to restore its ecosystems
- The Los Angeles Aqueduct diverted so much water that it entirely dried up Owens Lake

WATER SCARCITY IN CHILE

- In the Antofagasta Region of Chile, one of the world's driest regions, mining firms meet their need for water by purchasing water rights from farmers
- It is a less costly and more convenient solution than desalination
- The market-based solution shows that markets can lead to large gains from trade for all users

COAL ASH

- Cleaning up toxic coal ash can involve cap-in-place, recycling, temporary removal and lining of storage areas, and transportation to off-site lined facilities
- Virginia's Dominion Energy estimates a clean-up cost of \$2.4 to \$5.6 billion over the course of 15 years.
- Are the total costs of removal lower than the benefits of reduced contamination and improved health?

INVASIVE SPECIES

- Zebra mussels entered the Great Lakes in the ballast water of cargo ships in the 1980s
- Other sources of pollution can be controlled at the source; invasive species cannot
- Solutions can be biological, mechanical, or chemical

FLINT, MICHIGAN

- Officials in Flint, Michigan tried to save money by switching water supplies and ended up poisoning their citizens with lead from old pipes
- They hoped to save \$5 million dollars; the total cost of the switch, including the loss of home values, has reached well over half a million

EUTROPHICATION IN NORTH CAROLINA

- In North Carolina, phosphorus and nitrogen pollute water and lead to eutrophication.
- The North Carolina Department of Environmental Quality oversees water quality trading markets
- Polluters can trade their allotted nutrient amounts with other polluters within the same watershed.
- More successful private mitigation banks allow private firms to sell credits from restoring water bodies
- Urban development projects buy the credits to offset the pollution they send into rivers



CRUNCH KIT

List of Lists

14 FUNDAMENTAL ECONOMIC TERMS

Economics	The study of decision-making
Microeconomics	Study of economics on the micro-scale: households, firms, regions
Macroeconomics	Study of economics at a broad level: national and international issues
Scarcity	Not having resources to satisfy all wants
Opportunity cost	The value of the next-best alternative to a choice
Trade-off	Giving X up to get Y
Quantity supplied/demanded	The total quantity that, at a given price, producers will sell or consumers buy
Demand/ supply	The relationship between price and quantity demanded or supplied
Benefit-cost analysis	Rational decision-making process, weighing pros and cons
Firm	An organization that produces a good or service for sale to the market
Margin	Incremental change (benefit/cost)
Utility	Satisfaction gained from consumption
Absolute advantage	Ability to produce more of one good
Comparative advantage	Having a lower opportunity cost of producing a good than another party

16 KEY DEFINITIONS AND LAWS

CPI	Basket price in year t divided by basket price in base year, multiplied by 100
Elasticity	(% change in quantity)/(% change in price)
GDP deflator	(Nominal GDP divided by real GDP)*100
GDP	$Y = C + I + G + NX$
Profit maximizing	Marginal revenue = marginal cost
$MV = PY$	Quantity equation; M = money supply, V = velocity, P = price level, Y = real GDP
Okun's law	X% rise in unemployment > GPD falls 2X%
Law of supply	As price increases, producers supply more
Law of demand	As price increases, consumers demand less
Money multiplier	Reciprocal of reserve ratio
Reserve ratio	Share of deposits banks must hold
Output gap	Difference between potential, actual output
Labor force participation rate	Percentage of the total population eligible for the labor force that is in the labor force
Labor force	Total number of persons aged 16+, either working or actively seeking employment
Catch-up/convergence	Theory that underdeveloped countries can grow more rapidly, thus closing the gap
Deterrence	Strategy to deter conflict by amassing a stockpile of weapons

10 KEY WATER TERMS

Water inequality	Condition whereby different parts of the world have different amounts of access to water, meaning that price differs
Common law	Legal systems that rely on legal precedent; common in Anglo-Saxon systems
Riparian doctrine	Legal approach in which water is allocated equally along the body of water
Prior Appropriation	Legal approach in which users are granted a fixed quantity of flow based on the order in which they first accessed the water
Externality	A consequence of industrial activity that affects third parties but is not reflected in the price of the goods; for water, externalities often take the form of pollution
Productive efficiency	Production level at which firms maximize profits; does not take into account externalities such as pollution
Social efficiency	Production level that is best for all of society but may not lead to maximum profits
Prescriptive regulations	Regulations that pre-set which firms need to pollute less, and by how much
Economic regulations	Regulations that incentivize firms to produce less
Pigouvian tax	A tax that firms pay on every unit of pollution that they produce

12 HIGH PRIORITY MACRO TERMS

Discount rate	Interest rate the Federal Reserve charges for loans to its member banks
Federal funds rate	Interest rates banks charge on loans to each other; based on the discount rate
Federal Reserve (the Fed)	Central bank; sets monetary policy; FOMC controls money supply
Fiscal policy	Government taxation and spending policy choices meant to influence the economy
Monetary policy	Central bank policies; alter money supply
Open market operations	Trading of securities by the Federal Reserve to adjust the money supply
Frictional unemployment	Results from the time lag between workers leaving a job and finding another
Structural unemployment	Results from mismatch of skills offered by labor and skills desired by firms
Cyclical unemployment	Unemployment that occurs alongside the business cycle
Command economy	Economic system in which decisions are centralized and largely dictated by the government; as in the Soviet Union
Marxism	Philosophy underlying Soviet Union; prioritized state control of economy, redistribution of wealth
Military Keynesianism	Keynesian fiscal stimulus in the form of increased military spending



CRUNCH KIT

List of Lists

11 MARKET COMPETITION TERMS

Complements	Related goods, such that when the price of one good falls, demand for the other rises
Factors of production	Resources used to produce goods and services: land (natural resources), capital (buildings, equipment), and labor
Inferior good	A good the demand for which decreases as the income of its consumers increases
Monopolistic competition	A market with many producers; differentiated product; market power
Monopoly	A market that has only one producer, with high barriers to entry
Natural monopoly	A special monopoly that arises when multiple producers cannot be profitable
Normal good	A good the demand for which increases as the income of its consumers increases
Oligopoly	A market with a few producers and high barriers to entry; collusion may occur
Optimization	Act of maximizing total utility
Perfect competition	A market with many producers and consumers, perfect information, no barriers
Substitutes	Related goods, such that when the price of one good falls, demand for the other falls

6 ECONOMISTS

Adam Smith	Pioneered economics in An Inquiry into the Nature and Causes of the Wealth of Nations
John Maynard Keynes	Described Keynesian model of the economy and fiscal policy uses
Joseph Schumpeter	Described the impact of entrepreneurs as "creative destruction"
Michael Boskin	Reviewed methods used to calculate CPI
Milton Friedman	Prominent advocate of monetary policy
Simon Kuznets	Developed method of measuring GDP

4 USES FOR WATER

Agricultural use	Water used to grow food; makes up about 70% of all global water use
Urban use	Water used in cities, including drinking, bathing, and waste management
Commercial Use	Water used in factories and for other industrial purposes; this type of water use often leads to pollution
Environmental use	Now refers to water that provides an ecosystem service; used to refer to leftover water

10 WATER PRICING TERMS

Average cost	The unit price on average; calculated by taking the total cost and dividing by that number
Marginal cost	The cost of the next unit; often unknown or set by the producers
Flat fee	Consumers pay one price and can use as much water as they want
Regulated Monopoly	A monopoly with government-imposed limits, often in the form of a price cap
Constant marginal price	Each unit costs the same as the last and consumers will conserve water
Decreasing block rate	Each unit is cheaper than the last and consumers are incentivized to use more
Increasing marginal price	Each unit is costlier than the last and consumers are pushed to use less water
Pumping subsidies	In India, electricity subsidies have lowered the cost of pumping groundwater to zero and greatly stressed resources
Increasing returns to scale	Producing more or buying more makes something cheaper
Decreasing returns to scale	Producing more or buying more makes something more expensive; a scarce resource often leads to an increasing marginal cost

10 CASE STUDY TERMS

South North Water Transfer Project	Massive water transfer project in China that will move water from the most south to the arid but populated north
98 th Meridian	Longitude that separates the moist eastern part of the United States from the arid west
Aral Sea	Central Asian saline lake that has shrunk by 74% in area and 90% in volume because of agriculture diversions
Antofagasta Region	Extremely dry region in Chile where mining firms have met their water needs by purchasing rights from agricultural users
Coal ash	Toxic byproduct of coal power that can leach heavy metals into the water supply
Benefit-cost analysis	Question that asks whether the total costs of pollution cleanup are lower than the benefits of cleaning up
Invasive species	Introduced species; cannot be controlled at the source, unlike other forms of pollution
Eutrophication	Condition wherein excess nutrients cause algal blooms that suck up the oxygen in a water body and lead to animal death
Water quality trading markets	Markets that allow polluters to trade their allotted nutrient amounts with other polluters in the same watershed
Private mitigation banks	Firms that restore and protect bodies of water and then sell credits to polluters



FINAL TIPS

FINAL TIPS

1. Economics definitions are confusing at first: paraphrase them to get a better understanding
2. Remember the implied *ceteris paribus*: all else held equal, assume nothing else changes
3. Supply and demand are CURVES and quantity supplied or demanded are POINTS on the curve
4. Changes in **quantity** supplied or demanded are linked to **price** and are shifts **along** the curve
5. Changes in exogenous factors (anything but price) cause shifts **of** the entire curve
6. Never, ever, ever, ever, ever confuse the two; your economics teacher will disown you forever
7. Shallow slope means high elasticity and vice versa; elasticity is not constant along the curve
8. Have an example of each good on the rivalry/excludability axis to remember the difference
9. Draw out the diagrams in and practice modeling shifts due to various factors
10. USAD almost always asks about unemployment types
11. Labor force participation \neq employment (the former includes the unemployed)
12. Know how to manipulate $MV = PY$
13. Long run equilibrium is always $SRAS = LRAS = AD$
14. A command economy is not necessarily a communist economy

ABOUT THE TEAM

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Josephine Richstad is the Director of Curriculum for DemiDec and the World Scholar's Cup. She lives in Boise, Idaho, where she continues to grumble about the basic tenets of economics while overseeing the production of many hundreds of pages of DemiDec materials as well as assessment for the World Scholar's Cup. To apply for a job with DemiDec or to learn more about the World Scholar's Cup, you can email her at josephine@demidec.com.



ROBERT BROWN

Robert Brown is a third year at the University of Chicago, studying economics and political science, with an intent to complete a joint degree (M.A.) in International Relations in his fourth year. Robert, like any good Chicago Economist™, has recoiled at everything having to do with Keynes and rejoiced at everything having to do with capitalism. His recent obsessions include Beat literature (notably exceptions include sidetracks into Ocean Vuong, Vladimir Nabakov, and Aldous Huxley's works), the Ring Road in Afghanistan, and attempting to play catch with his younger sister, who says usually says no.

