Data Science Bootcamp

Economics for Beginners

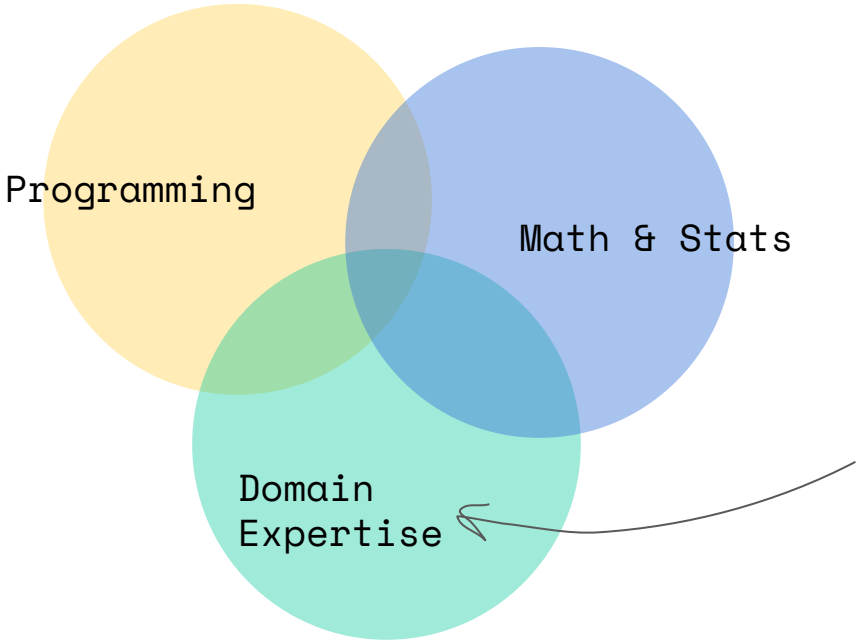
Content designed and curated by DataRockie 2022

Course Outline

Content

- ❏ What is Economics
- ❏ Production Possibility Frontier
- ❏ Branches of Economics
- ❏ Demand & Supply
- ❏ Elasticity
- ❏ Market & Competition
- ❏ Market Failure
- ❏ GDP, Unemployment and Inflation

Why study economics



Economics improve your decision making

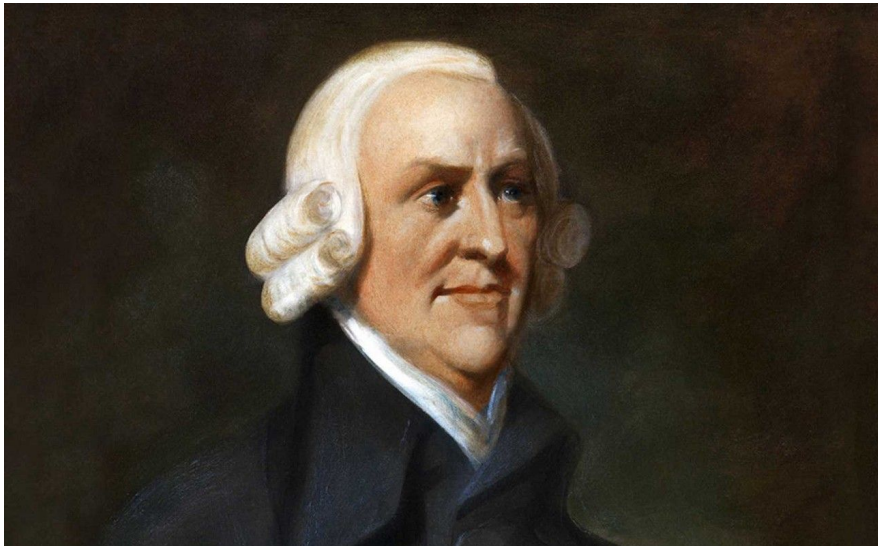
- Social science
- Decision science

What is Economics?

What is Economics?

Write one comment in the chat

Adam Smith



Father of Economics

1723-1790

Barter System

5 Books = 20 Bananas

https://sites.google.com/site/srishtisabharwaleportfolio/home/barter-system

Invisible Hand

An economic concept that describes the unintended greater social benefits and public good brought about by individuals acting in their own **self-interests**

The Theory of Moral Sentiment (1759)

Scarcity

The excess of human wants over what can actually be produced to fulfil these wants

Unlimited wants > Limited resources

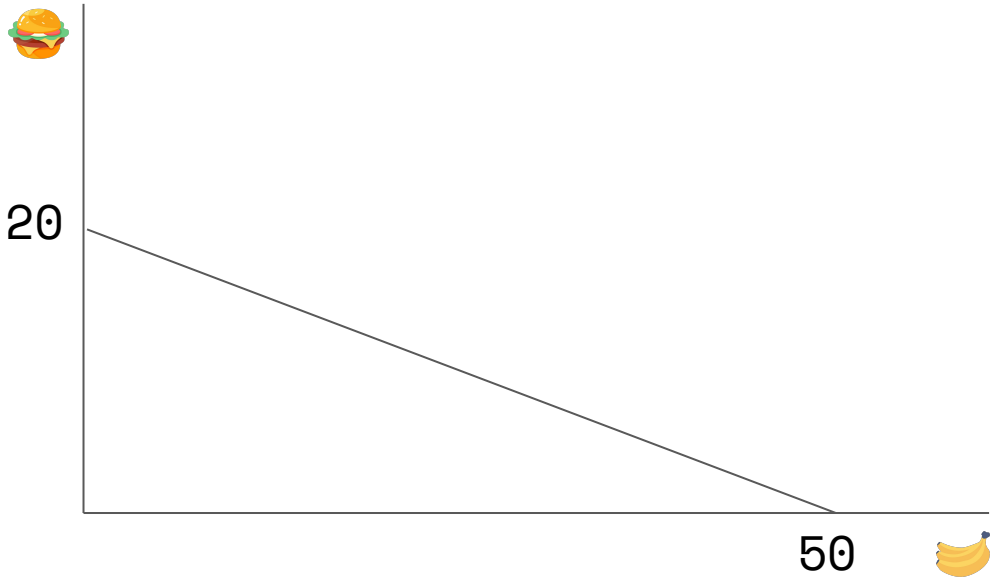
Economics

is the study of how society manages its scarce resources

Economy comes from the Greek word for “one who manages a household”

Source: Principles of Economics (2nd Edition) - Mankiw et al.

Limited Budget

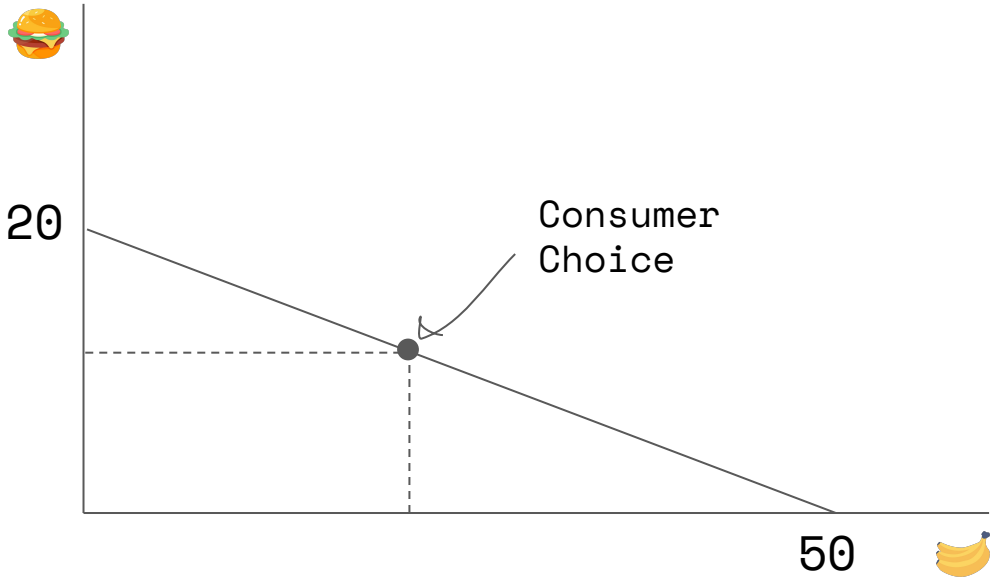


100$

2$

5$

Trade Off + Choice



100$

2$

5$

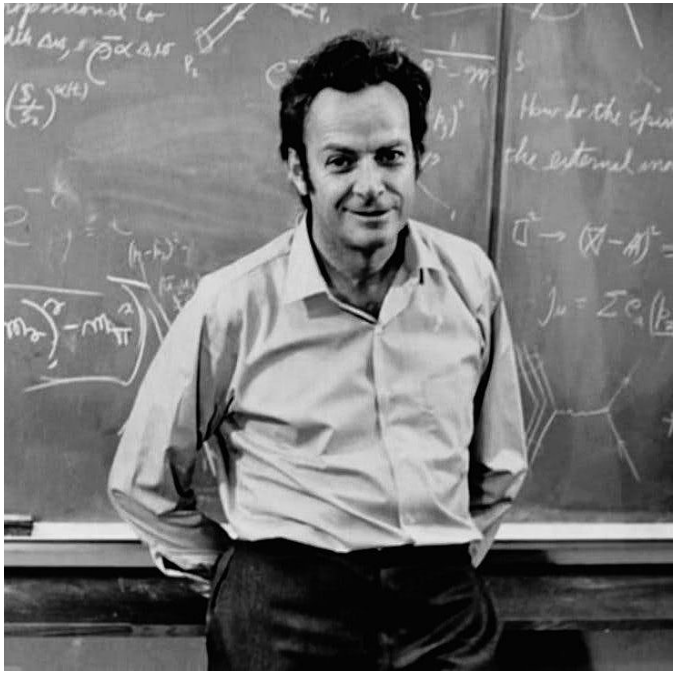
Opportunity Cost

The best forgone alternative (whatever must be given up to obtain)

Cost of Education

- Tuition
- Books
- Accommodation
- Living expenses
- Wages that would have been earned

Implicit cost



Richard Feynman

Education is **not free**. You have to pay attention.

Key Economics Terms

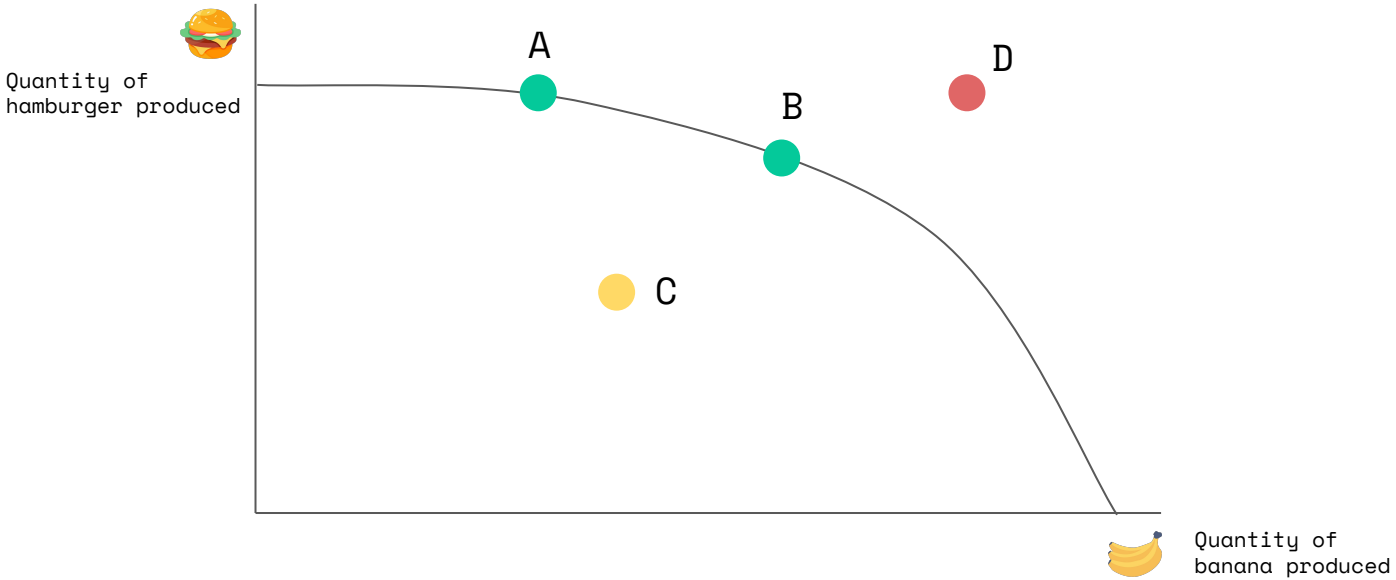
- ❑ Scarcity
- ❑ Limited Resources
- ❑ Trade Off
- ❑ Choice
- ❑ Opportunity Cost

Production Possibility Frontier

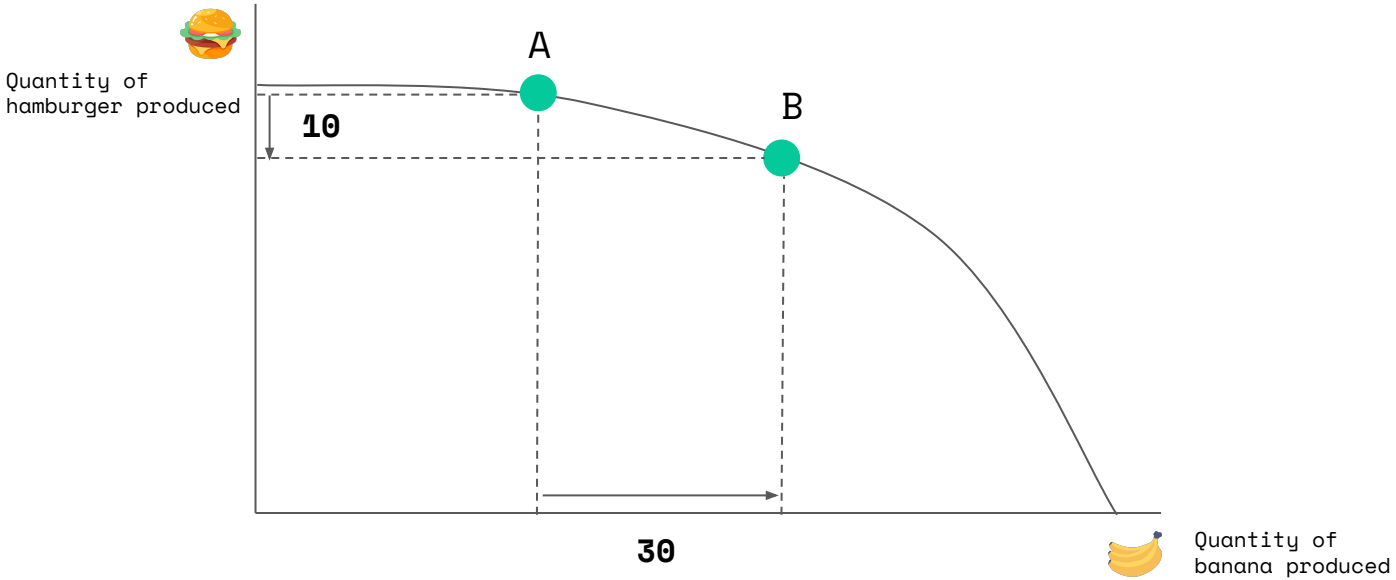
The Frontier

PPF stands for Production Possibility Frontier. It shows the combination of output the economy can produce.

PPF (or PPC)



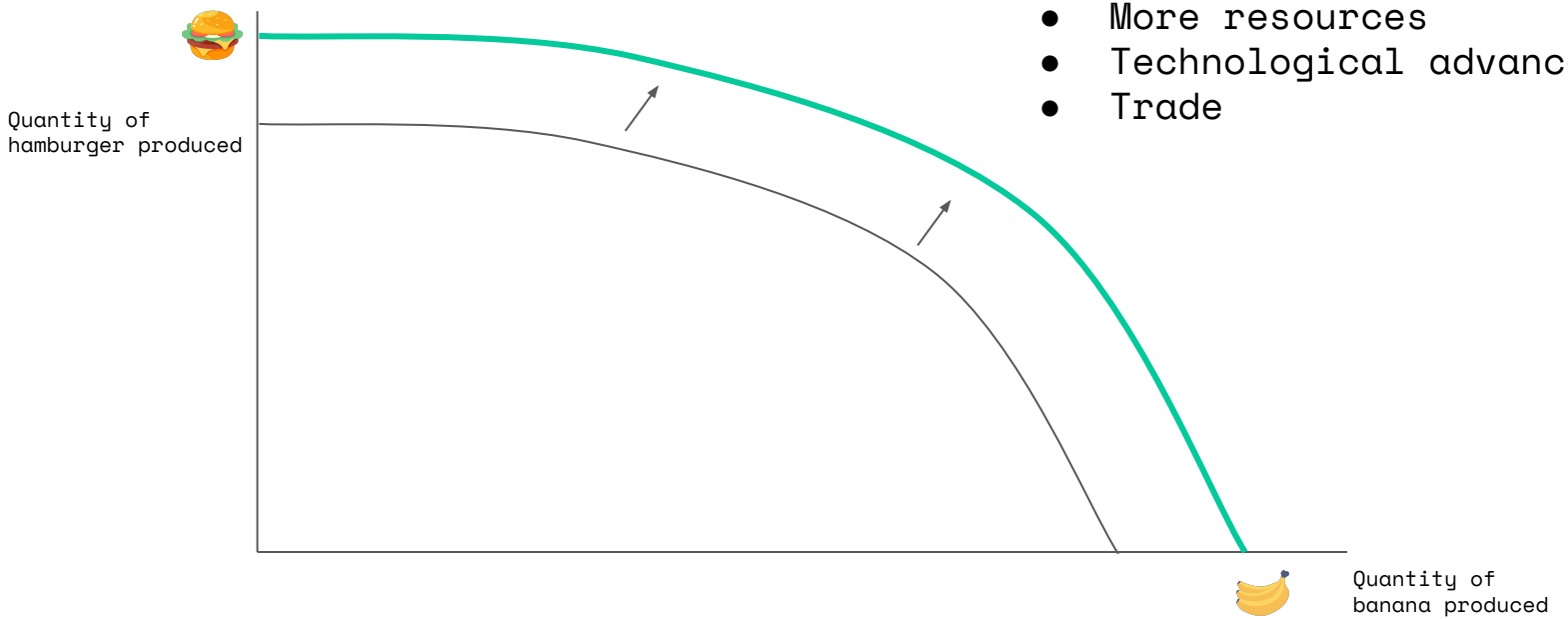
Opportunity Cost



PPF Expansion

One of the main goal of our economy is economic growth and efficiency

Growth



- More resources
- Technological advancement
- Trade

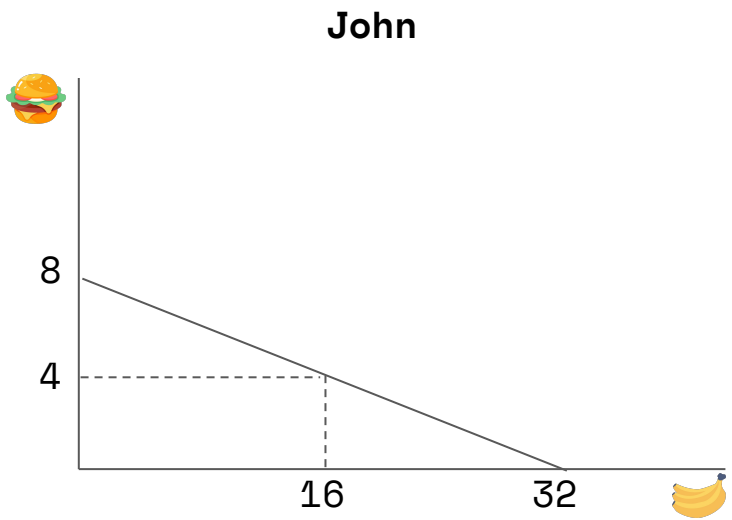
Gain From Trade

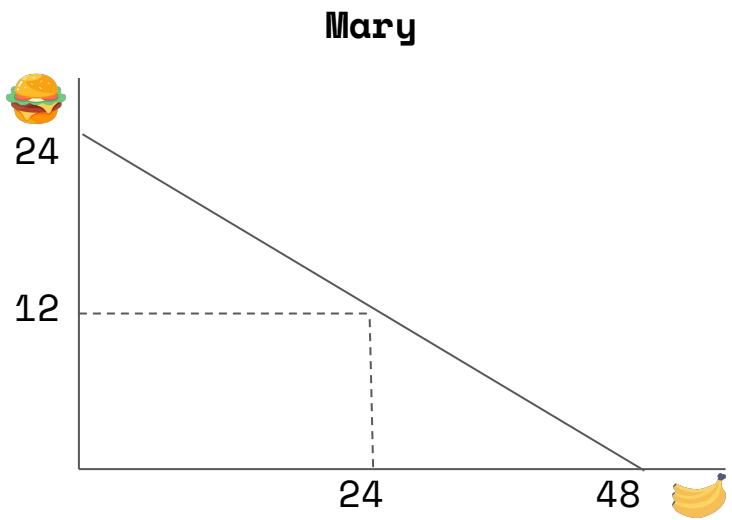
	Minutes needed to make 1 unit of product		Amount Produced	
	Hamburger	Banana	Hamburger	Banana
John	60 min	15 min	8 unit	32 unit
Mary	20 min	10 min	24 unit	48 unit

* Working 8 hours a day

Source: Principles of Economics (2nd Edition) - Mankiw et al.

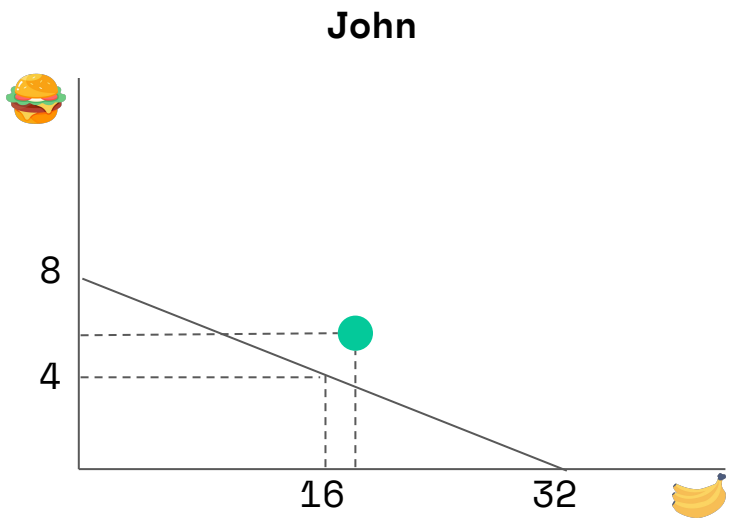
PPC of John & Mary

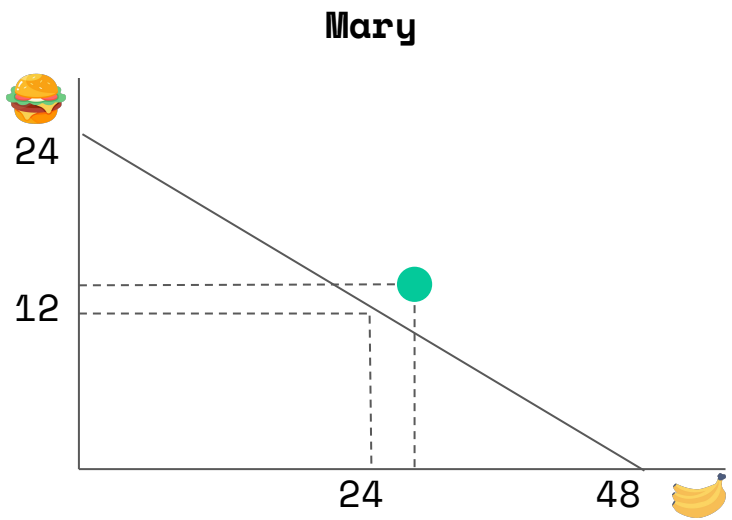




Source: Principles of Economics (2nd Edition) - Mankiw et al.

If both trade products





Source: Principles of Economics (2nd Edition) - Mankiw et al.

Gain From Trade

	John		Mary	
	Hamburger	Banana	Hamburger	Banana
Without trade	4	16	12	24
With Trade				
Production	0	32	18	12
Trade	+5	-15	-5	+15
Consumption	5	17	13	27

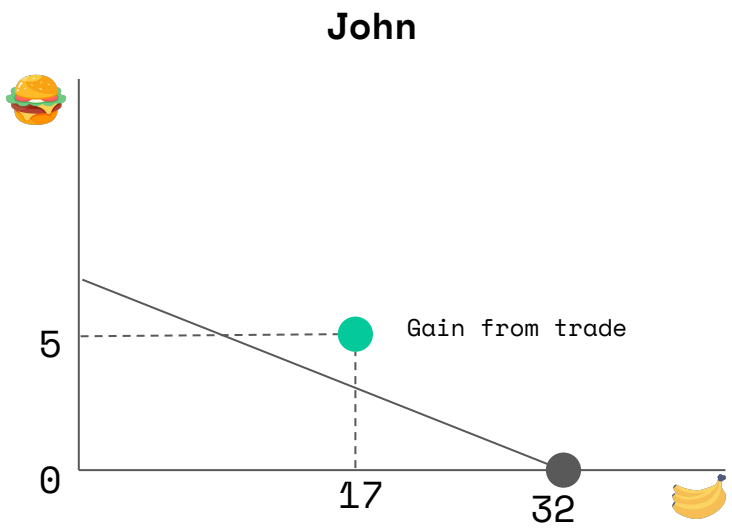
Source: Principles of Economics (2nd Edition) - Mankiw et al.

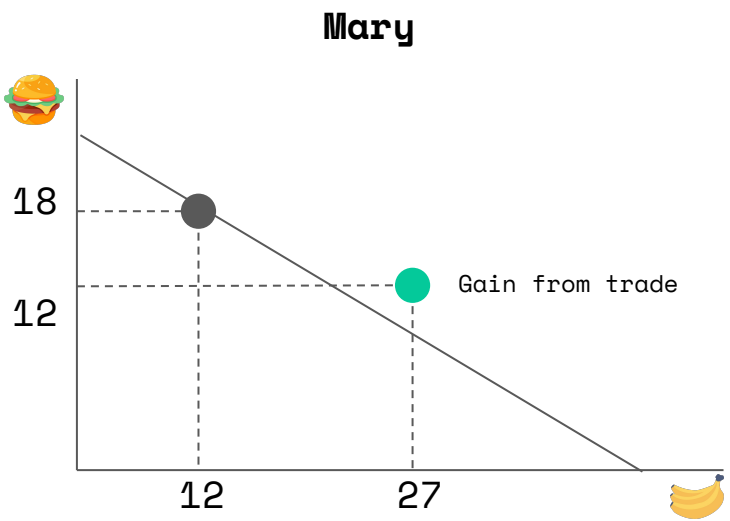
Everyone better off

	John		Mary	
	Hamburger	Banana	Hamburger	Banana
Without trade	4	16	12	24
With Trade				
Production	0	32	18	12
Trade	+5	-15	-5	+15
Consumption	5 (+1)	17 (+1)	13 (+1)	27 (+3)

Source: Principles of Economics (2nd Edition) - Mankiw et al.

Everyone better off





Source: Principles of Economics (2nd Edition) - Mankiw et al.

Key Economics Terms

- ❑ Production Possibility Frontier
- ❑ Trade
- ❑ Specialization

Branches of Economics

Branches of Economics

- Microeconomics
- Macroeconomics

Scope of Study

- **Micro**economics => Individual & firm
- **Macro**economics => A larger group like country

Demand & Supply

Core concepts in economics (used in both micro and macro)

The Difference

- Need
- Want
- Demand

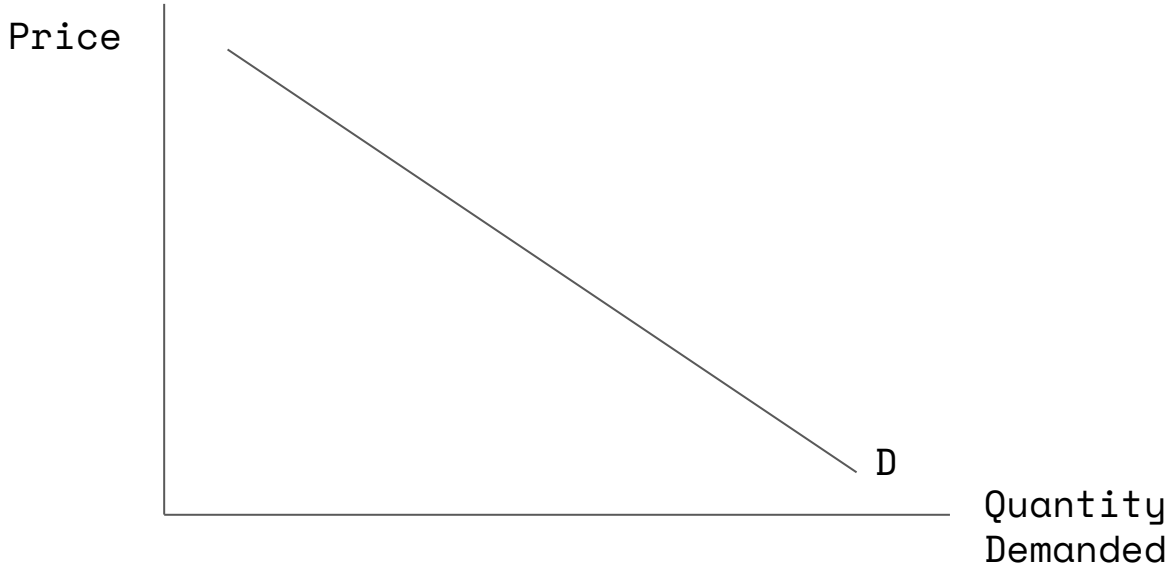
The Difference

- Need => hungry
- Want => KFC, McDonald, Pizza Hut
- Demand => Want backed up by money

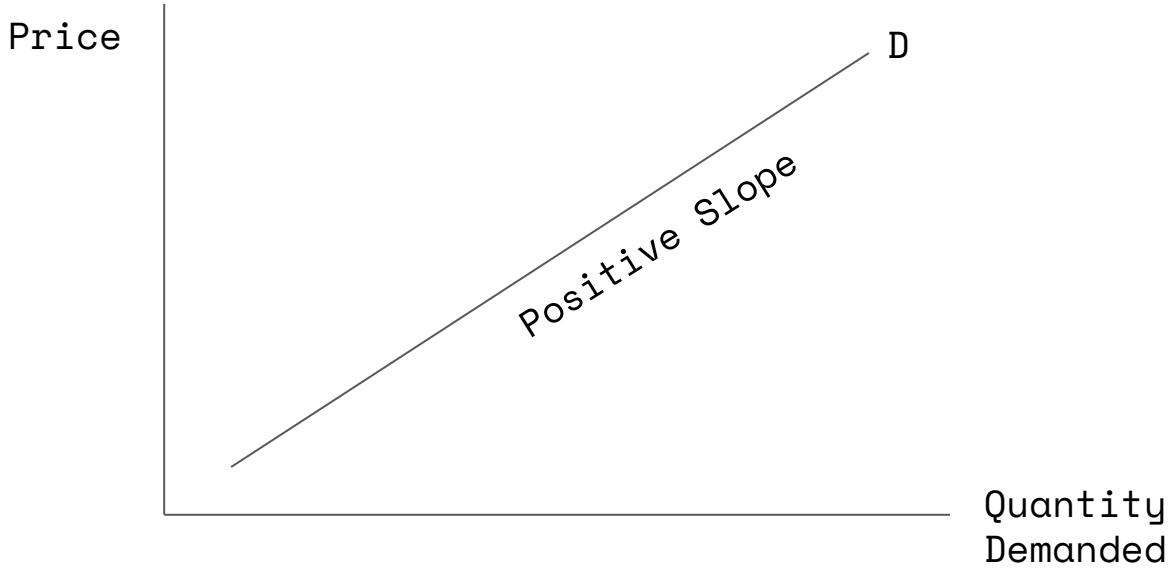
Demand

The amount of good and service **consumers** are willing and able to purchase at each price

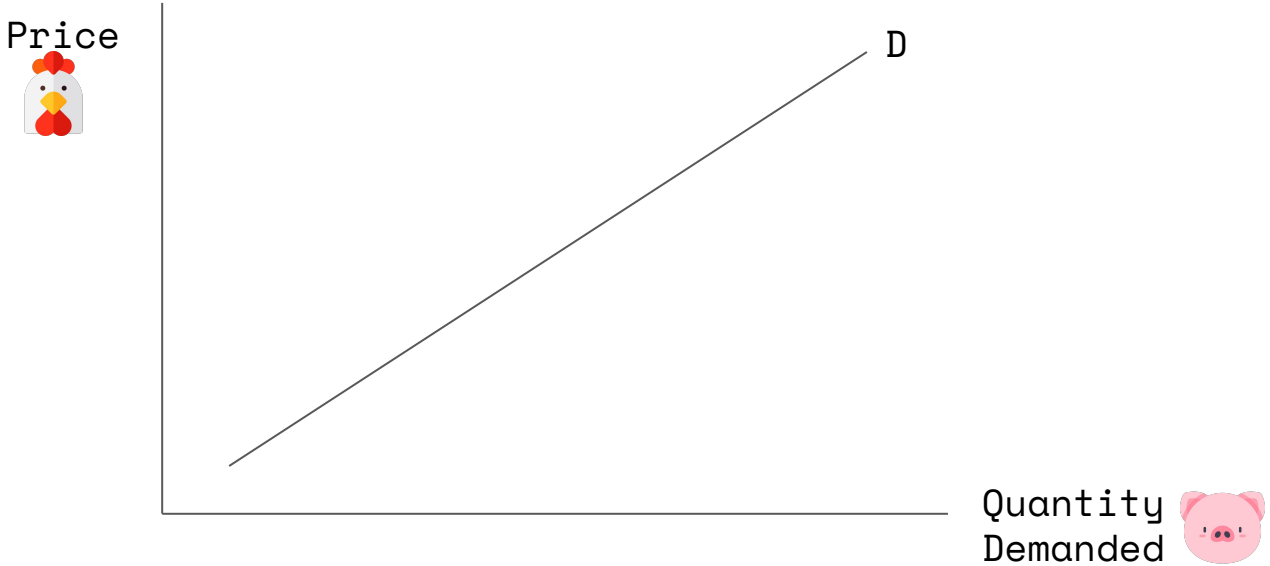
Demand 🍓🍓



Can Demand be like this?



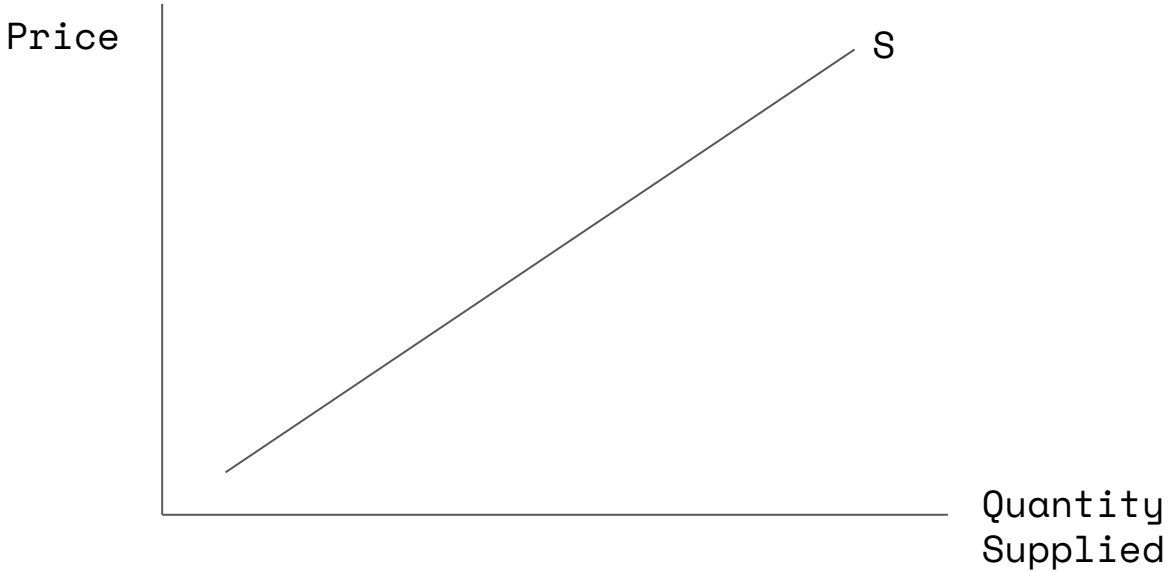
Yes! Substitute Products



Supply

The amount of good and service **producers** are willing and able to sell at each price

Supply 🍓



Another Perspective

- Demand represents willingness to pay
- Supply represents cost

2002

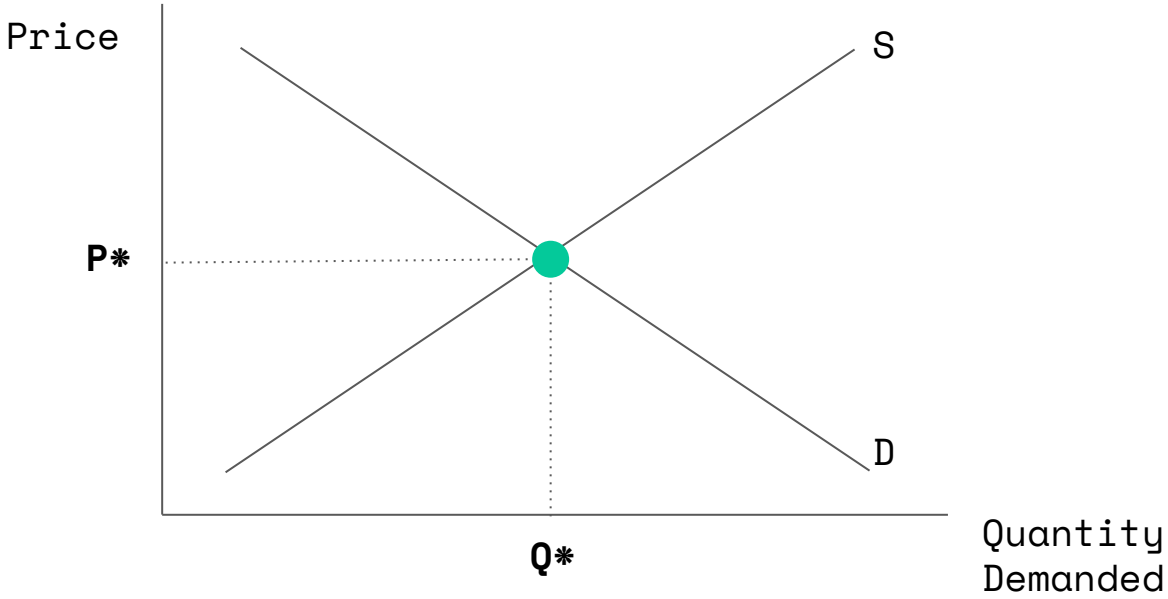
Equilibrium (n.)

The state of balance between two opposing forces

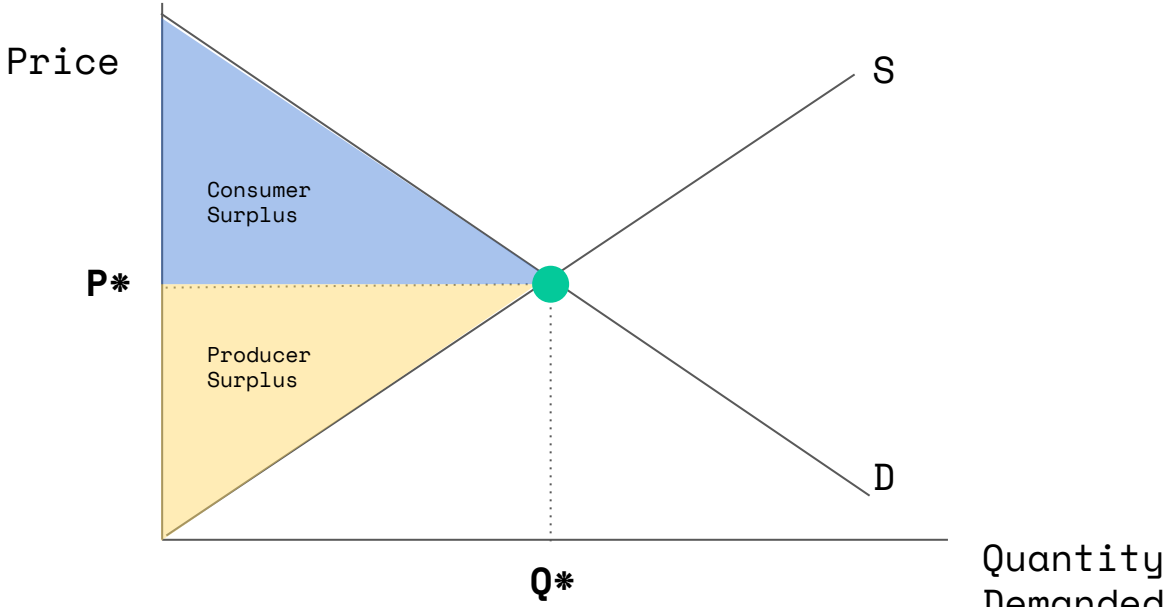
Equilibrium

When demand meets supply (intersect) we get the equilibrium price and quantity

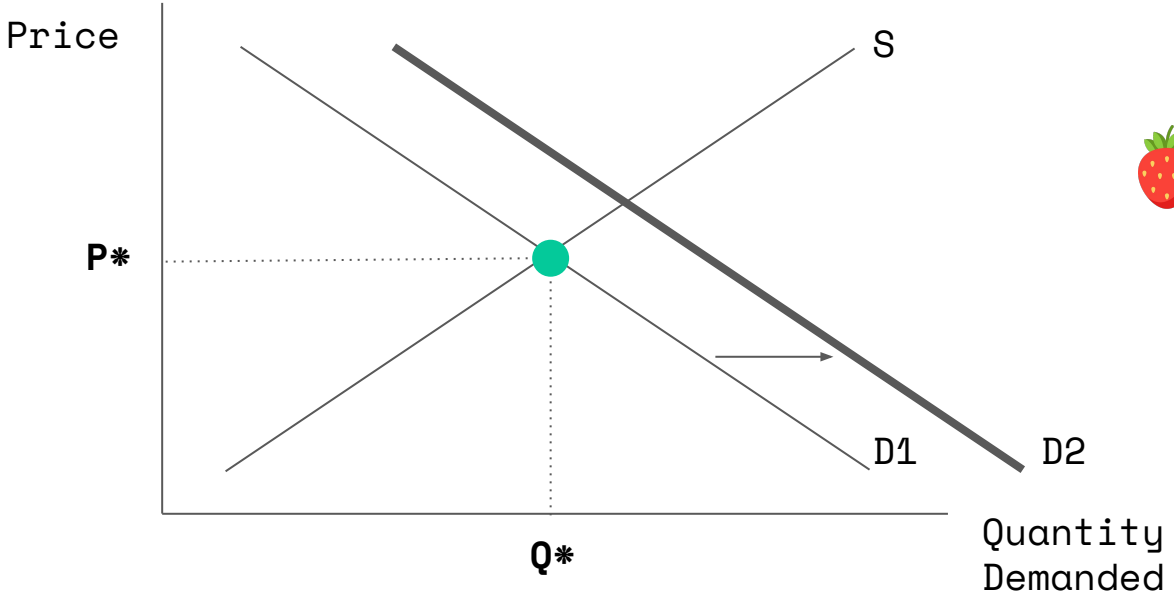
Equilibrium P*, Q* 🍓



Social Surplus

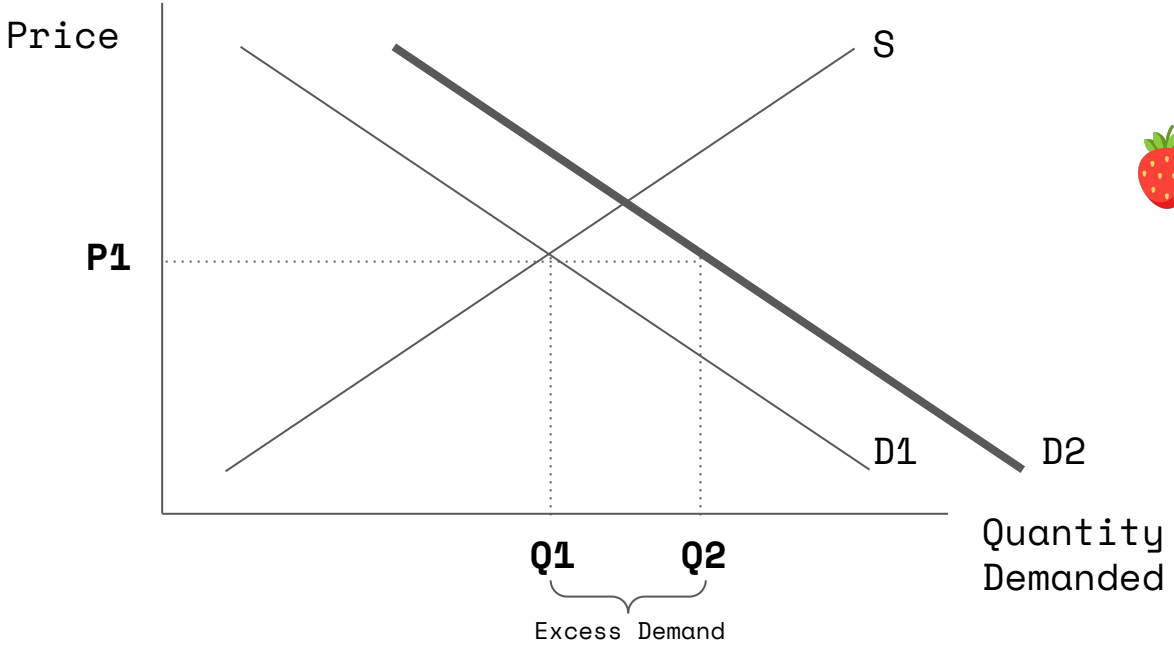


Shift in Demand



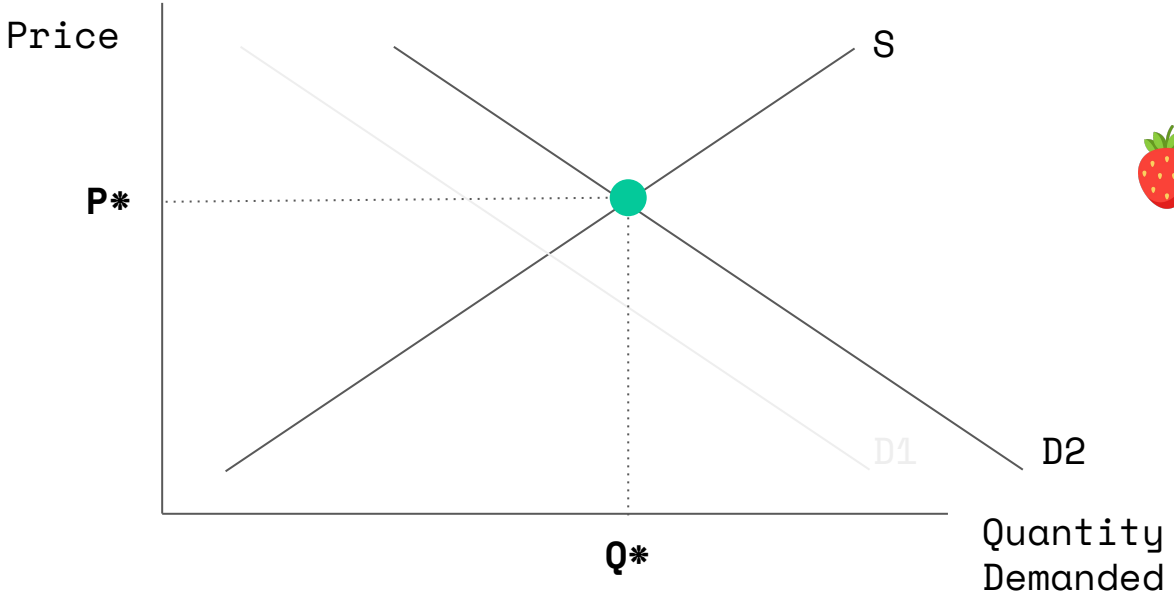
Winter season

Excess Demand



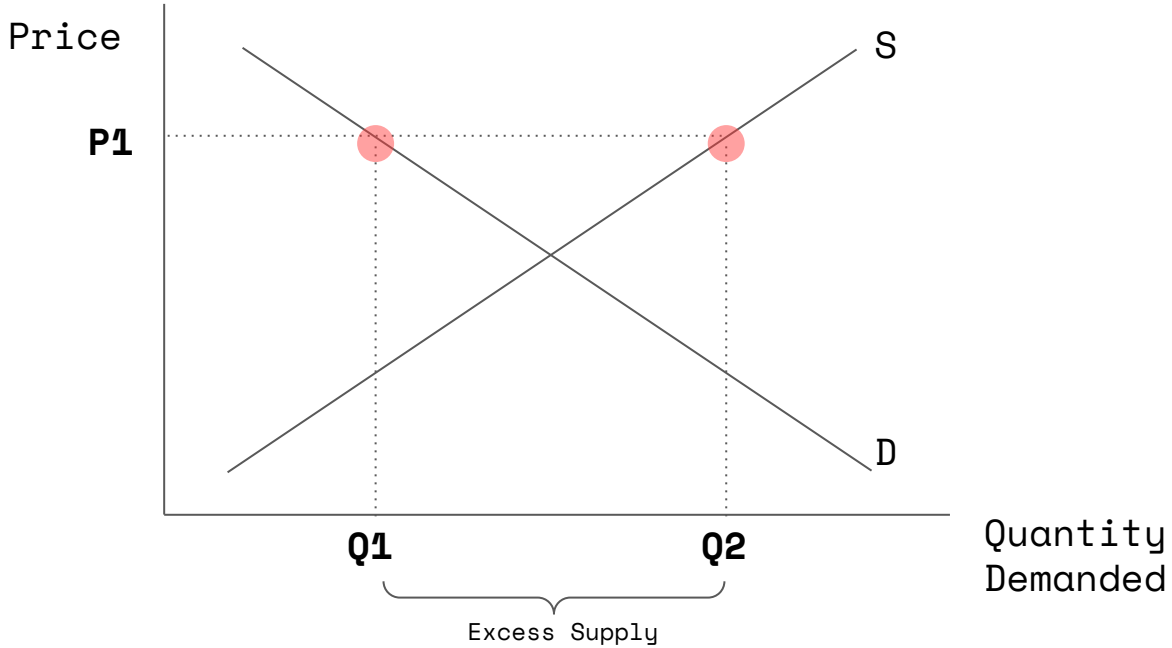
Winter season

New Equilibrium

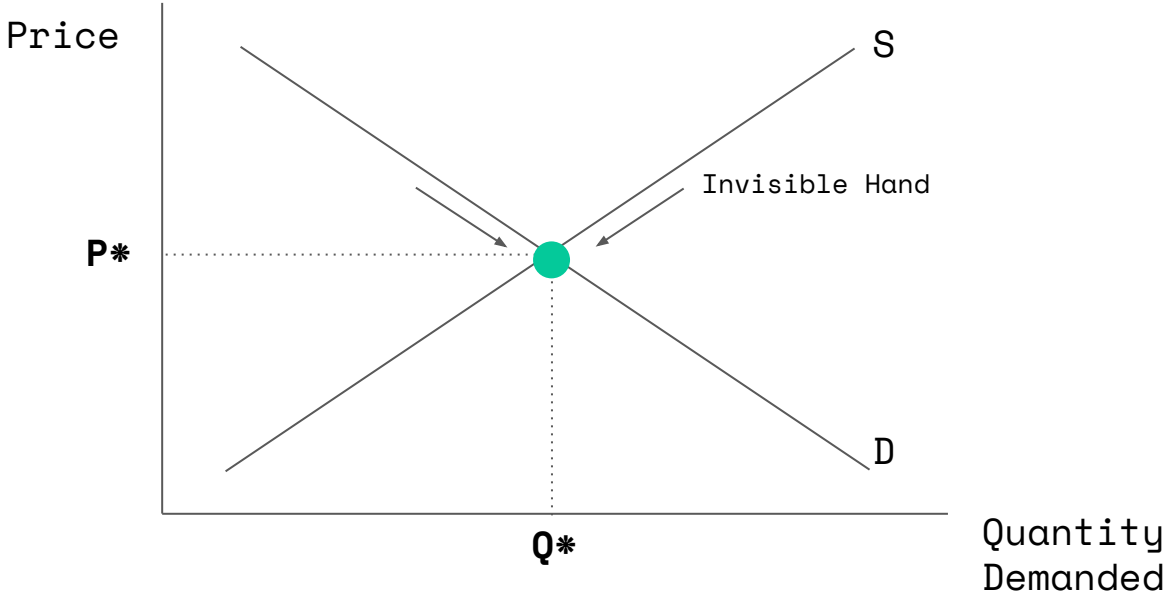


Winter season

Excess Supply



Price Gradually Adjusted



Price Control (Policy)

- Price ceiling
- Price floor

Minimum Wage

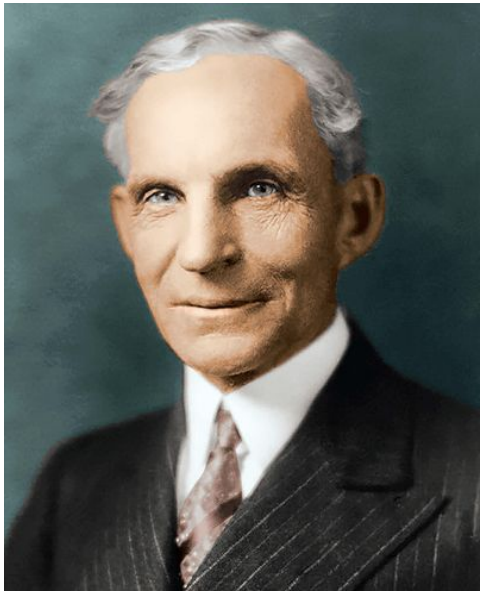
'GOLD RUSH' IS STARTED BY FORD'S $5 OFFER

Thousands of Men Seek Employment in Detroit Factory.

Will Distribute $10,000,000 in Semi-Monthly Bonuses.

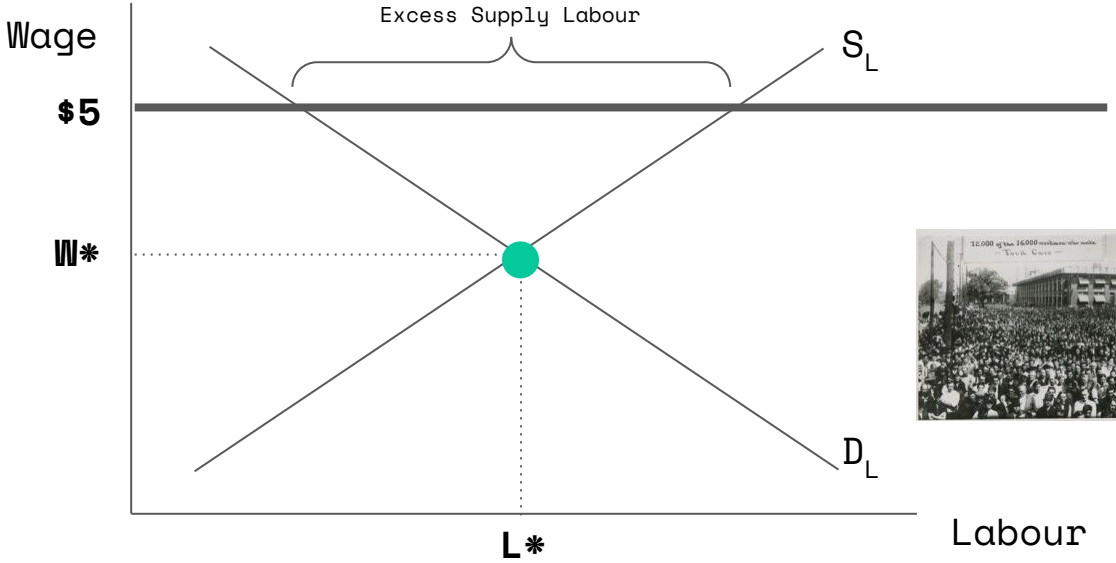
No Employe to Receive Less Than Five Dollars a Day.

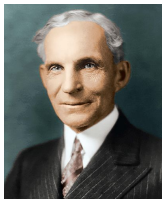
(TIMES-STAR SPECIAL DISPATCH.)
DETROIT, Mich., January 7.—Henry Ford in an interview to-



Henry Ford, **minimum wage** policy $5 a day in 1914

Minimum Wage



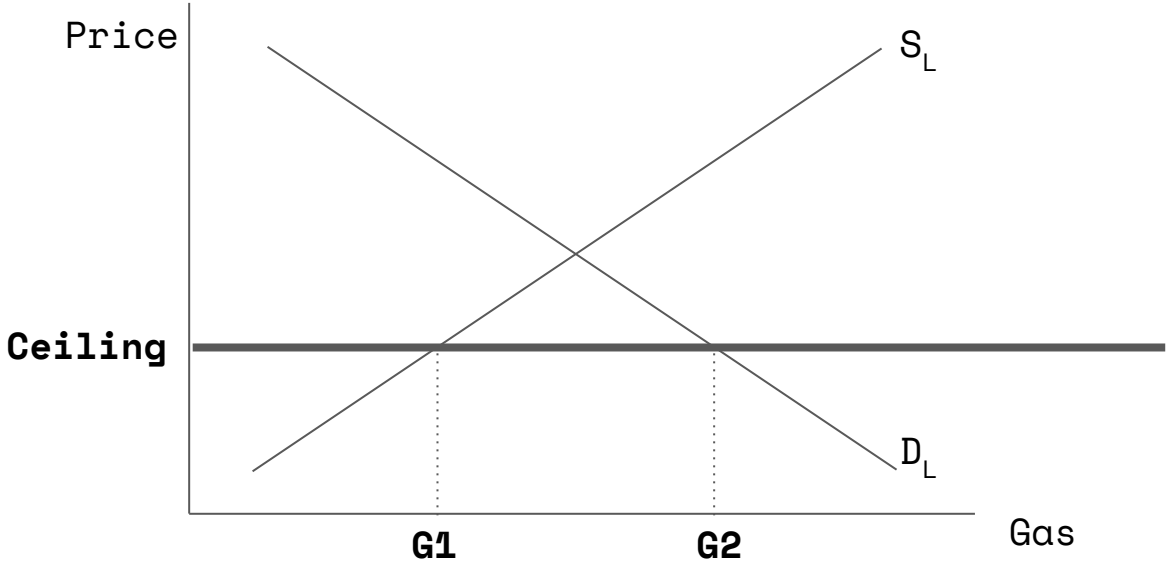


https://henryfordsemesterproject.weebly.com/the-dream.html

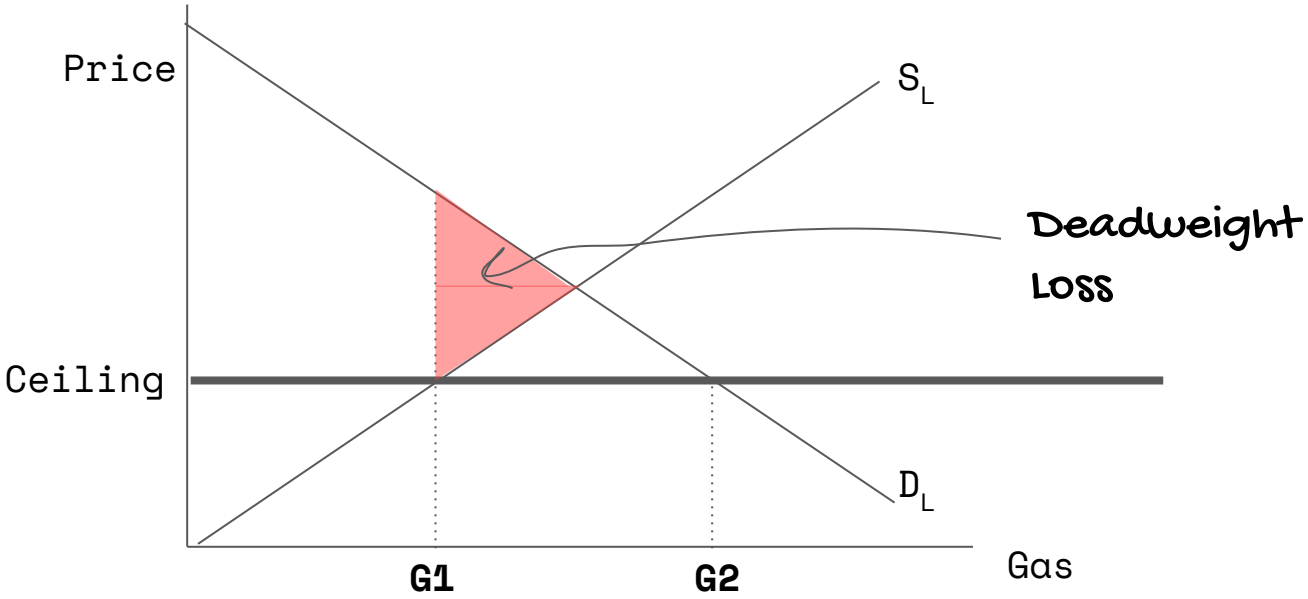
Deadweight Loss

A cost to society created by market **inefficiencies** which occurs when demand and supply are out of equilibrium

Price Ceiling Oil/Gas



Inefficiency



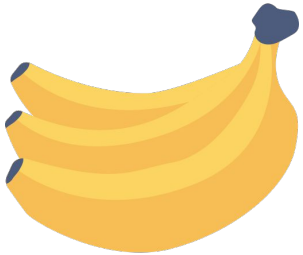
Elasticity

measures the **percentage change** of one economic variable in response to a percentage change in another

Price Elasticity

$$= \frac{\%\text{change in quantity}}{\%\text{change in price}}$$

What does this mean?



Banana has price elasticity of **2**

Elastic vs. Inelastic

If . . .	Then . . .	And It Is Called . . .
$\%$ change in quantity $>$ $\%$ change in price	$\frac{\%\text{ change in quantity}}{\%\text{ change in price}} > 1$	Elastic
$\%$ change in quantity $=$ $\%$ change in price	$\frac{\%\text{ change in quantity}}{\%\text{ change in price}} = 1$	Unitary
$\%$ change in quantity $<$ $\%$ change in price	$\frac{\%\text{ change in quantity}}{\%\text{ change in price}} < 1$	Inelastic

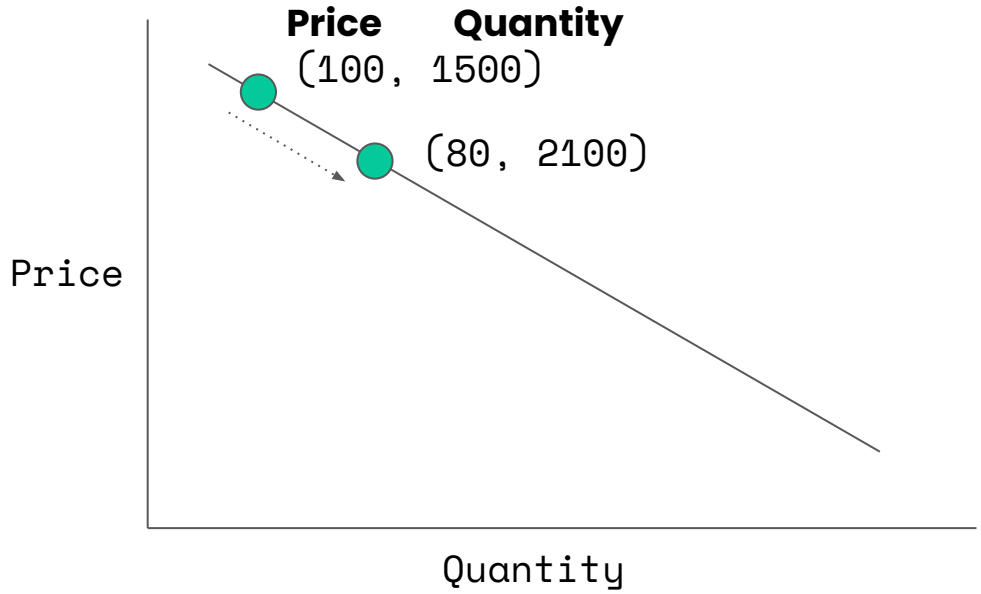
https://openstax.org/books/principles-economics-2e/pages/5-1-price-elasticity-of-demand-and-price-elasticity-of-supply

iPhone 13

Elastic or Inelastic?

If price drops 20%
What do you think about iPhone sales?

Easy to Compute



% Change in quantity

$$= \frac{(1500-2100)}{(1500+2100)/2} * 100$$
$$= 33.33$$

% Change in price

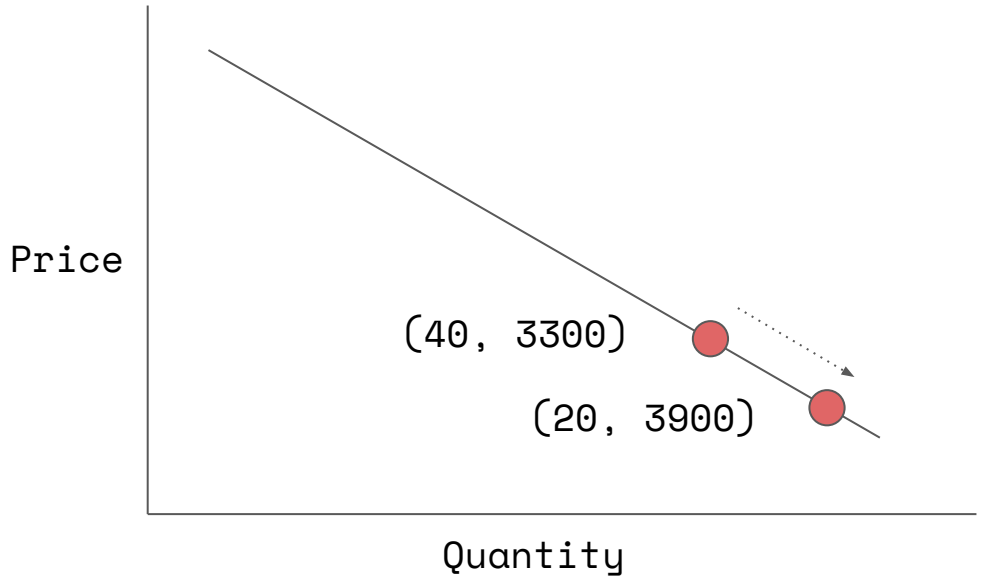
$$= \frac{(100-80)}{(100+80)/2} * 100$$
$$= 22.22$$

price elasticity

= 33.33 / 22.22 = 1.5

* we can ignore the +/- sign for now

Easy to Compute



% Change in quantity

$$= \frac{(3300-3900)}{(3300+3900)/2} * 100$$
$$= 16.67$$

% Change in price

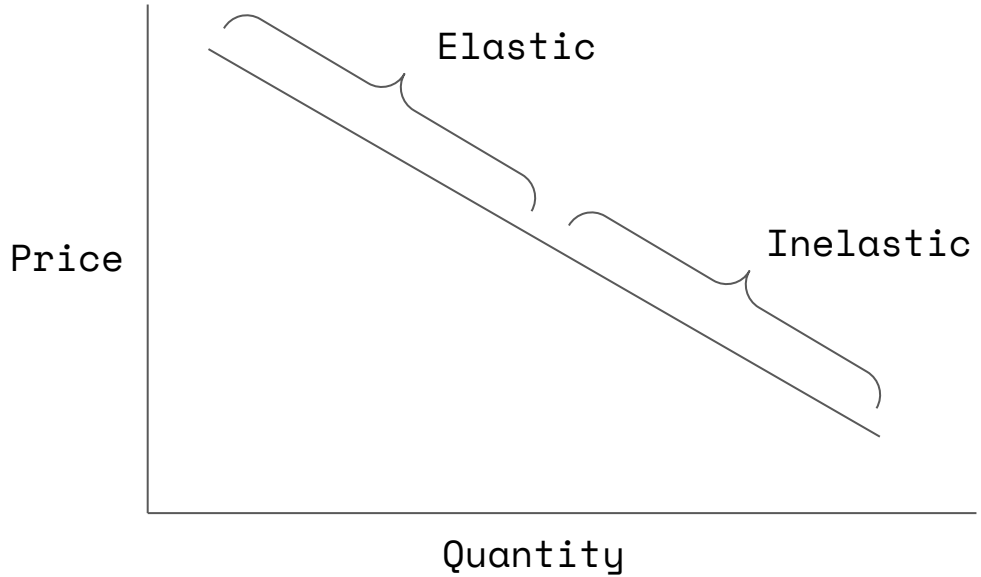
$$= \frac{(40-20)}{(40+20)/2} * 100$$
$$= 66.67$$

price elasticity

= 16.67 / 66.67 = 0.25

* we can ignore the +/- sign for now

Mind Blown



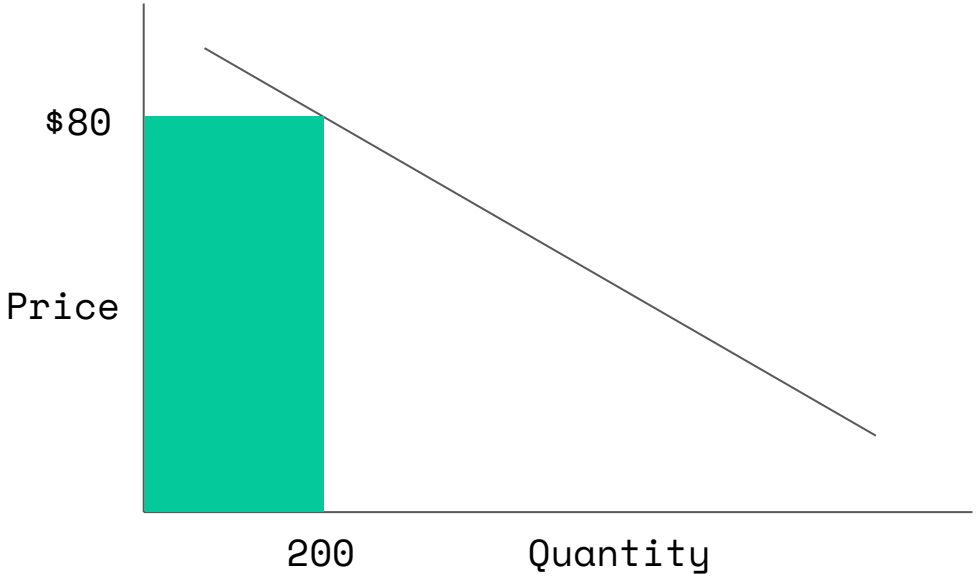
Total Revenue

Revenue that our business make

= P * Q

= Price * Quantity

Total Revenue



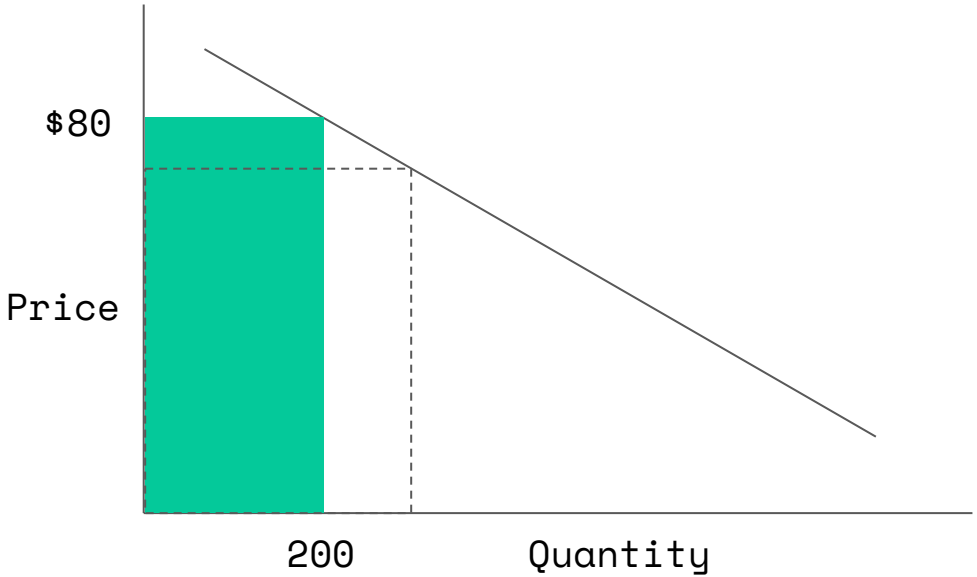
= $80 * 200
= $16000

Marketing Implication

Elasticity can guide our pricing strategy

- When e is high, lower the price
- When e is low, raise the price

New Total Revenue



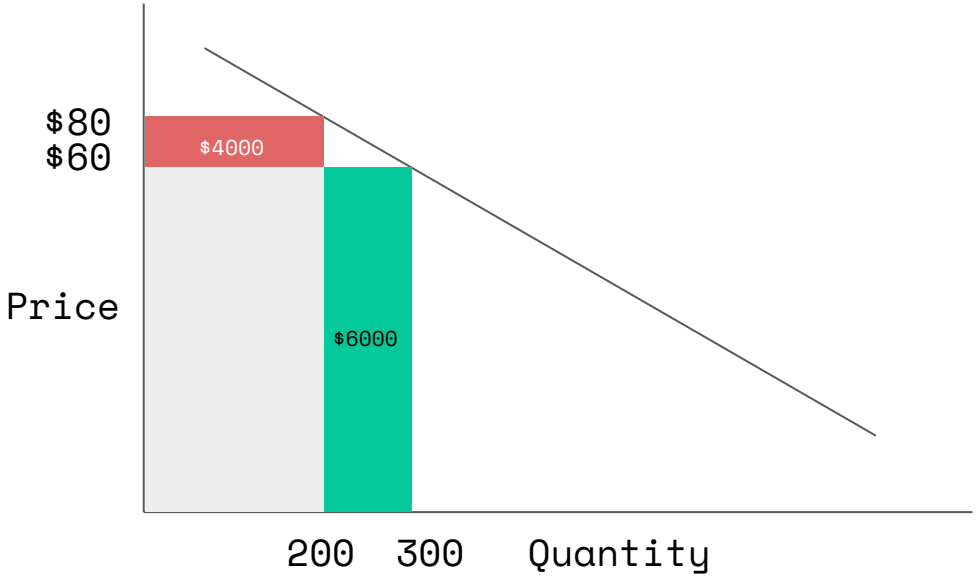
$TR_{original}$

= $80 * 200
= $16000

TR_{new}

= $60 * 300
= $18000

Change Decomposition



$TR_{original}$

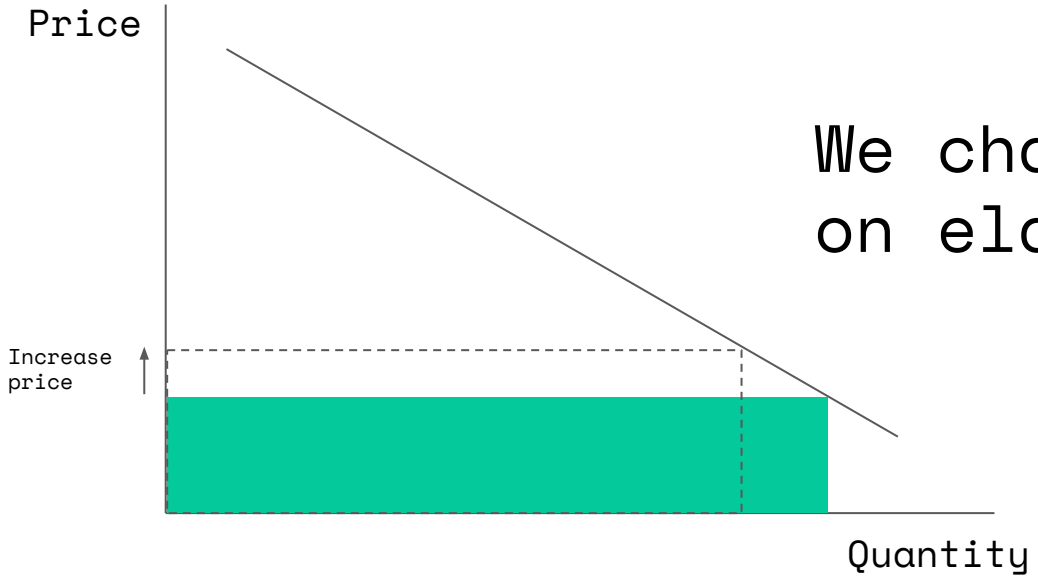
= $80 * 200
= $16000

TR_{new}

= $60 * 300
= $18000

$TR_{original}$ + (6000-4000)

New Total Revenue



We change price based on elasticity

Market Competition

Levels of Competition

- Number of firms
- Product differentiation
- Perfect information
- Free entry & exit criteria

Perfect Competition

- Number of firms => **Many**
- Product differentiation => **Identical**
- Perfect information => **Yes**
- Free entry & exit criteria => **Yes**

Monopolistic

- Number of firms => **Many**
- Product differentiation => **Little**
- Perfect information => **Yes**
- Free entry & exit criteria => **Yes**

Best, if difficult
to be copied

Product differentiation
is how business add value
and command higher price

ไก่ทอดหาดใหญ่
ไก่ทอดเชียงราย
ไก่ทอดประตูน้ำ

Oligopoly

- Number of firms => **Few**
- Product differentiation => **Little**
- Perfect information => **Not Really**
- Free entry & exit criteria => **No**

Oligopoly is common

* this could be monopolistic too, based on assumptions

Monopoly

- Number of firms => **One**
- Product differentiation => **No**
- Perfect information => **No**
- Free entry & exit criteria => **No**

https://thestandard.co/train-back-to-bangkok020163/

Market Failure

Market Failure

When the market on its own does not allocate resources **efficiently** in a way that balances social cost and benefits

Causes of Market Failure

- Asymmetric Information
- Market Power
- Externality
- Public Goods (Free Rider)

Second-hand car

Car dealers

Is it a lemon or good car?

Consumers

Market Power

Some companies have power over the market to control price and quantity

Reduced competition

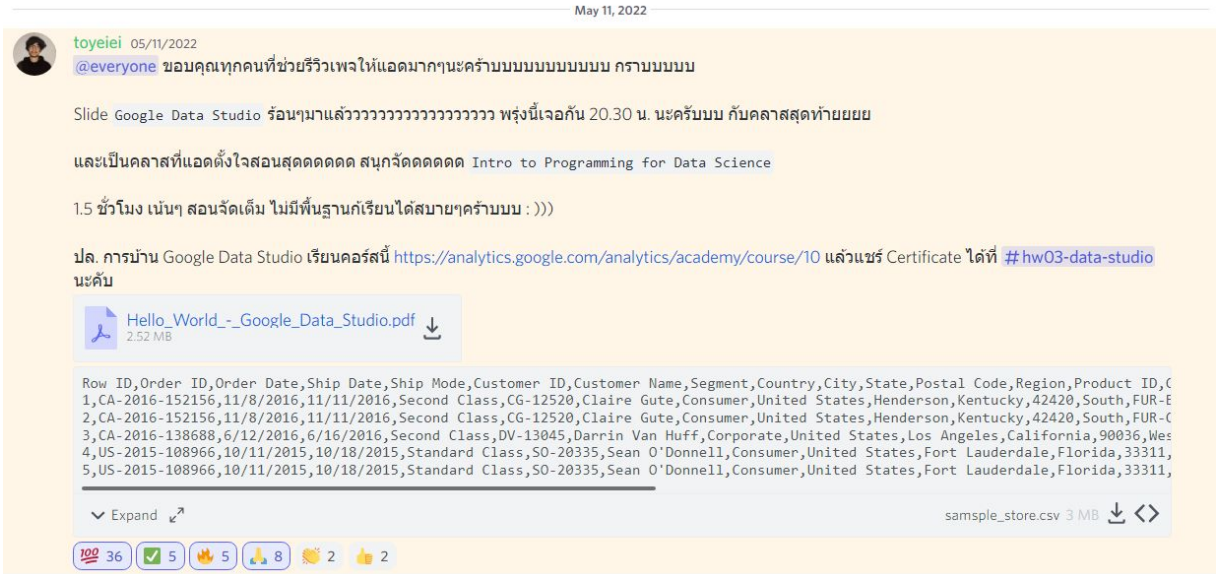
https://www.blognone.com/node/125938

Public Goods

Public goods create a **free rider** problem because consumers are able to utilize public goods without paying for them

Free Rider

- 3000+ students in discord
- 1500+ join live classes
- 130 very lovely students support us by writing reviews



Externality

an **indirect cost** or **benefit** to an uninvolved third party that arises as an effect of another party's activity

Production Externality

Too much production (not optimal) can cause **a detrimental effect** on environment

What is GDP exactly

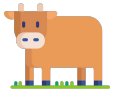
GDP (Gross Domestic Product) - a **monetary measure** of the market value of all the final goods and services produced in a specific time period by countries

GDP Formula

=SUM(P * Q)

for all products & services in a country

where
P is price
Q is quantity

	Price		Quantity	Value
	$1000	*	10	$10000
	$200	*	4	$800
	$50	*	10	$500
	$20	*	5	$100
	$100	*	8	$800

$$GDP_{2022} = \$12,200$$

Given time period

How to measure income

- GDP = Gross Domestic Product
- GNP = Gross National Product

GNP vs. GDP

Value of all goods & services made by a country's residents & businesses, regardless of production location

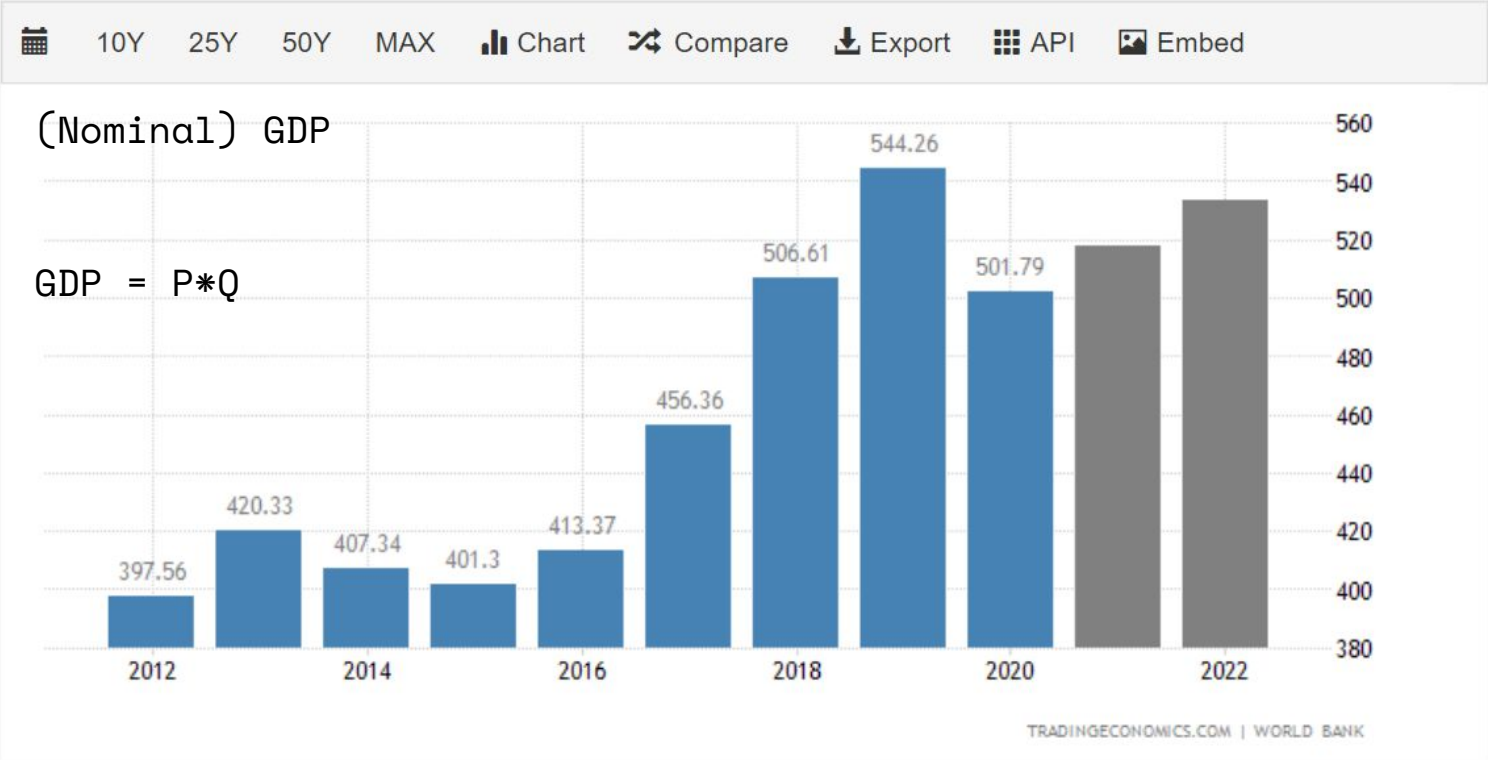
Measures production inside of a country, no matter who makes it

https://www.performancemagazine.org/kpi-gross-national-product-gnp/

GDP has two flavours

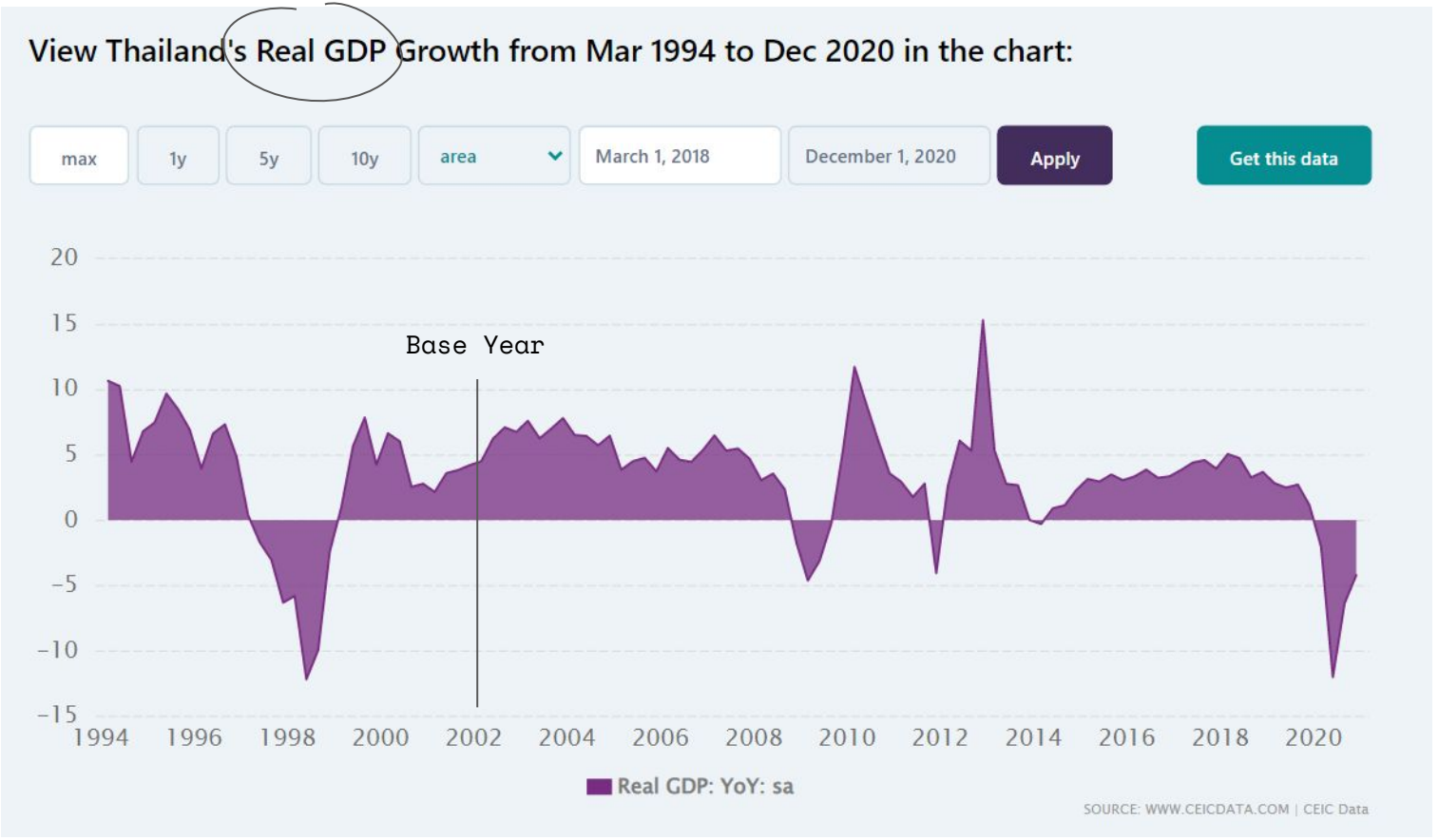
- Nominal GDP
- Real GDP

GDP Deflator = Nominal GDP / Real GDP * 100



https://tradingeconomics.com/thailand/gdp

View Thailand's Real GDP Growth from Mar 1994 to Dec 2020 in the chart:



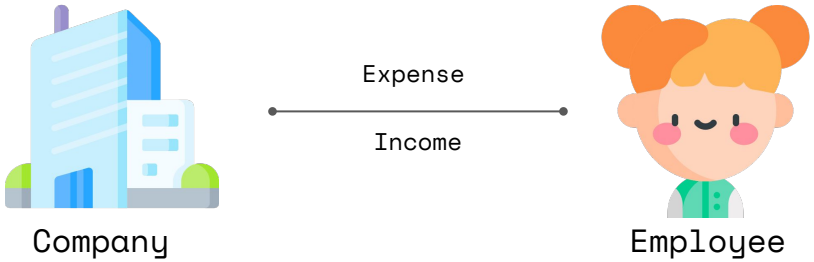
https://www.ceicdata.com/en/indicator/thailand/real-gdp-growth

GDP Calculation

- Income
- Expenditure
- Value-Added

Income = Expense

Income of one person comes from the expense of others

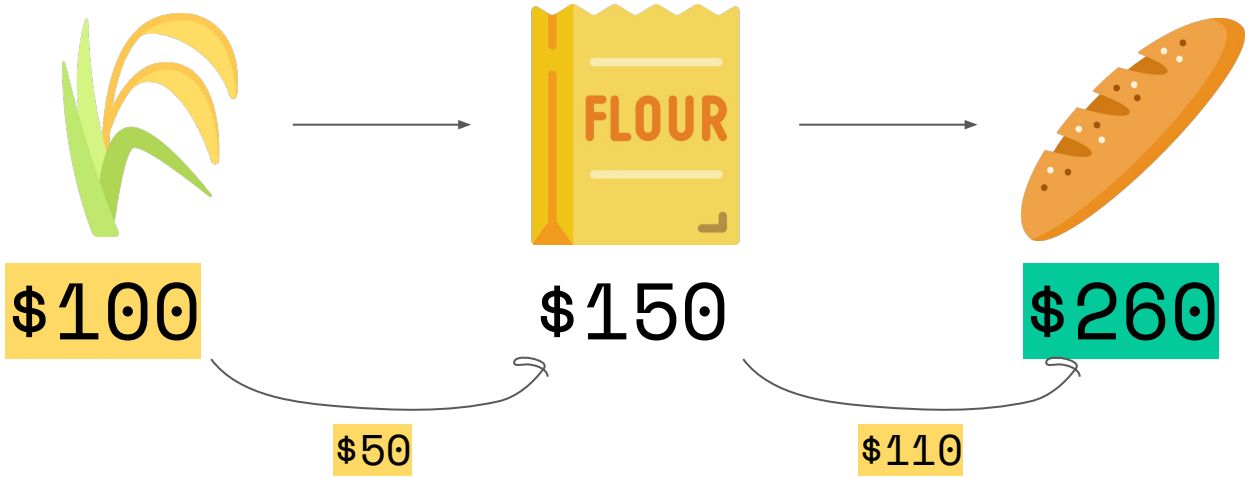


How much is the GDP?

$100 $150 $260

Value Added Approach

100+50+110 = 260



Expenditure Approach

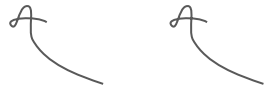
$$Y = C + I + G + (X - M)$$

Where

- Y = GDP
- C = Consumer Spending
- I = Investment Spending
- G = Government Spending
- X = Exports
- M = Imports

Interest Rate

$$Y = C + I + G + (X - M)$$



When interest rate change **C**, **I** will **likely** change too (in Theory)

How r impact C,I

$$Y = C + I + G + (X - M)$$

i ▼ → C ▲ I ▲ → Y ▲

i ▲ → C ▼ I ▼ → Y ▼

Consumer

$$Y = C + S$$

Consumption + Saving

Thinking in Money

i ▲

Bank

MS ▼

Bank sucks money out of the economy
=> slow down economic growth

GDP != GDH

GDP cannot measure the country success without measuring the country happiness level

Joseph Stiglitz (Nobel Prize Winner)

Econometrics

Econometrics

the application of **statistical methods** to economic data in order to give empirical content to economic relationships

Source: Wikipedia

Linear Regression

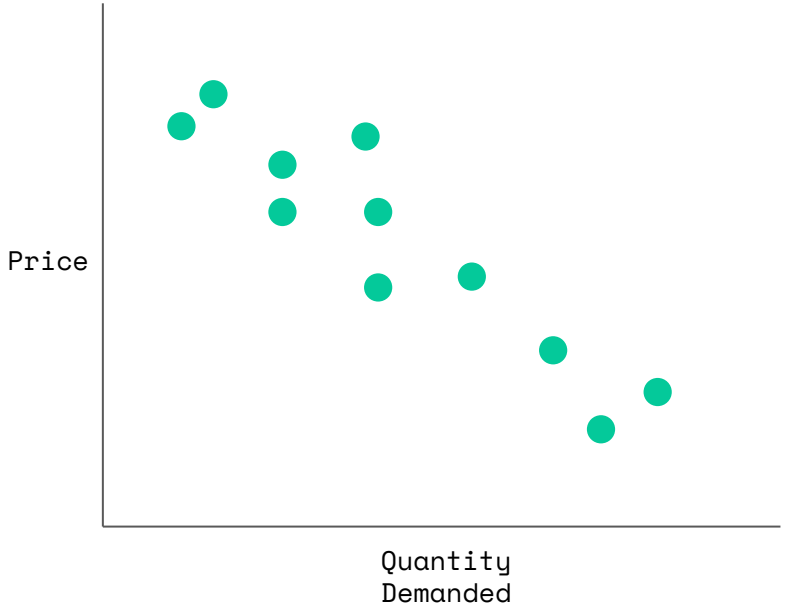
The starting point of econometric analysis used to model a wide variety of economic relationships

Source: Google

Simple Model

$$y = f(x)$$

$$y = b0 + b1*x$$

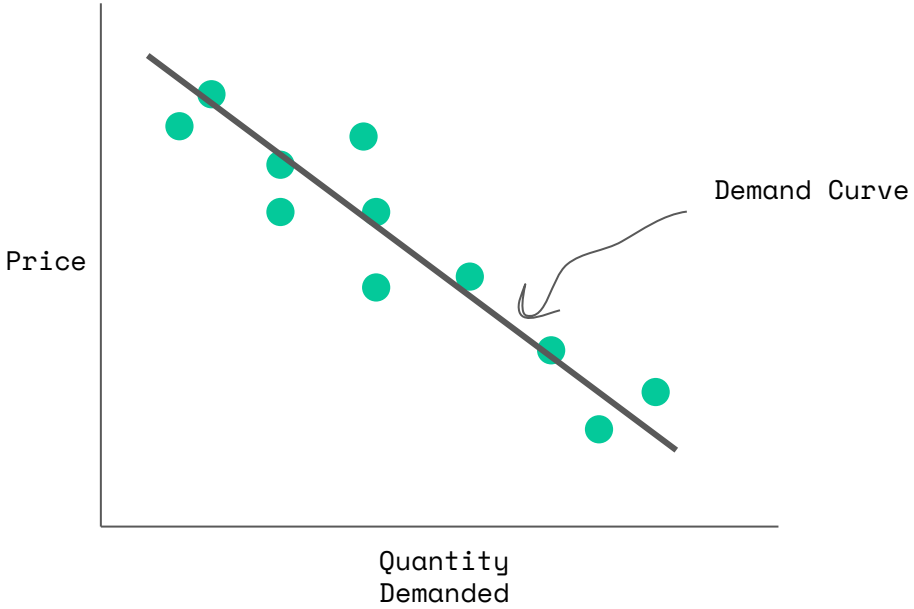


Simple Model

$$P = f(Q)$$

$$P = b0 + b1*Q$$

where
b0 = y-intercept
b1 = slope



Simple Model

$$P = 50 + (-5)*Q$$

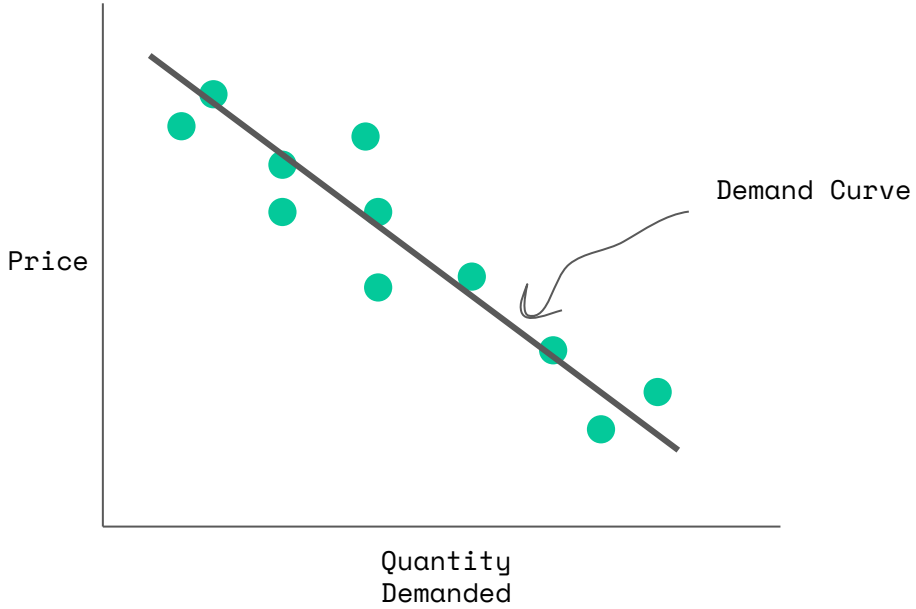
$$P = 50 - 5Q$$

$$P + 5Q = 50$$

$$5Q = 50 - P$$

$$Q = 50/5 - P/5$$

$$Q = 10 - 0.2P$$

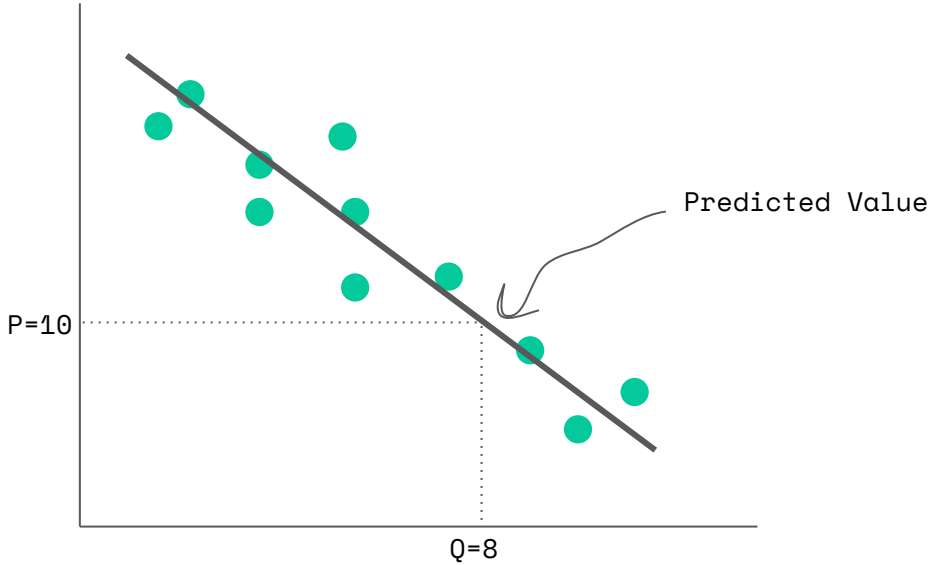


Projected Demand

$P = 50 - 5Q$

$Q = 10 - 0.2P$

If P=10,
What is Q?

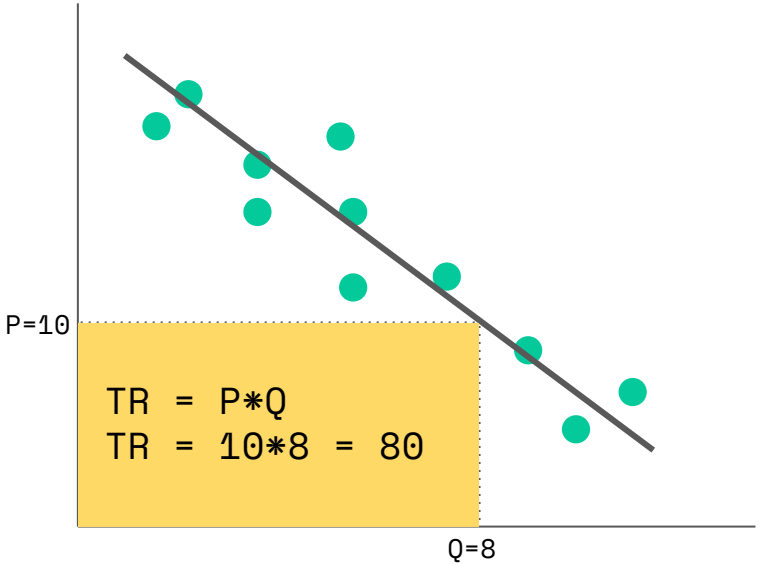


What is the Revenue?

P = 50 - 5Q

Q = 10 - 0.2P

If P=10,
What is Q?



Key Takeaways

- Economics help you make better decisions
- Scarcity, Trade off, Choice
- Micro vs Macro
- Econometrics analysis is a transferable skill to data science

Data Science Bootcamp

Economics for Beginners

Content designed and curated by DataRockie 2022