Opportunity Cost and Comparative Advantage

In your first model, there are only two activities, and two people, and transaction costs are non-existent.

Model: A simplified representation of occurrences in an economy.

Production Possibility Curve: This is the graphical representation of the production capacity of an economy.
 There are 4 points on the PPC.
1. Efficient
2. Inefficient
3. Unattainable
4. Attainable

- **Absolute advantage**: Who can produce the most overall.
- **Comparative advantage**: Who can produce the most for the least opportunity cost.
- **Opportunity cost**: The value of the next best alternative that was forgone.

Opportunity cost formula:

$$\frac{\text{What you didn't produce}}{\text{What you decided to produce}}$$

Principle of Comparative Advantage: It's basically that an economy is better off when its members do what they are comparatively better at.

Trading in a 2 Agent Economy

Finding the price to trade:

Trading with person 2:
Person 1's cost of collecting $\leq$ Good/service $\leq$ Person 2's cost of collecting

Economy wide PPC in a 2 agent economy

1. Find the total amounts that the economy can make if both people make the same good.
2. Expand one product by one unit, using the person with the *lowest opportunity cost*.
3. Continue step 2 and then join the curve.

Low-Hanging Fruit Principle: This basically means that the person with the lowest opportunity cost should produce first because it is easier for them to 'reach' and do.

How can we shift the PPC out?
- Better technology
- More workers
- Better access to inputs
- Higher productivity

Trading Between Economies

Whilst we only had a PPC before, now we're introducing the CPC!

CPC: The graph that shows how much the economy can consume – Consumption Possibility Curve.
- If a country has a closed economy, the CPC = PPC.
- Usually the CPC is greater than the PPC.

How do we get a PPC?
1. Look at the global price.
2. Then pick a point on the PPC (usually the furthest from the origin will give you the most benefits).
3. From there, the gradient of your CPC will be

    $$\frac{\text{What you're losing} \times -1}{\text{What you're gaining}}$$ if you look from the y-axis product/service.

4. Draw that straight line!

Economy wide PPC in a many-agent economy!

- It looks like an arc bowing from its origin

Drawing the CPC:
1. Derive the gradient of the CPC
2. Find the place on the PPC where the opportunity cost of buying object A is the same as buying it on the international market.
3. Then at that point, you draw in the CPC!

Critiques to the Model

- Assumptions that there are no transaction costs
- Assumptions that there are no psychological costs from doing the same thing everyday
- What if demand changes? This isn't taken into account.

Perfectly Competitive Markets

Market: is the set of all the consumers and suppliers who are willing to buy and sell that good or service.

Market Equilibrium: the point at which demand meets supply.

Characteristics of a Perfectly Competitive Market
- Consumers and suppliers are price takers
- Homogenous goods – all goods are the same e.g. wheat
- There are no externalities
    - External benefits e.g. vaccinations
    - External costs e.g. cigarettes
- Goods are excludable and rival
- Both suppliers and consumers have full information
- There's free entry and exit in the market

Supply Curve for an Individual
Marginal Benefit: The Marginal Benefit of producing a certain unit of a given good is the extra benefit accrued by producing that unit.

Marginal Cost: the extra cost of producing that unit. (Keep in mind here that the relevant cost is the "opportunity cost" and not just the "absolute cost" of producing the good.)

Cost-Benefit Principle: Take the action is $MB > MC$.

Economic Surplus: $MB - MC$.

Quantity Supplied: The quantity of a given good or service that maximizes the profit of the supplier.

Supply Curve: Graphical representation of the relationship between the price of a good or service and the quantity supplied of that good or service.

Law of Supply: As price goes up, supply goes up.

Producer Reservation Price: Producer Reservation Price denotes the minimum amount of money the producer is willing to accept to offer a certain good or service.

1. Find the world price
2. Divide the price with the changing time, with the price without the changing time. Then times it by the time of the non-changing time item.
3. Then go to the point where your last number matches, or is slightly bigger than the changing time.
4. Then pick that quantity and write it for the price!
5. Then you draw it like stepping stone things.

Supply Curve for a Firm

Sunk Cost: A Sunk Cost is a cost that once paid cannot be recovered.

Fixed Cost: A Fixed Cost is a cost associated with a fixed factor of production.

Fixed Factor of Production: If a factor of production is fixed, then the cost associated with it does not vary with the quantity produced.

Short Run: Short Run denotes a period of time during which at least of one factor of production is fixed.

Variable Factor of Production: If a factor of production is variable, then the cost associated with it tends to vary with the number of units produced. E.g. Labour.

Variable Cost: A Variable Cost is a cost associated with a variable factor of production.

Long Run: Long Run denotes a period of time during which all factors of production are variable.

Marginal Benefit: Price per unit e.g. 1 soda can = $1.20, the MB = $1.20
Marginal Cost: Change in total cost / Change in total quantity

Profit from Production Formula:

$$\text{Profit} = \text{Total Revenue} - \text{Total Cost}$$

Should the company shut down?

Short Run:
$$\text{Total Profit} \leq \text{Shut Down Cost (Fixed Cost)}$$

Long Run:
$$\text{Total Profit} \leq 0$$

Drawing the Supply Curve
The supply curve is the part of the MC that is:
- Above the AVC – in the short run
- Above the ATC – in the long run

Factors that shift the supply curve
- Technology
- Input prices
- Number of suppliers
- Expectations
- Changes in pricing of other goods and services

Price Elasticity of Supply

Price Elasticity of Supply: Price Elasticity of Supply denotes the percentage change in the quantity supplied resulting from a very small percentage change in price.

Law of Supply: Supply curves have the tendency of being upward sloping.

Formulas

Price Elasticity =

(1/Slope) x (P$_A$/Q$_A$)
or
(Change in Q / Q$_A$) x (Change in P / Q$_P$)

Elastic Supply: greater than 1.

Unit Elastic Supply: equal to 1.

Inelastic Supply: less than 1.

Determinants of the Price Elasticity of Supply
1. Availability of raw materials
2. Factors mobility
3. Inventories / Excess capacity
4. Time horizon

Perfectly Competitive Markets: Demand

Demand Curve for an Individual

Utility: Utility denotes the satisfaction that an individual derives from consuming a given good or taking a certain action. It is measured in utils per unit of time.

Decreasing Marginal Utility: Decreasing Marginal Utility implies that the utility from consuming an extra unit of a given good decreases with the number of units that have been previously consumed.

In a table, titles:
- 1st good
    - Units
    - Total utility
    - Marginal utility (difference in total utility)
- Other goods
    - Units
    - Total utility
    - Marginal utility

Substitution Effect: The Substitution Effect captures the change in the quantity demanded of a given good following a change in its relative price.

Income Effect: The Income Effect captures the changes in the quantity demanded of a given good following the reduction in the consumer's purchasing power.
- **Normal good** e.g. expensive wine — as someone becomes richer, she tends to consume more of it.
- **Inferior good** e.g. fast food — as someone becomes richer, she tends to consume less of it.
- **Giffen Goods:** The exception to the Law of Demand is a Giffen Good for which an increase in price increases the quantity demanded. But these good are extremely rare, in fact, almost mythical!

Law of Demand: Demand curves have the tendency of being downward sloping.

Demand Curve: Demand Curve represents the relationship between the price of a good or service and the quantity demanded of that good or service.

Consumer Reservation Price (or Willingness to Pay): is the maximum amount of money an individual is willing to pay for a certain good or service.

Cost-Benefit Principle: an action should be taken if the marginal benefit is bigger than the marginal cost

Should we take the action/buy the good or service?
Marginal Benefit ≥ Marginal Cost … Yes
Marginal Benefit < Marginal Cost … No

Drawing the curve:
Demand = Marginal Benefit

A Continuous Demand Curve

- **Substitutes**: Two goods are Substitutes when an increase in the price of one causes an increase in the quantity demanded of the other.

- **Complements**: Two goods are Complements when a decrease in the price of one causes an increase in the quantity demanded of the other.

Why does it become smooth?
Because you can choose how many cans you want to buy, not just in whole numbers.

Things that can shift the curve:
1. Successful marketing campaign
2. Decrease in the price of complements
3. An increase in the price of substitutes
4. An increase in income for a normal good
5. A decrease in income for an inferior good
6. A positive shift in consumers' preferences towards a certain good
7. Expectations of an increase in future prices that push the buyers to try to purchase the goods early
8. Population growth

Price Elasticity of Demand

It captures the percentage change in quantity demanded resulting from a very small percentage change in price.

Elasticity $_A$ = (1/slope) x (P_A/Q_A)
Price Elasticity $_A$ = (delta Q / Q_A) / (delta P / P_A)   Take the absolute value!

Unit elastic: 1
Inelastic: Less than 1
Elastic: greater than 1

What affects the price elasticity of demand?
- Availability of substitutes
- Definition of goods – what are the goods?
- Income share – how much of your income it takes up

Demand and Supply: An Equilibrium Analysis

Demand and Supply Aggregation

To draw the graph, just add the lines together
- i.e. at Q1, P might = 1 for one person, 2 for the next and 3 for the third. So what you do is just add 1+2+3=6 and for Q1 on your new graph, the P = 6!
- You can also do this horizontally
  - i.e. At P of $3, they might want Qs of 2, 5 and 7. In your new graph, at $3, the Q will be 14.

Market Equilibrium

Occurs when S = D. This means that there is no incentive to change your reservation price.

Excess Supply: Excess Supply depicts a situation where the quantity supplied is larger than the quantity demanded.
Excess Demand: Excess Demand depicts a situation where the quantity demanded is larger than the quantity supplied.

Equilibrium Price and Quantity: The Equilibrium Price (Quantity) represents the price (quantity) such that the quantity supplied equals the quantity demanded.
Reservation Price (Buyer): The Reservation Price of a Buyer is the highest price a buyer is willing to pay for a given good.
Reservation Price (Seller): The Reservation Price of a Seller is the lowest price a seller is willing to accept for a given good.

- We make a simplifying assumption: the buyers who value the good more will be the first to buy it. This is called the **rationing rule**.
- buyer with the highest reservation price moves first and decides which seller to approach.
- Once the seller is approached, the buyer pays the price and the seller produces the good and transfers it to the buyer.
- The buyer with second highest evaluation then moves and decides which seller to approach among the remaining ones, and so on and so forth.

Consumer Surplus: Consumer Surplus represents the difference between what a consumer is willing to pay for a good or service (her reservation price) and what she actually pays for that good or service.

Producer Surplus: Producer Surplus represents the difference between the price a seller receives for a good or service and what he was willing to receive for that good or service (her reservation price).

Consumer and Producer Surpluses

Total Consumer Surplus: Total Consumer Surplus represents the sum of the economic surplus of all consumers. It is maximised at the equilibrium price.
- The area between the demand and supply curve until the equilibrium

Total Producer Surplus: Total Producer Surplus represents the sum of the economic surplus of all producers.
- The area between the world price and the supply curve

Total Surplus: Total Surplus is the sum of the total consumer surplus and the total producer surplus.
- The area between the world price and the demand curve

This Toy is Yours to Play With
- You can shift the curves of the graph to demonstrate things
- The movements can be:
    - Right
    - Left
    - Along the curve
    - Tilting the curve for elasticity

Why Competitive Markets Are Great: Pareto Efficiency (Short Run)

Pareto Efficiency: Pareto Efficiency is an outcome situation in which it is impossible to make any individual better off without making at least one other individual worse off.

Vilfredo Pareto (1984-1923): An Italian economist who studied economic efficiency and income distribution.

Pareto Improving Transaction: A Pareto Improving Transaction is a transaction where all parties involved are better off.

- This is the throw up between equity and efficiency, and you can't have both.
- An example is a rich man and a poor man. You take $10 from the rich and give it to the poor. The poor is better off, but the rich is worse off, therefore it's not a Pareto Improving Transaction!
- It's a valuable objective, but can't be a final goal.

- A society should facilitate markets in their quest of maximizing social surplus and achieving Pareto efficiency. But once this objective is achieved (the social pie is maximized), society should consider how to redistribute the surplus in order to realize other goals, such as equality of resources and opportunities.

The Invisible Hand (Long Run)

The Invisible Hand Principle: Pushing firms to produce at the lowest possible average total cost. How? Individuals' independent efforts to maximize their gains (profits for the sellers and utility for the buyers) will generally be beneficial for society and result in the socially optimal allocation of resources.

It's likely to happen in the long run because:
(1) existing firms can adjust all their factors of production and perhaps exit
(2) new firms can enter the market.

Entry continues until the point where profits are equal to zero and the *market price equals the minimum average total cost*.

The mechanism basically does this: If firms are making positive profit, then more firms will go into the market, shifting the supply curve and lowering price.

Negatives to the Long Run Supply Curve Model

The negatives to this model is that it assumes that all producers have the same tech. However, the basic intuition of the principles still applies to real life.

Government Intervention

<u>Price Ceiling</u>
- Maximum allowable price the government imposes on the market
- Lower than the equilibrium
- For: electricity, water, food etc.
- Creates excess demand, and lower total surplus
- When you look at surplus, the surplus goes at the point that suppliers are willing to supply at that given price.
- Winners: consumers with the high reservation price – the rich!
  The solution: to help low income households, just give a direct lump sum transfer to the poor.

Deadweight loss: the loss in economic surplus due to the market being prevented from reaching the equilibrium price and quantity where MB = MC.
 On the graph, it's the region where surplus was generated under market equilibrium that's no longer attainable because of a change in price.

Price Floor
- Minimum allowable price imposed by the government.
- Higher than the equilibrium.
- For: wheat
- Excess supply
- You measure it up to the demand limit
- Losers: consumers and some producers
Solution: Pareto Improving Transaction: The 'losers' would be willing to pay the winners the exact amount they gained from the intervention in exchange for cancelling the price floor

Taxation
- Generates tax revenues
- Can be used to redistribute wealth
- A tax can be found by the perpendicular distance between the new curve and the old curve.
- $P_{tax-\$1}$, and P_{tax} are the points
- Tax revenue = $tax x equilibrium quantity
- There is some deadweight loss.
- They still supply at their normal MC, just have to pay the government more.
- Losers:
  o consumers and producers
  o Consumers only if D is inelastic or S is perfect elastic
  o Producers only if S is inelastic or D is perfectly elastic
- Winner:
  o Government BUT losers lost more than revenue gained.
- Solution:
  o Losers should pay the 'winner' the exact amount and then it would be a Pareto transaction.
- The government might use the tax for:
  o Public goods
  o To subsidise or reduce taxes on other markets etc.
- How do you collect tax revenues most efficiently?
  o Tax markets with the lowest elasticity – they'll have less deadweight loss.

Subsidy
- Where the government pays producers to help them produce, or consumers, to help them buy.
- Example: dairy
- Decreases the producer's marginal cost. The subsidy is found by the perpendicular distance between the supply curves – ADD HORIZONTALLY
- Subsidy cost: $Subsidy x Quantity of subsidy
  o Area of a parallelogram
- The cost of the subsidy isn't completely covered by the new Q supplied, so it's called deadweight loss.
- Winners
  o Consumers

o   Producers
-   Losers
        o   Costs government more than the economic surplus it generates
-   Solution:
        o   Direct lump sum to the poor is more efficient – because there's wastage in
            government things.

Perfectly competitive markets converge to an equilibrium where total surplus is maximised -
> any government intervention that prevents a market from reached Pe is going to be bad
for total surplus -> Avoid Gov. intervention, but they can also make public goods. For private
bad.

International Trade

Domestic Price: the equilibrium price if a country didn't trade at all.
World Price: equilibrium price on the international market.

Small Open Economy: small countries that participate in international markets but their
production (or consumption) is small enough compared to the rest of the world that their
supply or demand doesn't affect the world price.

Closed economy: no trade at all AKA autarky

In a small open economy:
-   Has a certain domestic price
-   Takes world price as given
        o   No seller will accept a price lower than the world price
        o   No buyer will pay more than world price

Exporting

Now, the world price might create excess supply. If it does, then you can export it!

Gains from trade is the triangle between the demand curve and the supply curve. It
captures the extra surplus available in an open economy compared to a closed economy. It
comes from international consumers, but at the expense of domestic consumer's surplus.

If the WP is higher than the P e, then you are an exporter. If the WP is less than the P e, then
you are an importer.

Importing

At a WP lower than P e, then there's excess demand. These people will import the goods they want.

Gains from trade comes from larger surplus for consumers by importing, at the producer's cost.

Additional benefits from trade:
- Consumers: have access to more goods
- Producers: may be able to take advantage of economies of scale by selling to a larger market
- Domestic monopolies or oligopolies might face international competition, reducing their market power
- Flow of ideas and technology is faster and easier

Trade Restrictions: Tariffs
- Represents a tax on imported goods or services
- The little triangles on either side of your new rectangle are your new dead weight loss because it represents less imports!
- Consumers lose, but producers/government gain
- Tariff revenue is the new rectangle between WP and WP and we get it through $tariff and quantity

Trade Restrictions: Quotas
- A quantity limit on the amount of goods or services permitted to be imported.
- Supply shifts right to the point where it's S + Quota, that's just where you want to see the price. From there, you look at the new price and you can see how much domestic producers want to produce at that new price.
- Domestic consumers lose, but domestic producers gain.
- Deadweight loss is the two triangles again.

Imperfectly Competitive Markets: The Monopoly

In an imperfectly competitive market, one of the following or more characteristics must be broken.
1. Consumers and suppliers are price takers
2. Homogenous goods
3. No externality
4. Goods are excludable and rival
5. Full information
6. Free entry and exit

Determinants of Market Power

If there's market power: someone's not a price taker, and there are barriers to entry.

Price maker: ability to set their own prices.
If a supplier is a price maker, they have market power.

The invisible hand principle is stopped by barrier to entry, therefore the price can't be driven down, and the price and quantity are distorted.
- In the invisible hand, firms make profit -> new firms enter -> pushes profits to zero.

Examples of barriers to entry:
- Control over scarce resources
    o E.g. OPEC – collusion to set the world price of oil.
- Government created barriers
    o E.g. patents (intellectual property stuff) – pharmaceutical companies
- Increasing returns to scale
    o This is when the average total cost of producing a certain good decreases with the amount of the good produced.
    o The result is a natural monopoly – basically a monopoly that grows from getting more returns because of economies of scale.
        ▪ E.g. Public utilities – trains!
- Network economies
    o This is where a company's market position gets stronger and stronger as it expands production. Basically, customer satisfaction goes up as the company gets bigger.
    o Example: Facebook is more fun with more people.

PRICE-TAKER FIRM (NO MARKET POWER) — PANEL A

PRICE-MAKER FIRM (MARKET POWER) — PANEL B
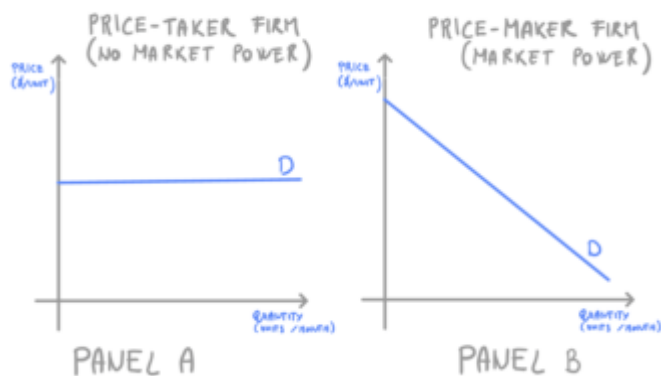
In the graphs, the demand curve on the left is for **one** firm that's a price taker. This is when the invisible hand sets the price at 0 profit!

The right one is for **one** firm which has market power, and therefore can change the price.

Monopoly

A market structure where there is only one firm operating in the market.

This challenges the assumptions 1, 2 and 6.

Firms with market power are price makers/setters. This means that if they change their price, then they'll only lose a few customers – slightly inelastic. But individual price taker firms have a horizontal straight line demand because they 'have' perfectly elastic demand.

- Monopoly: only one firm in the market. – Their demand curve is the normal D.
- Monopolistic competition: A large number of firms that sell slightly different goods, therefore still being the only one to sell that good (almost perfect substitutes).
- Oligopolistic competition: A small number of firms that sell goods that are close substitutes.

A natural monopoly usually happens when there's increasing returns to scale.

Increasing Returns to Scale: the notion that when your output increases, your ATC decreases.

To see how many people a monopoly should hire, expand the curve until $MR = MC$.

Workers per day	Units per day	Fixed Cost ($/day)	Variable Cost ($/day)	Total Cost ($/day)	Variable ($/unit of output)	Total ($/unit of output)	Marginal Cost ($/unit of output)
					Average Cost		
W	Q	FC	$VC = \$10 \times W$	$TC = VC + FC$	$AVC = \frac{VC}{Q}$	$ATC = \frac{TC}{Q}$	$MC = \frac{\Delta TC}{\Delta Q}$
0	0	100	0	100	—	—	—
1	200	100	10	110	0.05	0.55	0.05
2	400	100	20	120	0.05	0.3	0.05
3	600	100	30	130	0.05	0.22	0.05
4	800	100	40	140	0.05	0.17	0.05
5	1000	100	50	150	0.05	0.15	0.05

Marginal Revenue: Change in Revenue / Change in Quantity

If the ATC is increasing, then you can tell if it's a perfectly competitive market or not. If ATC goes up, it's not (i.e. it's a natural monopoly and this isn't a perfectly competitive market.)

To find this firm's profit-maximising level of output, you need to find the demand curve! This is because they have a downward sloping D curve as opposed to a constant price.

This is where Marginal Revenue comes in.

1	2	3	4	5	6
Workers per day	Units per day	Market Price (or Marginal Benefit) ($/ unit of output)	Revenues ($)	Marginal Cost ($/ unit of output)	Marginal Revenue ($/ unit of output)
W	Q	P	$R = P \times Q$	$MC = \frac{\Delta TC}{\Delta Q}$	$MR = \frac{\Delta R}{\Delta Q}$
0	0	—	0	—	—
1	200	0.85	170	0.05	0.85
2	400	0.65	260	0.05	0.45
3	600	0.45	270	0.05	0.05
4	800	0.25	200	0.05	−0.35
5	1000	0.05	50	0.05	−0.75

The profit maximising quantity is therefore 600, because that's where MC = MR.

Q: So if they had this, would they just stop selling to the last two countries?
They would because it's a set price. So if you make 600, then the price for all 600 will be $0.45!!

Monopoly and the Invisible Hand
Why does a monopoly not produce socially optimal quantity?
This is because MB DOES NOT EQUAL MR.

The socially optimal level of production is the number at which MB=MC.

However, a monopoly doesn't want this. They want the point to which they can maximise their revenue – where MR = MC

We know that they monopolist has profit maximising production at 600. What happens if they move it to 800?
At 600: TR – TC = 270 – 130 = 140
At 800: TR – TC = 200 – 140 = 60

But if they did increase production, the monopolist's MB would still be greater than MC. But the monopolist has no incentive because they're the only profit maximising firm, and because there's a barrier to entry, there's no new firm to drive the price down through competition.

PANEL A: SOCIALLY OPTIMAL QUANTITY

PANEL B: MONOPOLY EQUILIBRIUM QUANTITY
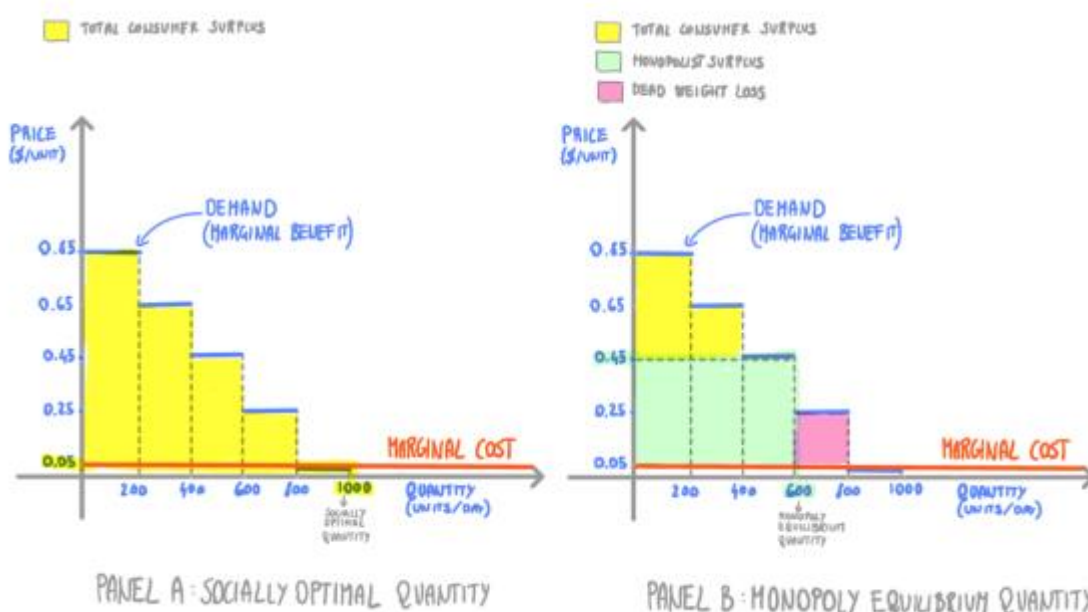
Why is there a deadweight loss?
People are willing to consume at that quantity, but the producer isn't going to make it, so therefore it's just a waste.

In the social optimal quantity, there's no producer surplus. In the second one, that changes, and there's also a deadweight loss!

Why is there a conflict between what the monopolist wants and what consumers desire?
- The monopolist has no incentive to drive down the price, which decreases their own profits.
- Implicit costs go up because they need to charge all consumers the same price (assuming there's no price discrimination)

This means:
Q Monopoly < Q Socially

Government Regulation

To help increase competition, governments have **competition law**.
 E.g. Four Pillars Policy.
Competition law: denotes a law that is intended to foster market competition by regulating the anti-competitive conduct of firms.

However, in the case of a natural monopoly where returns of scale are better than having many little firms, the government may just impose **average cost pricing**. This is where they make the price fixed at where the ATC meets the demand curve.

This seems good, but there are flaws because:
- The government doesn't know the ATC. It can only estimate.
- Once the policy is in place, firms have no interest in investing in new tech because they're making 0 profit anyways, so they've lose their incentives.
- It's allocatively inefficient
  - A firm's output is said to be Allocatively Inefficient if the price asked for the goods produced exceeds their marginal cost.
  - The solution for this is to set a price ceiling at MC.
  - But in some cases profit might be less than 0 and the industry collapses.

First Degree Price Discrimination

It describes a situation in which the monopolist knows the reservation price of each consumer and is able to charge each consumer his marginal benefit (or reservation price).

It assumes that the monopolist:
- Knows the maximum price (or reservation price) that every consumer is willing to pay

AND
- Can charge each consumer exactly their reservation price.

1	2	3	4	5	6
Workers per day	Units per day	Market Price (or Marginal Benefit) ($)/unit of output	Revenues ($)	Marginal Cost ($/ unit of output)	Marginal Revenue ($/ unit of output)
W	$Q(W)$	$P(W)$	$R = \sum_{n=1}^{W}(P(n) \times \times[Q(n) - Q(n-1)])$	$MC = \frac{\Delta TC}{\Delta Q}$	$MR = \frac{\Delta R}{\Delta Q}$
0	0	—	0	—	—
1	200	0.85 (Italian Market)	170	0.05	0.85
2	400	0.65 (French Market)	300	0.05	0.65
3	600	0.45 (US Market)	390	0.05	0.45
4	800	0.25 (Canadian Market)	440	0.05	0.25
5	1000	0.05 (Brazilian Market)	450	0.05	0.05

The revenue would be Market Price X Quantity per consumer.

Price = MB = MR (selling more in Country A does not require the monopolist to lower P in other countries)

- ➢ The quantity that would be sold in a perfectly competitive market is the same with the one that the monopoly would sell.
- ➢ Hence, a monopolist that can engage in first degree price discrimination is actually selling the socially optimal quantity — or, in other words, the quantity that maximizes social surplus.
- ➢ However, whilst the social surplus is maximised, the distribution of surplus within the society is very uneven: the monopolist charges the consumers exactly their marginal benefit (or reservation price) and so leaves them with zero surplus!
- ➢ The monopolist is the one who accrued all the surplus available in the market.

Other Forms of Price Discrimination

Sometimes, monopolies can't engage in 1st degree price discrimination because they don't know the reservation prices, or the government has laws against it.

Other forms then include:
- 2nd degree price discrimination
  - o the monopolist charges different prices depending on the quantity demanded by each consumer.
  - o E.g. first class vs. cattle class, buying in bulk.
- 3rd degree price discrimination
  - o the monopolist charges different prices depending on observable consumers' attributes such as location.
  - o This means that if Australia's reservation price is $4 and New Zealand's is $3, to gain more people in the Asia-pacific region, they'll make the price $3, and when they do that, Australia will get a surplus! This is means that the monopoly loses some surplus.
  - o The revenues of a monopolistic firm with 3rd degree price discrimination is found by $Q \times P_A + Q \times P_B$ etc.
  - o Total costs is ATC x Q

Oligopoly

In an oligopoly, there are a few firms which produce similar goods. Each firm knows who the other competitors are. The firms tend to be large.

This means that their interactions with each other need to be strategic.
- The actions of one firm has direct effects on the other firms (and vice-versa)
- In making its own decision, a firm tried to anticipate what the other firms are about to do. This is called Game Theory.

Dominant Strategy: this is the strategy that's preferred by a player in the game (firm in the market) *irrespective* of the strategy selected by the other player.

Simultaneous Game: this is where the players move simultaneously or, alternatively, they are unaware of the other players' actions – make their move whilst guessing the actions of the other players.

A Simple Entry Game

	Entry	No Entry
Stay	8 , − 20	10 , 0
Exit	0 , −10	0 , 0

The left column is Facebook, and Ace Book (the new competitor) is the top.
Ace Book's dominant strategy is to not enter, and Facebook's dominant strategy is to stay. Their choices don't depend on the other player.

	Entry	No Entry
Stay	8 ,−2	10 , 0
Exit	0 , 10	0 , 0

Now we take a look at Facebook and Google (Google is trying to entry). Facebook will stay, and Google will still not want to enter. BUT if Facebook leaves, then Google's choice will change and they'll only enter if Facebook leaves. Therefore, Google doesn't have a dominant strategy. BUT, although their strategy depends on what Facebook does, they do what is called **assumes rationality**.

Assumes Rationality: assuming that a company will make a rational decision i.e. to maximise profits.

Prisoner's Dilemma Game

The prisoner's dilemma game is a type of game where firms (or individuals) might decide not to cooperate even though doing so would be beneficial to both of them. This is where the best result isn't necessarily the result of the dominant strategy.

The Prisoner's Dilemma: criminals can't talk to each other so they have to make a decision that might benefit them or not.

		ANZ	
		Advertising	*No Advertising*
NAB	Advertising	70, 70	120, 50
	No Advertising	50, 120	100, 100

The dominant strategy here is to confess/advertise. But if they both confess, then they don't get their best result. Their best result is to have advertised when the other one hasn't.

The realised outcome is the Nash equilibrium i.e. 70, 70.

Nash equilibrium: the result that you'll get in the market when you follow your dominant strategy; total earnings = $140bn. It is not Pareto optimal.

Realised Outcome: what will happen – the Nash equilibrium.

Cooperation Outcome: if they cooperate – 100, 100, total earnings $200bn.

Cartel Game

Cartel: represent private agreements aimed at increasing the profit of the cartel members by reducing competition in the market. This is done by controlling prices or preventing entry – collusion.

Cartels are illegal nearly everywhere (prohibited under competition law)
- They can't write enforceable contracts to keep the other members in line because if they do, then people can sue them.
- This means than they have the prisoner's dilemma because they can't talk to each other.

		Firm B	
		Price Cut	*No Price Cut*
Firm A	Price Cut	150, 150	300, 100
	No Price Cut	100, 300	200, 200

Their dominant strategy is to cut the price. The Nash equilibrium will be 150, 150. But if they both don't cut the price, then they're both better off.

200, 200 is **collectively optimal**. So it's the best for the both of them. (Price cut, price cut) is the **realised outcome** if they can't collude, whilst the collectively optimal will happen if they can collude.

Coordination Games

These are games that capture those situations where the players benefit from coordinating their decisions.

Battle of the Sexes

This is a game in which players differ over which activity they would prefer to engage in, but they still prefer engaging in the same activity over going alone.

	Theatre	Stadium
Theatre	20 , 10	0 , 0
Stadium	0 , 0	2 , 15

They only get enjoyment from going together. There's no dominant strategy here.
What will happen is that whichever player gets in first will have the second player follower.
How you can figure out which one is better though is which one has the stronger preference. The left will like to go to the theatre better (20 – 18) vs the girl (15 – 10).
The collective benefit is also higher in the theatre.
We don't know for sure, but they'd probably do that.

Strategy Profile: A Strategy Profile denotes a set of strategies, one for each player. In our example there are four strategy profiles: (Theatre, *Stadium*); (Stadium, *Theatre*); (Stadium, *Stadium*); (Theatre, *Theatre*). They're all possible outcomes.

Both strategy profiles are **Nash Equilibrium:** A strategy profile is a Nash Equilibrium if no player can benefit from *individually* changing their strategy.

Externalities

Positive Consumption Externality

Marginal analysis – where her MB = MC, someone will find the optimal amount of something to consume.
 When there are externalities, MC = Price, because it's still a pretty competitive market.

How to find out how much they should consume, you do the 'external marginal benefit':
MC (Price) = MB of person 1 + MB of person 2
 That's how you come up with a positive externality-included graph.

Positive Consumption Externality

Benefit accrued to someone who is not involved in the consumption of a given good.
 To make the graph, you just shift the demand curve up by $x for the social demand curve.
 On the private graph, you find where the private demand curve meets the market price.
When you do the social demand curve, you find the optimum the same way from where the social demand curve hits market price.

Social surplus = the area below the social surplus graph and the price.

If you only consume up to the private optimal number, then there's a DWL.

Making consumption decisions without accounting for their external benefit doesn't allow to maximise social surplus! This is because of DWL. This means that the Invisible Hand Fails.
 Solution: private negotiation – pay the other person your marginal benefit so that you'll get it.

Negotiating:
   - You offer to consume 2 more units in exchange for $x
   - Private MB (of that extra unit) + Transfer = $x + $y. This will be greater than the marginal cost. So then you consume another extra unit! Then you get MB = MC.

We have a situation where property rights are clearly defined (you have the right to consume), there's no ban – so you can continue to be like hey, can you wear some more. Therefore, this transaction is called the Coase theorem

Coase Theorem

"If trade in an externality is possible and there are no transaction costs, bargaining will lead to an efficient outcome regardless of the initial allocation of property rights."

Examples of positive consumption externalities:
   - Fitness activities
   - Vaccinations
   - Education
   - Fire protection services

Negative Production Externality

The most classic case is pollution.

How producers find out home much they want to sell: MC = MB (Price)

So what they have to do:
MB (Price) = MC_1 + $MC_{2 (External)}$

When you read the individual supply graph, you need to go to the right of the little line.

Negative Production Externality: Cost incurred by someone who's not involved in the production of a given good.

The social supply curve will be the private supply curve minus the additional MC.
The way you read the supply curve is that the very left of the line is the number at the number. E.g. if the little line is at $3 between 2 and 3 Q, then it's $3 at 2.

There's still a DWL.

Invisible hand fails as the social optimal production is less than the private optimal production.

The negotiation: How to lower the Q, the person with the additional marginal cost should pay the producer their MC (the external MC).

Examples of negative production externalities:
- Pollution
- Over-fishing
- Excessive risk-taking (by financial institutions)

Externalities in Large Markets

When you shift the curves, the amount by which the curves shift is equal to the marginal external cost or marginal external benefit.

When the Coase conditions don't apply anymore (high transaction costs), then governments must intervene (subsidy or a tax).

Negative and Positive Consumption Externality

Negative Consumption Externality: Cost incurred by someone who is not involved in the consumption of a given good.
Examples: smoking, alcohol abuse, driving recklessly and in general.

DWL is the area of the triangle with the negative consumption externality.

Positive Production Externality: Represents a benefit accrued to someone who isn't involved in the production of a given good.

Examples: beneficial production activities (social housing), new production technologies, on-the-job training.

Tips

To see what is the socially optimal action, you just look for the total social surpluses and pick the biggest one.

You look at the initial set of property rights, and the difference in their values. One can sell their right to have a certain action – e.g. sell the right to be quiet. And the price will be: between how much you value being quiet, and how much the other person will earn from that action.

DWL = difference between the social supply curve and the private curve ABOVE the demand curve because it's what society didn't want.

Public Goods

Excludability and Rivalry

Non-Rivalry: One individual's consumption of the good does not impede another individual from consuming it as well: the marginal cost of providing the public good to an additional individual is equal to zero.

Non-Excludability: No one can be excluded from consuming the good.

Pure Public Goods: Pure Public Goods represent goods that are *perfectly* non-rivalrous and non-excludable.

Impure Public Goods: Impure Public Goods represent goods that are non-rivalrous and non-excludable only up to a point.

Marginal Social Benefit and Efficiency

Marginal Social Benefit: The Marginal Social Benefit is the vertical sum of the individual marginal benefits.

This is where you make $P = Q + x$ then add them together.

Samuelson Condition: The Samuelson Condition states that the efficient quantity of a public good is found by setting the sum of the individual marginal benefits equal to the marginal cost.

Market Provision and Free Riding

Free-Riding: Free-Riding denotes the action of enjoying a good without paying for it. The free-riding problem is caused by the non-exludable nature of public goods and it results in their under-provision.

Lindahl Prices Structure: Lindahl Prices imply that each individual pays for the provision of a public good according to their marginal benefit.

Public Goods and Externalities

A public good is an extreme case of a positive externality.
- Like positive externalities:
  o Non-excludable
  o Under-provided
- Extreme case because *unlike* standard externalities, the benefit accrued doesn't depend on who is providing it – Non rivalry.

Market, Government and Taxation

- Non-rivalry
    - Each individual can benefit from someone else's public good provision.
- Non-excludability
    - An individual cannot be stopped from enjoying it.
- Government intervention is the only way to get public goods – TAXATION.

The government will hire the cleaner for 6 hours and tax Anna and Zoe at $20 and $10 (their Lindahl prices).

But the government doesn't know the MB of both of them, and they will want to say their MB is less.

2 Tax Fairness Principles:
1. Ability to pay
2. Pay-as-you-go
    a. Taxing as you use the public good

Market equilibriums will always underprovide a public good – Equilibrium is under the socially optimal level.