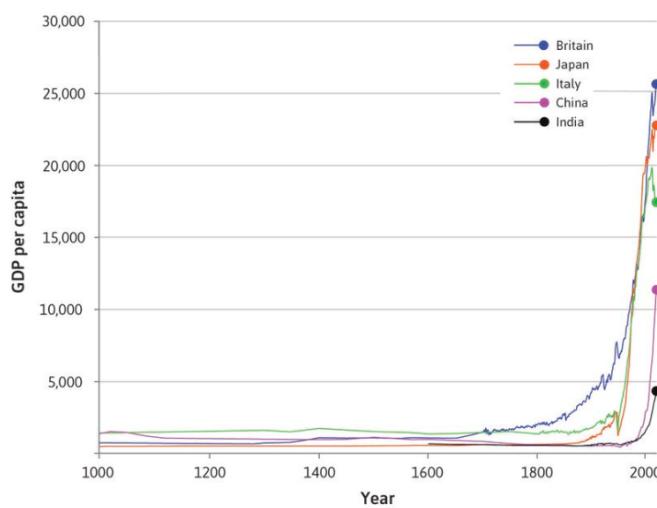


The Capitalist Revolution

Introduction

- **GDP** measures the value of all the goods and services produced in an economy per period of time.
- Dividing GDP by the total population gives the average income per person (also known as **GDP per capita**)
 - Used to gauge the living standard of a population.
 - The **Hockey-Stick Diagram**



- There has been a rapid sustained growth in average living standard since 1700.
 - This growth is associated with the capitalist revolution (a new economic system involving private property, markets and firms).
 - Also brought along threats to the natural environment

Income Inequality

- 1000 years ago the world was “flat” (very little income inequality within and across countries).
- Today, this inequality is much more significant and the differences in average income can be associated with the hockey-stick diagram.
- When sustained GDP growth occurred, it began at different times in different countries.
 - The countries that economically increased over a century ago are now rich (UK, Japan, Italy, etc)
 - The countries that took off only recently are still “flat”.

Measuring Income and Living Standard

- **Gross Domestic Product (GDP)** is a measure of total income and output of the economy in a given period.
 - Usually expressed per capita (average income)
- GDP per capita is not equal to Disposable income
- **Disposable Income** = Total Income – Taxes + Government Transfers.

- Disposable income is considered a good measure of living standards because it is the maximum amount of goods and services that a person can buy without having to borrow.
- Issue – Disposable income is insufficient to measure overall wellbeing as it leaves out:
 - Quality of social and physical environment
 - Amount of leisure time
 - Government provided healthcare and education

Hockey-Stick Growth

- The Hockey-Stick represents the sustained rapid growth in GDP per capita experienced by countries world-wide
- Growth began at different times for different countries
 - Britain – around 1650
 - Japan – around 1870
 - China and India – second half of the 20th century
- For some economies, growth did not begin until they gained independence from colonial rule

The Technological Revolution

- Technology is a process that uses inputs to produce an output.
- It has reduced the amount of work-time it takes to produce the things we need, thus increasing our standard of living.
- Scientific and technological advances occurred around the same time as the GDP increase in Britain (Mid-18th century)
- The technological revolution is driven by the scarcity of time:
 - Only 24 hours in a day to allocate between work and leisure
 - Technology helps ease this trade-off by providing the opportunity to spend less time working in exchange for more leisure time (or work the same amount of time but get more consumption).

The Industrial Revolution

- The Industrial Revolution was a wave of technological advances starting in Britain in the 18th century.
- It transformed an agrarian and craft-based economy into a commercial and industrial economy.
- Technological progress also greatly improved the speed at which information travels, making the world more connected.

Environmental Consequences

- Increased production and population growth affects the environment
 - Global changes – climate change
 - Local Changes – pollution, deforestation
- The technological revolution may also be part of the solution, by making it possible to use less resources to produce more output.

Capitalism

- Institutions are the laws and social customs governing the production and distribution of goods and services
- **Capitalism** is an economic system where the main institutions are private property, markets and firms
 - **Private Property** – ownership rights over possessions.
 - **Markets** – a way for people to exchange products and services for their mutual benefit. Markets are reciprocated transfers, voluntary and there is usually competition.
 - **Firms** – business organisation that uses inputs to produce outputs and sets prices to at least cover production costs. Their main aim is to make profit.
- The pursuit of profit provides an incentive for firms to innovate and adopt new technologies.

The Capitalist Revolution

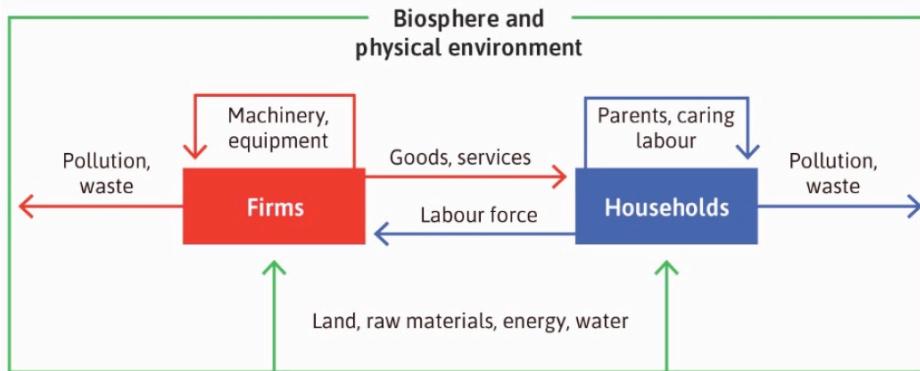
- Capitalism led to growth in living standards because of:
 - Impact on technology – firms competing in markets have incentive to develop new technology
 - Specialisation – the growth of firms and the expansion of markets linking the entire world allowed historically unprecedented specialisation in tasks and production.
- **Specialisation** increases productivity of labour because it takes advantage of natural differences in skill and productivity is increased by focusing on a limited range of activities.
- **Comparative Advantage** – all producers can benefit by specialising and trading goods, even when this means that one producer specialises in a good that another could produce at a lower price.
- Not all capitalist economies are equally successful. The right incentives must be in place in order to promote growth.
 - Economic conditions – firms or markets may fail.
 - Political Conditions – capitalist institutions are regulated by the government. The government also provides essential goods and services

Political Systems

- Capitalism coexists with political systems.
- A political system determines how governments will be selected, and how those governments will make and implement decisions.
- In most countries, capitalism coexists with democracy.
 - Individual rights of citizens
 - Fair elections

Economics

- Economics is the study of how people interact with each other and their natural surroundings in producing their livelihoods, and how this changes overtime.



Technological Change, Populations and Growth

Economic Models

- The changes in the economy depend on the actions and interactions of millions of people.
- We can use models to depict these changes.
- To create an effective model we need to distinguish between:
 - The essential features of the economy that are relevant to the question we want to answer, which should be included in the model
 - Unimportant details that can be ignored
- Models generally omit many details. This is a feature, not a mistake.
- Building a model:
 - Capture the elements of the economy that are relevant to the question
 - Describe how agents act, and how they interact with each other.
 - Determine the outcomes of these actions (an equilibrium)
 - Study what happens when conditions change
- **Equilibrium** – a situation that is self-perpetuating. It does not change unless an external force is introduced that alters the situation in the model.
- Key concepts in a model:
 - *Less is more* – simplification that involves holding most things in the model constant
 - *Incentive* – economic rewards or punishments, which influence the benefits and costs of alternative courses of action
 - *Relative prices* – help us compare alternatives
 - *Economic rent* – the benefit received from a choice, taking into account the next best alternative.

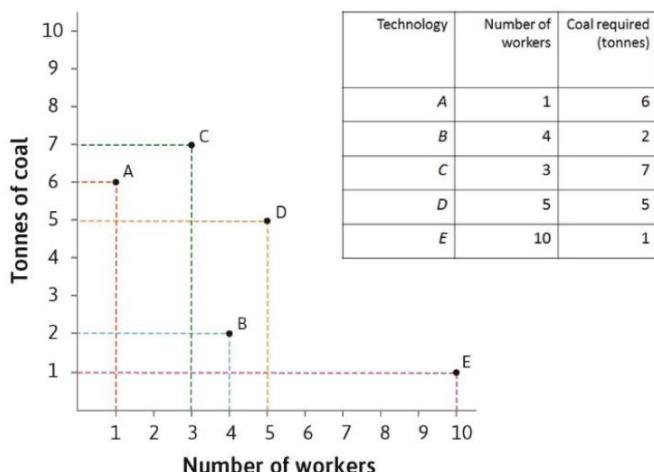
Explaining the Industrial Revolution

- There are many explanations as to why the industrial revolution began at the time and place that it did:
 - Access to colonies
 - Relatively high cost of labour

- Europe's scientific revolution and Enlightenment
- Political and cultural characteristics
- Abundance of coal

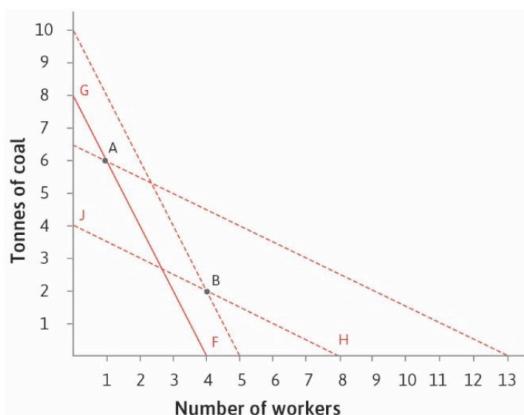
Modelling Technology

- This is a simplified example of how technology lead to the industrial revolution.
- Suppose there are 5 different ways to produce 100 metres of cloth, using labour (number of workers) and energy (tonnes of coal) as inputs.



- Technologies C and D are completely dominated by the other technologies in terms of required inputs and therefore are eliminated from our final choice.
- Firms will look at maximising profits, which involves minimising costs.
- Cost of the technology will depend on the following formula:
$$\text{cost} = (\text{wage} \times \text{workers}) + (\text{price of a tonne of coal} \times \text{number of tonnes})$$

$$= (w \times L) + (p \times R)$$
- **Isocost lines** – combinations of inputs that give the same cost (slope = relative price of inputs)
 - We can derive it from the cost equation:
$$R = \frac{c}{p} - \frac{w}{p}L$$
- Technology was more labour intensive before the industrial revolution (Technology B).
- Increase in wages relative to the price of coal in Britain creates the incentive to innovate more capital-intensive technology (Technology A)



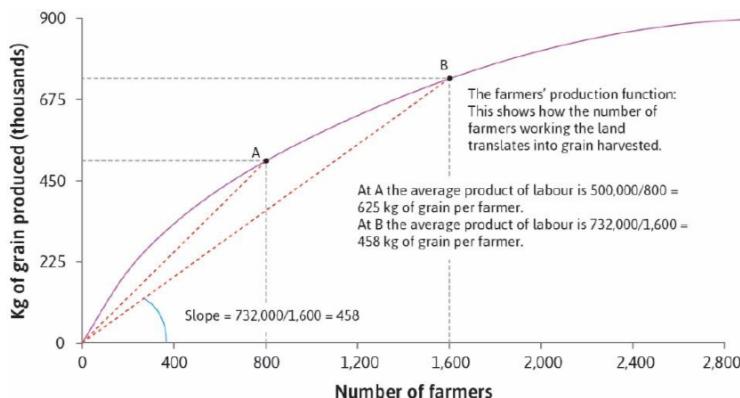
- From this model, we can see that Technology B was more cost effective before the Industrial revolution, and Technology A is more cost effective after the industrial revolution.
 - This is due to the changes in relative prices of wages and resources (wages became more expensive than resources)
- Because the relative prices changed, a firm that switches to the new cost minimising technology will have an advantage over its competitors.
- There are also costs associated with adopting the new technology called the **innovation rent**.
- **Entrepreneur** – first adopter of new technology.
- **Creative Destruction** – the process by which old technologies and firms that do not adapt are swept away by the new technologies.

Technological Change in the Industrial Revolution

- One of the first sectors to experience technological change was textiles.
 - By the late 19th century, a single spinning mule could replace more than 1000 spinsters (older technology)
 - These machines were powered by water wheels and later coal-powered engines, instead of human labour
- The reason Britain was first to this revolution was that their wages were much higher than any other country, and the coal was significantly cheaper.
- The combination of capacity to innovate and changing relative prices of inputs led to a **switch to energy-intensive technology**.

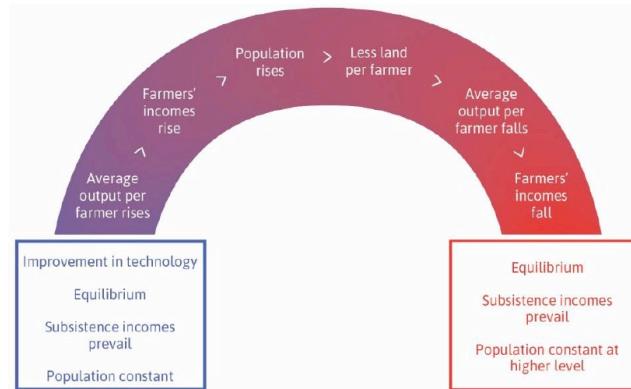
Explaining Stagnation

- Production function gives maximum output for a given set of inputs.
- **Law of Diminishing Product of Labour** - If we hold one input (land) fixed, and expand the other input (labour), the average output per worker is going to fall.



Malthus' Model

- Key ideas:
 - Population expands if living standards increase
 - But the *law of diminishing average product of labour* implies that as more people work on the land, their income will inevitably fall.
- In equilibrium, living standards will be forced down to subsistence level.
- Population and income will stay constant.



- The model predicts a self-correcting response to new technology, and this trend is evident between 1280-1600 (Malthusian trap)
- There are three conditions required to stay in the Malthusian trap.
 - Diminishing average product of labour
 - Rising fertility in response to increases in wages
 - An absence of continual improvements in technology to offset the diminishing average product of labour.
- The reason this model failed in the subsequent hockey-stick growth is that there were continual improvements in technology, and the economy was able to break out of the trap.

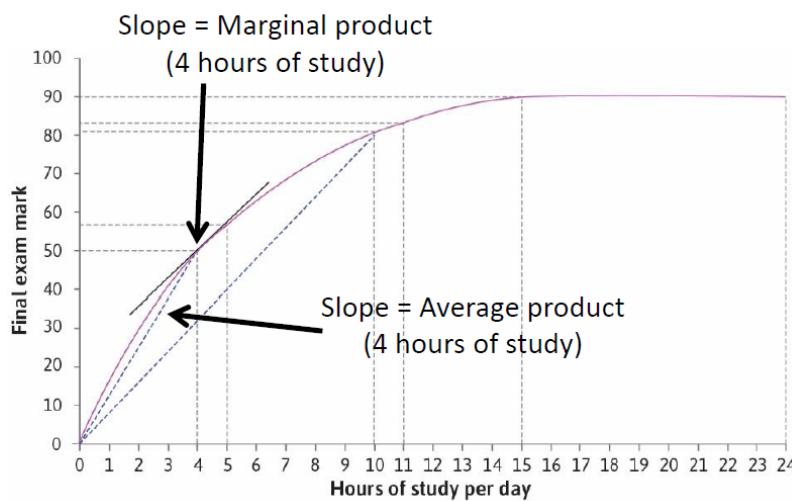
Scarcity, Work and Choice

- Labour is an input in the production of goods and services.
- People used economic progress as a way to consume more goods and enjoy more free time.
- However, resources are scarce. Therefore, we face situations under which we need to make a choice.
- Model of individual choice – a model to determine a situation in which an individual maximises their happiness within the constraints they face.
- This example will focus on a student's choice between studying hours and free time.

Example:

- Students choose how many hours to study, which affects their grade.
- We assume a positive relationship between GPA and number of hours studied
- **Production function** – a production function shows how inputs translate into outputs (holding other factors constant)
- A production function can tell us:
 - Marginal Product: Change in output per unit change in input
 - Average Product: Average output per unit of input.

Production Function

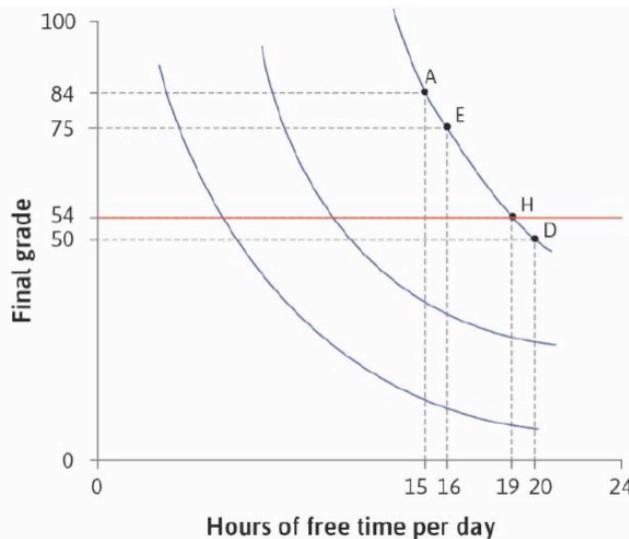


- **Diminishing marginal product** – Studying becomes less productive the more you study.

Indifference Curves

- Indifference curves show all combinations of goods that give the same utility (satisfaction)
- The **marginal rate of substitution** (MRS) is the slope of the indifference curve and represents the trade-offs that an individual faces.

	A	E	F	G	H	D
Hours of free time	15	16	17	18	19	20
Final grade	84	75	67	60	54	50
Marginal rate of substitution between grade and free time (MRS)	9	8	7	6	4	



- Properties of indifference curves:
 - Indifference curves slope downward due to trade-offs: If you are indifferent between two combinations, the combination that has more of one good must have less of the other good.
 - Higher indifference curves correspond to higher utility levels: As we move further away from the origin, we move to combinations with more of each good.

- Indifference curves are usually smooth: Small changes in the amounts of goods don't cause big jumps in utility.
- Indifference curves do not intersect
- As you move to the right along an indifference curve, it becomes flatter.

Opportunity Cost

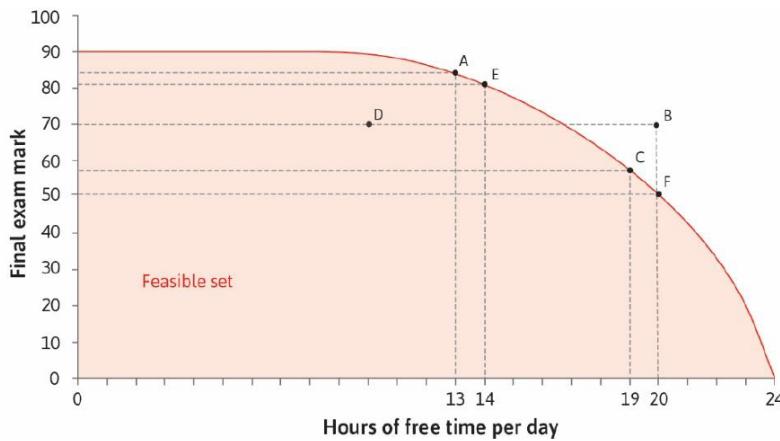
- Choices are limited by constraints and involve trade-offs.
- The opportunity cost of an action is the net benefit of the next best alternative.
- We compare actions based on economic cost
 - $Economic\ Cost = Monetary\ Costs + Subjective\ Costs$

	A HIGH VALUE ON THE THEATRE CHOICE (A)	A LOW VALUE ON THE THEATRE CHOICE (A)
OUT OF POCKET COST (PRICE OF TICKET FOR A)	\$25	\$25
OPPORTUNITY COST (FOREGONE PLEASURE OF B, PARK CONCERT)	\$15	\$15
ECONOMIC COST (SUM OF OUT OF POCKET AND OPPORTUNITY COST)	\$40	\$40
ENJOYMENT OF THEATRE CONCERT (A)	\$50	\$35
ECONOMIC RENT (ENJOYMENT MINUS ECONOMIC COST)	\$10	-\$5
Decision:	A: Go to the theatre concert.	B: Go to the park concert.

- If the benefit from an action exceeds the economic costs, you receive an **economic rent** from choosing it.

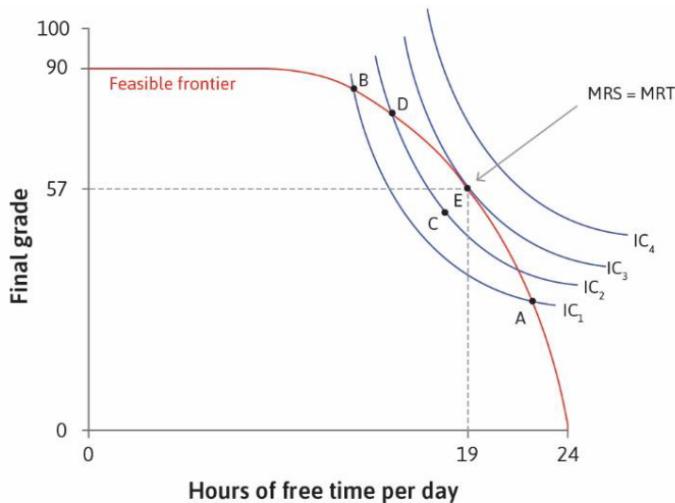
The Feasible Frontier

- The feasible frontier shows the maximum output that can be achieved with a given amount of input.
- The **marginal rate of transformation (MRT)** is the slope of the feasible frontier.



Optimal Decision Making

- The utility maximising choice is where the amount of one good the individual is willing to trade off for the other good (MRS) equals the actual trade off between the two goods (MRT)
 - i.e. $MRS = MRT$



	THE TRADE-OFF	WHERE IT IS ON THE DIAGRAM	IT IS EQUAL TO...
MRS	<i>Marginal rate of substitution:</i> The number of percentage points Alexei is willing to trade for an hour of free time.	The slope of the indifference curve.	
MRT, OR OPPORTUNITY COST OF FREE TIME	<i>Marginal rate of transformation:</i> The number of percentage points Alexei would gain (or lose) by giving up (or taking) another hour of free time.	The slope of the feasible frontier.	The marginal product of labour.

- What happens when the feasible frontier changes:
 - Technological progress makes it feasible to both consume more and have more free time.
 - Choice of free time/consumption depends on relative preferences and willingness to substitute one good for another.

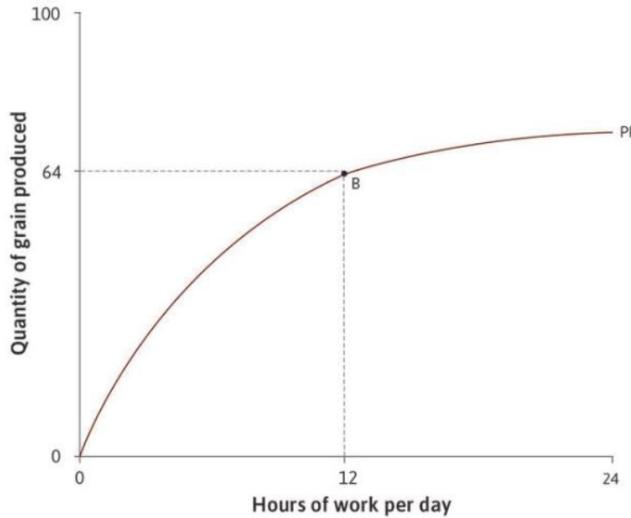
Hours of Work and Economic Growth

- New technologies raise the productivity of labour.
- A simple model of decision making under scarcity can be used to analyse the effects of this increased productivity on living standards, specifically on incomes and the free time of workers.
- We will apply the model of constrained choice to a self-sufficient farmer who chooses how many hours to work.

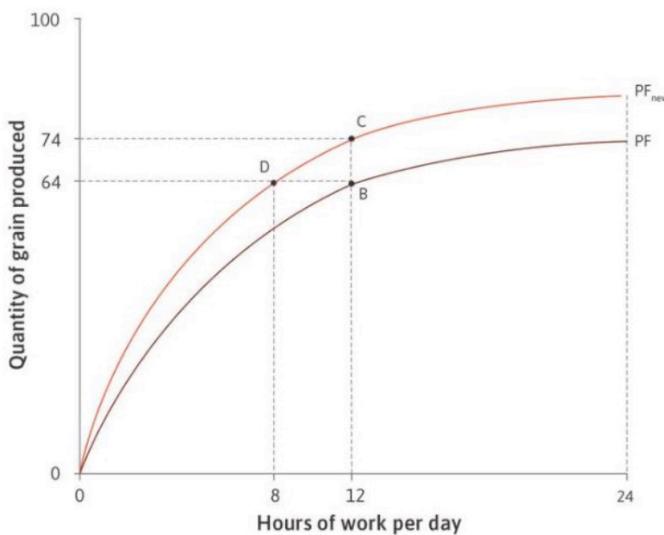
Production choice and Technological Change

- Assume the farmer produces grain to eat and does not sell it to anyone else. If they produce too little grain they will starve.

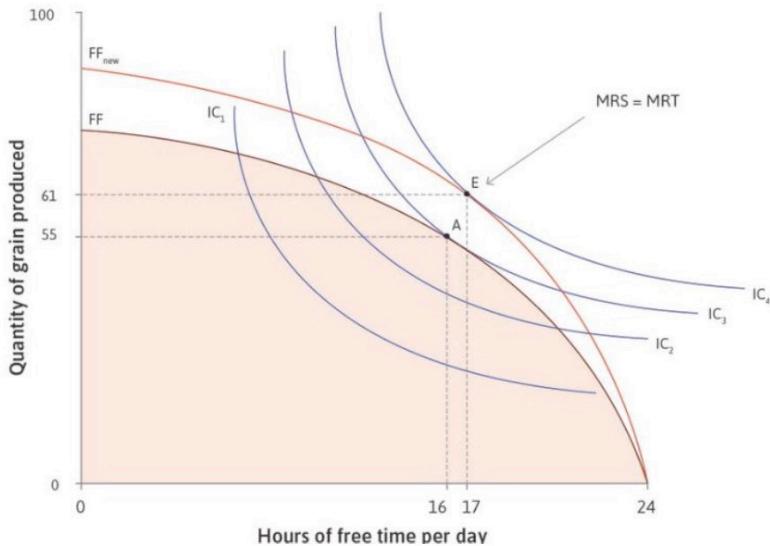
- Suppose the production function changes: an improvement in technology means the farmer can now produce the same amount of grain with fewer hours of work. How much more free time will they choose?
- The initial technology: The farmers initial choice is to work for 12 hours a day and produce 64 units of grain. (Point B on the graph)



- Improvement in Technology: The production function shifts upward.



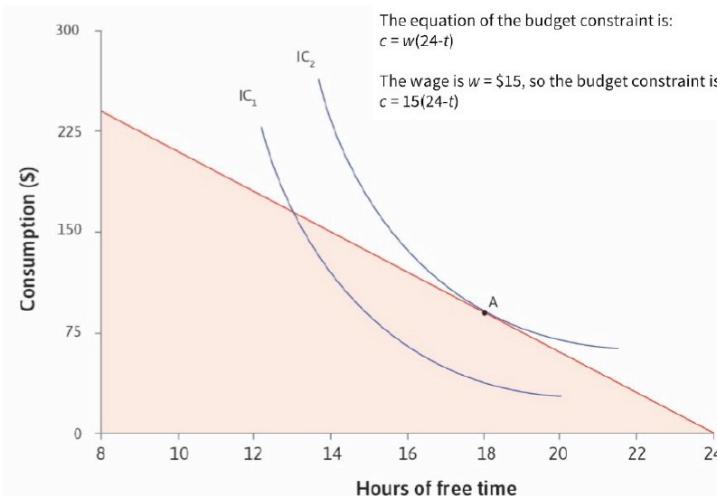
- Now if the farmer works for 12 hours per day, they can produce 74 units of grain (point C)
- Alternatively, by working 8 hours a day, they can produce 64 units of grain (point D)
- Technological progress expands the feasible set. We can now add the farmers indifference curves to the diagram to find the best combination for them.



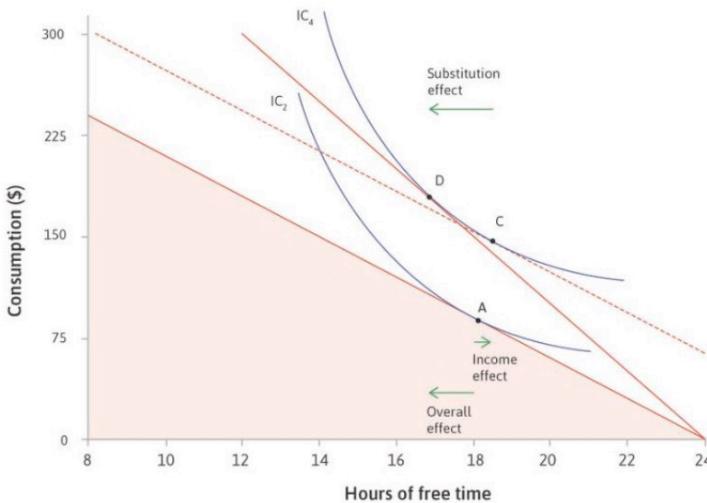
- Maximising utility with the original technology: the highest indifference curve they can attain is IC_3 at point A (16 hours free time and consume 55 units of grain)
- The farmers new optimal choice: after the technological change, the farmers optimal choice is point E (more free time and more grain)
- Technological change raises the farmers standard of living:
 - It enables them to achieve a higher utility
 - Increases both consumption of grain and free time
- This is just one possible result. Whether the farmer chooses to have more free time or more grain depends on their willingness to substitute one for the other.

Income and Substitution Effects

- Jobs differ according to the number of hours you have to work
- Assume that your spending cannot exceed your earnings. Your maximum level of consumption is therefore:
 $c = w(24-t)$
 - Where w is wage and t is free time in hours
- This is your **budget constraint**; it shows what you can afford to buy.
- Budget constraints are the feasible frontiers for consumption choices.
- The optimal choice is where the slope of the indifference curve equals the wage.



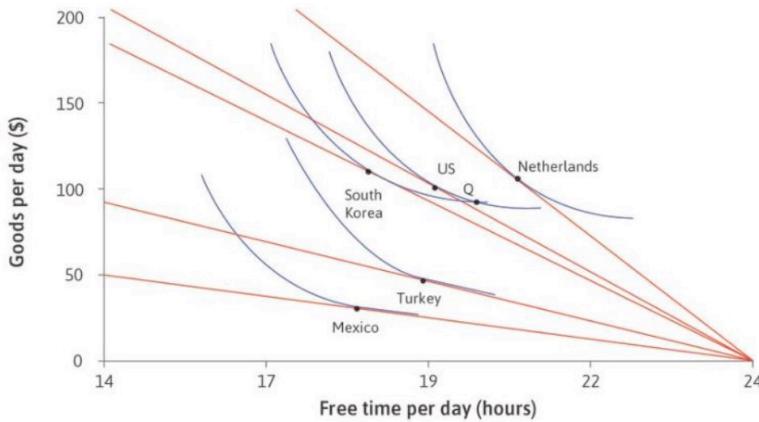
- Wage changes affect the slope of the budget constraint (MRT)
- A wage increase will have 2 effects:
 - Your total earnings increase, holding work hours fixed (**income effect**)
 - The opportunity cost of free time increases (**substitution effect**)



- When the wage is \$15, your best choice is at point A.
- The steeper line shows your budget constraint when your wage rises to \$25. (feasible set has expanded).
- Now you can reach a higher indifference curve (point D).
 - You now have 17 hours of free time and your consumption has risen to \$175
- The dotted line shows what would happen if you had enough income to reach IC_4 without a change in the opportunity cost of free time. (You would choose C, with more free time)
 - This shift from A to C is called the income effect. On its own, it would cause you to take more free time.
- However, the rise in opportunity cost of free time makes the budget constraint steeper. This causes you to choose D rather than C, with less free time.
 - This shift is called the substitution effect
- The overall effect of the wage rise is the sum of the income and substitution effects. In this case, the substitution effect is bigger, so with the higher wage you take less free time.
- **Income Effect:** the effect that the additional income would have if there were no change in the opportunity cost
- **Substitution Effect:** the effect of the change in the opportunity cost, given the new level of utility.

Application to Technological Change

- Income and substitution effects can explain trends in working hours over time (e.g. in the US, the income effect dominated the substitution effect, so consumption and free time both increased)
- International differences in working hours can be explained by cross-country difference in preferences.



- The indifference curves of the US and South Korea intersect at point Q. At this point, Americans are willing to give up more units of daily goods for an hour of free time than South Korea.
- Some other explanations are:
 - Difference in cultures
 - Politics (legal working hours)
 - Social Preferences

Review of Model

- Not realistic, but still a good approximation.
 - Over time, people learn what combination best suits them. Working hours can change due to culture and politics
- Helps us understand real world phenomena: preferences and income/substitution effects can explain differences in working hours across countries and over time.

Social Interactions

- Individuals motivated by self-interest can produce outcomes that are beneficial for society
- However, self-interest can also be harmful to society.
- **Social dilemma** occurs when people do not take adequate account of their impact on others
- Actions taken independently by self-interested individuals can result in a socially sub-optimal outcomes
 - Tragedy of the commons: common property or resources are often overexploited
 - Free riding: benefiting from the contributions of others to some cooperative project without contributing oneself.
- We will use tools of **game theory** to model social interactions

Social and Strategic Interactions

- **Social interaction** – A situation involving more than one person, where an individual's actions can affect other people's outcomes
- **Strategic Interaction** – A social interaction where people are aware of the ways that their actions affect others
- **Strategy** – Actions that people can take when engaging in social interaction
- **Game** – A model of strategic interaction that describes the players, the feasible strategies, the information that the players have and their payoffs.

- Game Theory – A set of models of strategic interactions

Invisible Hand Game (Example)

- Two farmers decide which crops to specialise in.
- They interact only once and decide simultaneously.
 - Players – Anil and Bala
 - Feasible Strategies – Rice or Cassava
 - Information – Each farmer does not know what the other chose
 - Payoffs – Depend on the market prices and quality of land
- Best Response: Strategy that yields the highest payoff, given the other players strategy
- Dominant Strategy: A best response to all possible strategies of the other player
 - Anil's dominant strategy is to grow cassava and Bala's is to grow rice.
- Dominant Strategy Equilibrium: An outcome of a game in which everyone plays their dominant strategy.
 - In this example it is (Cassava, Rice)
- Although they independently pursued their self-interest, they were guided by an 'invisible hand' to an outcome that was in both of their best interests.

		Bala	
		Rice	Cassava
Anil	Rice	3	2
	Cassava	1 4	2 1

Dominant Strategy Equilibrium

Prisoners Dilemma (Example)

- In this next example, Anil's dominant strategy is to use terminator, and so is Bala's.
- The dominant strategy equilibrium is NOT the socially optimal outcome in this case.

		Bala	
		IPC	Terminator
Anil	IPC	3	4
	Terminator	1 3	1 2

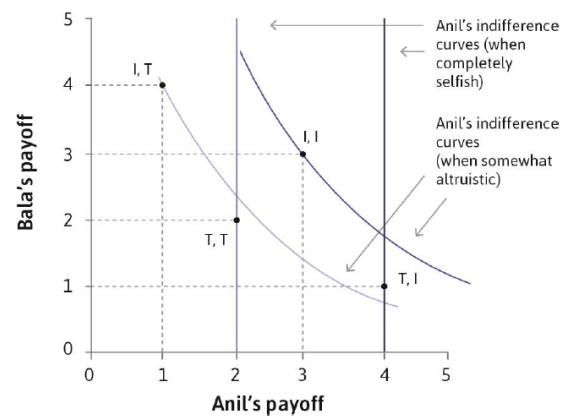
Socially Optimal Dominant Strategy

Nash Equilibrium

- Nash Equilibrium: A set of strategies such that each player's strategy is the best response to the strategies chosen by everyone else.
- In a Nash equilibrium, no player has an incentive to deviate unilaterally.
- Note: There may be more than one Nash equilibrium in a game.
- We predicted this outcome because we assumed that:
 - Players did not place any value on the payoffs of other players
 - Nobody could make the farmers pay for the consequences of their actions on others
 - Players could not coordinate their actions beforehand

Social Preferences: Altruism

- Social dilemmas arise when players only care about their own payoffs
- However, in many experiments, many players show altruism by choosing the *dominated* strategy
- Altruism is an example of a social preference – a preference that places value on what happens to other people, even if its results in a low payoff for the individual.
 - Spite and envy are also social preferences
- If Anil doesn't care about Bala's wellbeing, his indifference curves are vertical
 - He is indifferent to Bala's payoff and his most preferred outcome is (T, I)
- When Anil DOES care about Bala's wellbeing, indifference curves are downward sloping and (I, I) is his most preferred outcome.
- If Bala feels the same way, then the outcome would be (I, I)
- When people care about others' outcomes, social dilemmas are easier to solve



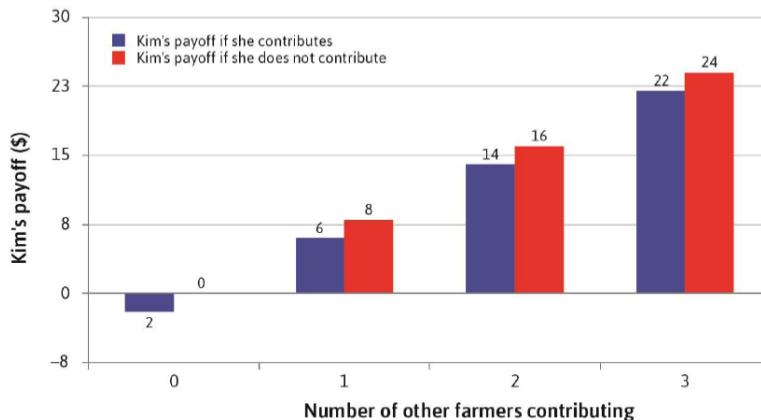
Social Preferences: Other Types

- Reciprocity – Being kind/helpful to others who are kind/helpful.
- Fairness (inequality aversion) – Disliking outcomes in which some individuals receive more than other individuals
- We evaluate whether others have been 'kind' or 'helpful' according to social norms .
- These motives affect outcomes in the **public goods game** and the **ultimatum game**.

- Economists use experiments to learn about preferences.
- Lab Experiments:
 - Can control participants decisions and outcomes
 - Can create a control/treatment group for comparison
 - Results can be replicated
 - Can control for other variables
- Field Experiments:
 - Lab Experiments may not predict real-world decision making
 - More realistic context in which people make decisions

Public Goods Game (Example)

- There are a group of farmers
- Each farmer decides whether to contribute to the public good (e.g. irrigation project)
 - A public good is a good for which use by one person does not reduce availability to others.
- Contributing has a personal cost (\$10), but everyone benefits (\$8 each).



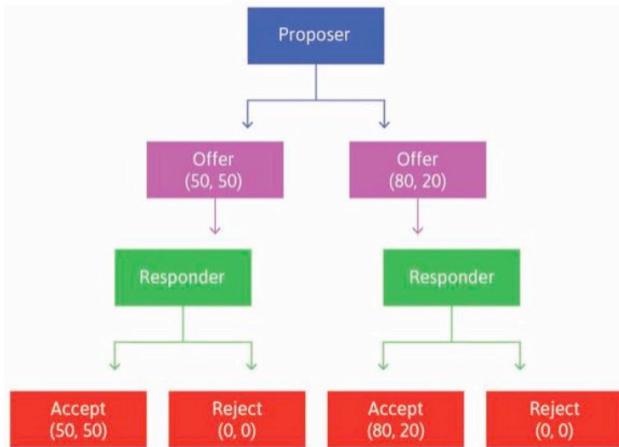
- If the farmer only cares about their own payoffs, free riding is a dominant strategy for each farmer
 - If they all contribute, they all get \$22.
- There is a dominant strategy equilibrium: no one contributes and earns zero payoff, which is a social dilemma.
- **Ongoing relationships** are an important feature of social interactions.
- Behaving selfishly in one period has consequences in future periods, so it may no longer be a dominant strategy.
- Better outcomes can arise in repeated interactions due to social norms, reciprocity and peer punishment.

Public Goods Game (Experimental Data)

- Public goods experiments were conducted in cities around the world, and the experimental data shows that:
 - Contributions were high at the start
 - The contributions decreased over time and were negative by the tenth period.
(People are not solely self-interested)
- It appears as if participants are punishing free riders by decreasing contributions.
- Reciprocity is a better explanation than altruism here.
- When participants were given the option to identify and anonymously punish free riders, the contributions increased in most cities, and did not decrease across the duration of the game.

The Ultimatum Game (Example)

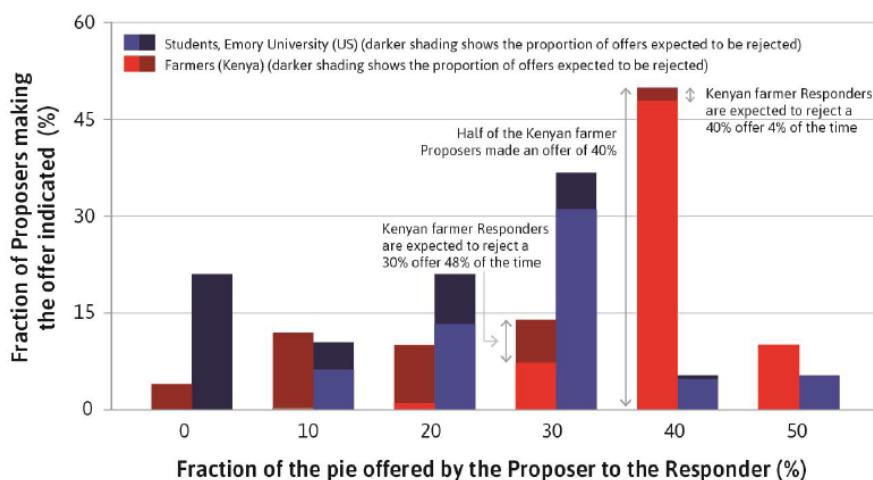
- This is a two-person one-shot sequential game.
- A proposer is given \$100 and is told to give a part of it to the responder.
- The responder can accept or reject the offer:



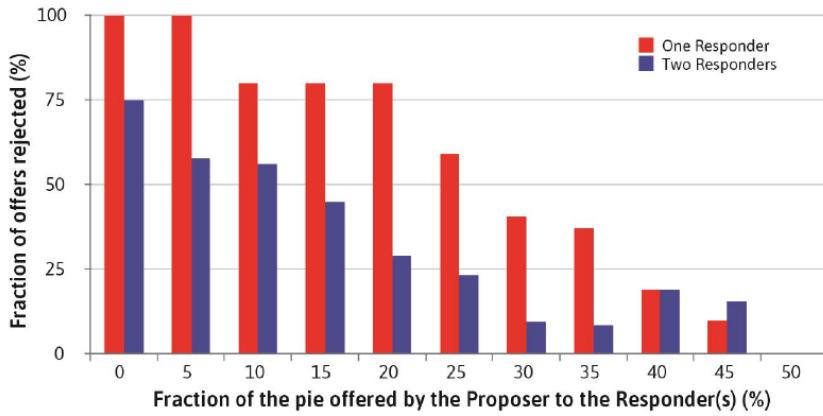
- This provides insights about sharing economic rent that arises in an interactions
 - E.g. sharing profit between employer/employees
- In a world where people only care about their own payoffs, we can predict that
 - The responder will accept any offer because something is better than nothing
 - Knowing this, the proposer would offer the minimum amount possible

The Ultimatum Game (Experimental Data)

- However, this prediction does not match experimental data.
- Better offers have fewer rejections
- The proposer may be motivated by altruism, fairness, social norms or reciprocity



- If we introduce two responders and the following conditions:
 - If no one accepts, no one gets anything
 - If one accepts, but not the other, that Responder and the proposer get the split, and the other responder gets nothing
 - If both responders accept, one is chosen at random to receive the split
- In this case where the responder is in a competitive situation, the outcomes shift towards self-interest.



Coordination Issues

- When there is more than one Nash Equilibrium and individuals choose independently, the socially optimal outcome may not be selected.
- Society could be stuck in a suboptimal outcome since there is no incentive to unilaterally change one's action.

Property and Power: Mutual Gains and Conflict

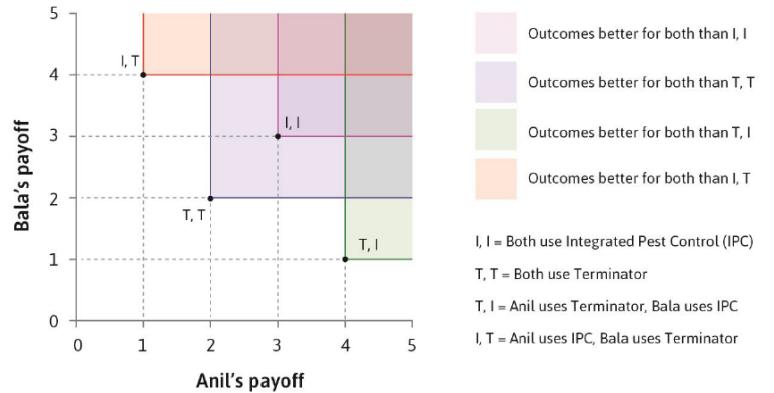
- Institutions (the rules of the game) matter for social outcomes.
- Institutions can affect the income that people receive for their work.

Pareto Efficiency

- Allocation: outcome of an economic interaction (describes who does what, and who gets what)
- Suppose we want to compare two possible allocation, A and B , that may result from an economic interaction. If we find that everyone involved in the interaction prefers allocation A , then most people would say A is a better allocation than B .
 - This criterion for judging between A and B is called the Pareto criterion.
- **Example:** From the example in the previous concept, there are two farmers Anil and Bala who want to decide how to deal with pest insects that destroy the crops they cultivate.
- There are two feasible strategies:
 - Terminator: Inexpensive and kills all insects. Also leaks in water supply.
 - IPC: Introduces beneficial insects that eat the pest insects.
- If only one of them chooses Terminator, the damage is quite limited. If they both choose it, water contamination becomes a serious problem, and they need to buy a costly water filtering system.
- An allocation can be said to be **Pareto efficient** if nobody can be better off without making somebody worse off.

(I,I) Pareto-dominates (T,T).

(I,I), (I,T), and (T,I) are all Pareto efficient.



- There is often more than one Pareto efficient allocation. Pareto criterion does not help us choose among these allocations.
- If an allocation is Pareto efficient, this does not necessarily mean we should approve of it: Anil choosing IPC and Bala free riding by choosing Terminator is Pareto efficient, but we still agree that this is unfair.
 - The Pareto criterion does not tell us which of the Pareto-efficient allocations is better or fairer
 - If an allocation is Pareto efficient, this does not mean we should approve of it.

Fairness

- Allocations can be considered unfair for two reasons:
 - Inequality of final outcome (e.g. wealth, well-being) - **Substantive judgement of fairness**
 - How they came about (e.g. force vs fair play, equal opportunity, conforming to social norms) – **Procedural judgment of fairness**
- Rawls' veil of ignorance: Taking an impartial perspective
- Economics does not provide judgements about what is fair. But it can clarify:
 - How institutions affect inequality
 - Trade-offs in the fairness of outcomes (e.g. giving up equality of income for equality of opportunity)
 - Which public policies can address unfairness, and how

Determining Allocations

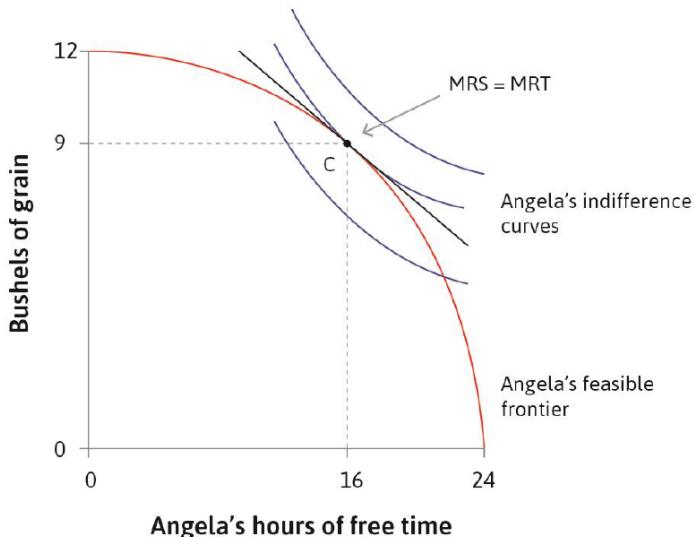
Example: Angela the Farmer

- Angela is a farmer who produces a certain crop.
 - Initially, Angela works the land on her own and gets everything she produces.
 - Next we introduce a second person who does not farm but would also like some of the harvest. He is called Bruno.
 - At first, Bruno can force Angela to work for him and in order to survive she has to do what he says.

- Later, the rules change: the rule of law replaces the rule of force. Bruno can no longer coerce Angela to work. But he owns the land and if she wants to farm his land, she must agree to pay him some part of the harvest.
- Eventually, the rules of the game change again in Angela's favour. She and her fellow farmers achieve the right to vote and legislation is passed that increases Angela's claim on the harvest.

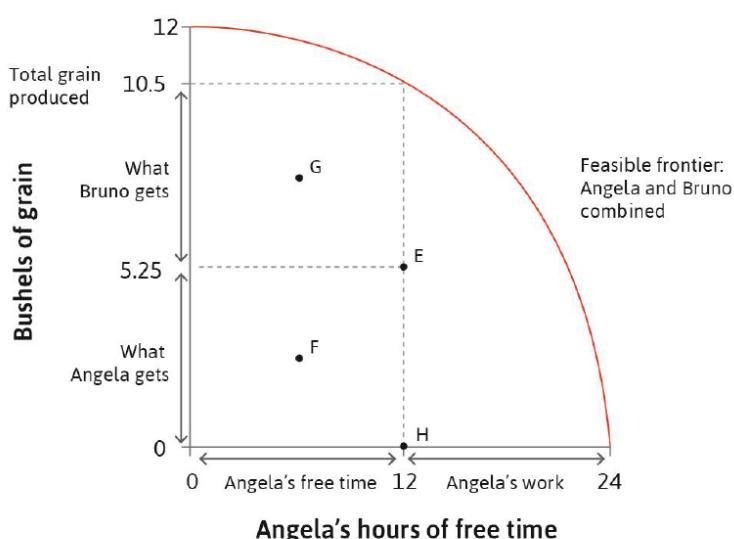
Personal Trade-off

- Angela faces a trade-off between grain and free time. Initially she farms the land by herself and keeps all the grain



Combined feasible set

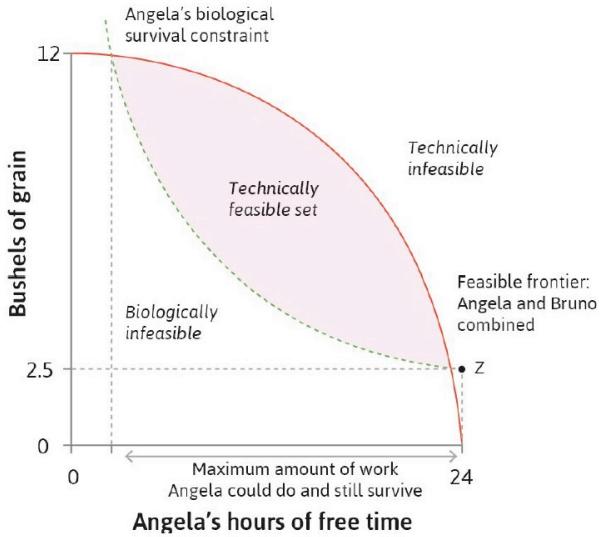
- Bruno is not a farmer but wants some of Angela's grain.
- The combined feasible shows all possible allocations of production between two parties.



- Not all of these allocations are possible (e.g. if Angela receives nothing she would not survive)
- Of the possible allocations, the one that will occur depends on institutions and policies.

Feasible Allocations

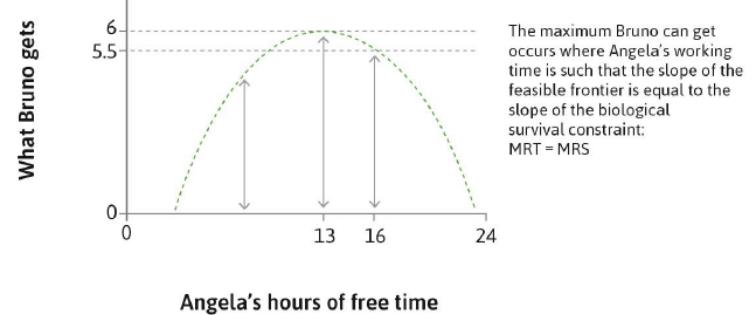
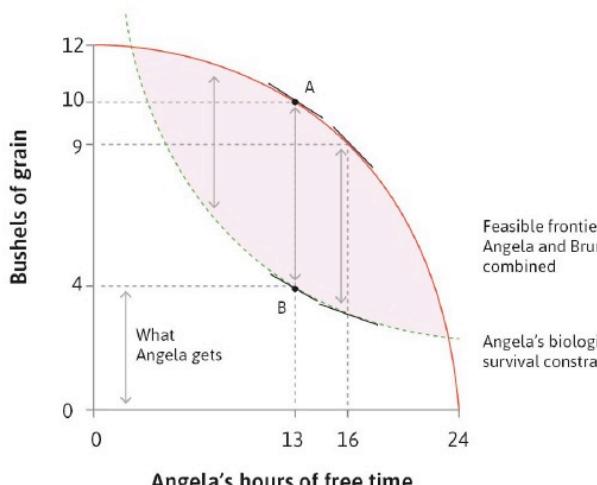
- The feasible frontier shows all the technically feasible outcomes.
- The biological survival constraint shows all the biologically feasible outcomes (limited by survival)
- Feasible allocations are given by the intersection of these constraints.



- When Angela gives up some free time and expends more energy working, she needs more food, so the BSC is higher when she has less free time.

Coercion: Imposing Allocations by Force

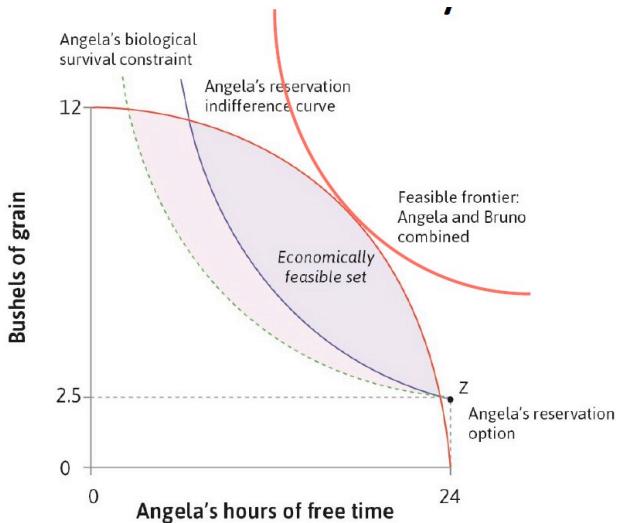
- Suppose Bruno can make any allocation he wants.
 - Bruno must give Angela at least the amount shown by the BSC to keep her alive.
 - Bruno gets to keep the difference between these two points.
 - Therefore, Bruno should find the hours of Angela's work for which the vertical distance between the feasible frontier and the biological survival constraint is the greatest.



- The allocation that maximises his economic rent is where the slope of the biological constraint (MRS) equals the slope of the feasible frontier (MRT) (Point A).

Voluntary Exchange: Bargaining

- Now the limitation is not Angela's survival, but rather her agreement. We know she values her free time, so the more hours he offers her to work, the more he is going to have to pay.



- Point Z is the allocation in which Angela does no work and gets only survival rations (e.g. from the government or her family)
- This is her **reservation option** (if she refuses Bruno's offer, she has this option as a backup)
- Angela's reservation indifference curve: all of the allocations that have the same value for her as the reservation option.
- How parties divide up joint surplus depends on:
 - Each party's reservation option
 - The relative bargaining power between the parties
- The economically feasible set shows all possible allocations that benefit both parties.

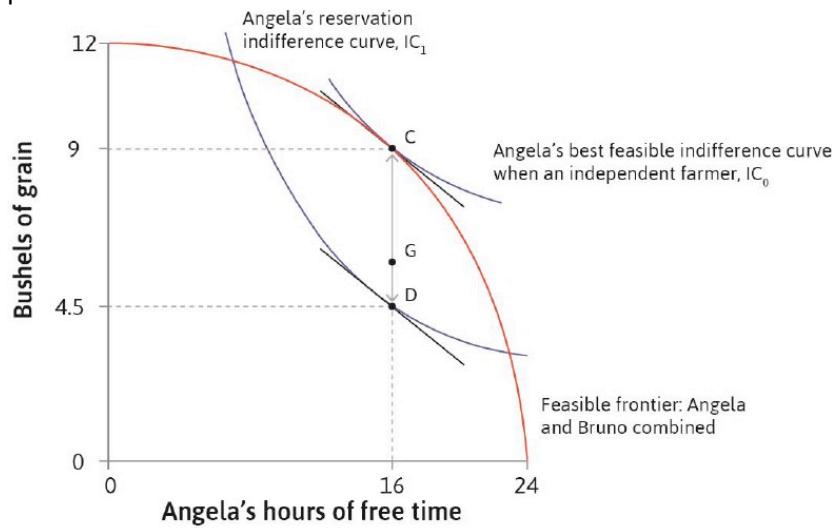
Coercion vs Bargaining

- We can see that both Angela and Bruno may benefit if a deal can be made.
 - As long as Bruno gets some of the crop he will do better than if there is no deal.
 - As long as Angela's share makes her better off than she would have been if she took the reservation option, taking account of her work hours, she will also benefit
- The potential for mutual gain is why their exchange need not take place via coercion but can be motivated by the desire of both to be better off.
- Under coercion, the allocation chosen is where the slope of the biological constraint equals the slope of the feasible frontier – She will work 11 hours per day
- Without coercion, joint surplus is maximised where the slope of the reservation indifference curve equals that of the feasible frontier – Angela works 8 hours per day

The Pareto Efficiency Curve

- These allocations are Pareto efficient as it is impossible to change the allocation without making one party worse off.
- Pareto efficiency curve: the set of all Pareto efficient allocations (also called the contact curve)
 - Joins together all points in the feasible set where $MRS = MRT$

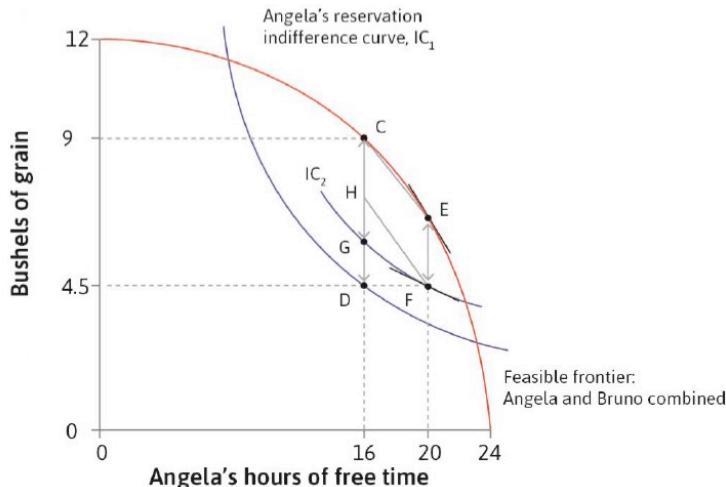
- The joint surplus is the same, but the distribution of the surplus differs at each point.



- The allocation chosen will be on the Pareto efficiency curve (line CD)
 - At C, Angela gets all the surplus
 - At D, Bruno gets all the surplus
 - At any other point, Angela and Bruno split the surplus and each receive a rent.

Institutions and Policies: Legislation

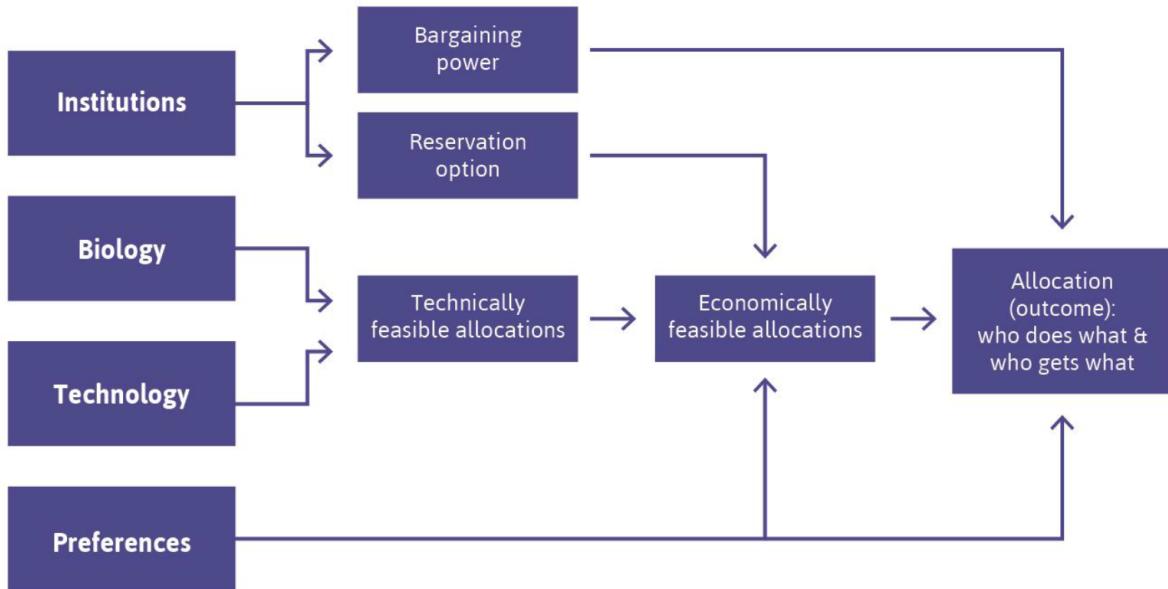
- Institutions and policies affect the size of the surplus and its distribution.
- The new allocation must give both parties at least as much as their new reservation option.
 - E.g. A law that limits working hours gives Angela more bargaining power



- Angela's reservation option is now F, so Bruno must offer her a point on CG.

Conclusion

- Technology and biology determine which allocations are technically feasible
- Institutions and policies help determine which allocations are economically feasible (Pareto-improving)
- The allocation chosen depends on the parties' preferences and their bargaining power



Economics and Ethics: More on Fairness

Fairness and Markets

- Economics involves allocating resources, primarily through markets, in a way that efficiency is maximised.
- Another important aspect is the concept of fairness.
- Fairness: the intersection between economics and ethics.
- The results of the ultimatum game show that people do indeed value fairness as responders are generally willing to give up monetary gain in order to punish proposers for being unfair.
 - Other experiments have shown that proposers also value fairness.
- There is evidence that people regard markets as a relatively unfair allocation mechanism for dealing with shortages of some goods and services.

Example

- A football team normally sells some tickets on the day of their games. Recently, interest in the games have increased and tickets are always in great demand. The team owners can distribute the tickets in one of three ways:
 - By auction
 - By lottery
 - By queue
- When asked to rank these allocation methods in terms of fairness, these were the results:

TABLE 1 Ranking of Allocation Methods

Allocation Method	Most Fair (%)	Least Fair (%)
Auction	4	75
Lottery	28	18
Queue	68	7

- In terms of economic efficiency: auction markets are superior to lotteries, and lotteries are superior to queuing.
 - This is because queuing has the most amount of resources lost (time)
- The experiment shows that ranking by fairness is the reverse of ranking by efficiency (suggestive of a trade-off between efficiency and fairness)

An Approach to Fairness

1. *Procedural Judgement of Fairness*: evaluate an outcome based on how the allocation came about, and not on the outcome itself.
2. *Substantive Judgement of Fairness*: evaluations are based on the allocation itself, not how it was determined or came about or the actions that produced it. (Equality of the outcome)
- Consider fairness from two competing perspectives of moral philosophy:
 - Consequentialism
 - Deontology

Consequentialism and Fairness

- Consequentialist accounts of fairness focus on the outcome/results of distribution:
 - Substantive judgement of fairness
- The consequence that is important in economics is economic welfare, which arises from satisfaction of preferences.
- However, when another consequence, such as the fairness of an outcome, is also important, conflicts can arise between these two objectives.
- From a consequentialist perspective, fairness can be the specified objective or goal and the choices are ethically judged in term of their consequences for fairness.

Deontology and Fairness

- Deontological accounts of fairness are focused on the processes or actions that lead to an outcome via the rules involved:
 - The method of determination of final outcomes will signal unfairness without regard to the consequences that obtain.
 - Procedural Judgement of fairness
 - There is no presumption of equality of outcomes and it is morally unjustified to impose it.

The Firm: Owners, Managers and Employees

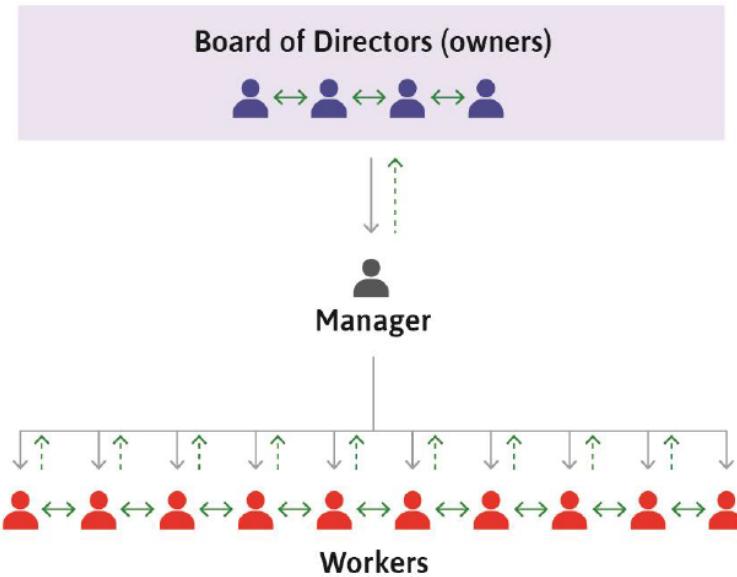
Firms

- Firm – A business organisation which
 - Employs people
 - Purchases inputs to produce market goods and services
 - Sets prices greater than the cost of production
 - “A miniature, privately owned, centrally planned economy”

Firms vs Markets

- In a capitalist economy, the division of labour (specialisation) is coordinated in two ways:
 - Firms
 - Markets
- Firms – Concentration of economic power in the hands of the owners/managers allows them to issue commands to workers
- Markets – Power is decentralised, so decisions and autonomous and voluntary

Structure of a Firm



- Owners decide on long term strategy
- Managers implement their decisions by assigning tasks to workers and monitoring them

Contracts

- Firms and markets differ in the contracts that form the basis of exchange
- *Contract* – a legal document or understanding that specifies a set of actions that parties to the contract must undertake.
- Contracts for products sold in **markets** permanently transfer ownership of the good from the seller to the buyer
- Contracts for labour (**firms**) temporarily transfer authority over a person's activities from the employee to the manager or owner.

Relationships within a Firm

- Unlike in markets, relationships within a firm may extend over a long period of time
 - Creation of a network of colleagues
 - Acquisition of skills necessary for the job
- These skills, networks and friendships are firm-specific assets
 - They are only valuable when the worker remains employed in a particular firm
 - When the relationship ends, value is lost on both sides

Owners and Managers

- Separation of ownership and control – managers decide on the use of other peoples' funds
- Asymmetric information:
 - Owners or managers do not always know that their subordinates know or do, not all of their directions or commands are necessarily carried out

Conflict of Interest

- The firm's profits legally belong to the people who own the firm's assets
- Managers actions have impact on profits, but if profits increase thanks to the managers work, they will not automatically benefit
 - This creates a conflict of interest between managers and owners
- To solve the conflict of interest owners could:
 - Link the managers pay to the performance of the company's share price
 - Monitor the managers performance

Incomplete Contracts

- Hiring employees is different from buying goods and services
- The contract between a firm and its employees is incomplete if:
 - Some tasks depend on future (unknown) events
 - Some aspects of the job are difficult to measure and base wages on (e.g. effort)
- Incomplete contracts do not specify, in an enforceable way, every aspect of the exchange that affects the interests of the parties
- Incomplete contracts are not a problem everywhere
 - Piece rate work – a type of employment in which the worker is paid a fixed amount for each product made
 - This gives workers extra incentive to exert effort
 - However, this is rarely used in the modern day as it is typically difficult to measure output and employees often work as part of a team
- Reasons why workers work hard:
 - Work ethic
 - Feelings of responsibility
 - To reciprocate a feeling of gratitude for good working conditions
 - Benefits for measurable output
 - Promotions
 - Fear of being fired

Employment Rents

- If firms paid their employees the lowest wages, they would not be willing to accept
- There is a difference between the value of the job and the value of the next best option, which is being unemployed and having to search for a new job
 - There is an **employment rent**
- Employment rents can benefit owners and managers in two ways:
 - The employee is more likely to stay with the firm – saves the firm money on recruitment and training

- They can threaten to fire the worker – owners and managers exert power over employees because the employee has something to lose

Calculating Employment Rent

- To calculate employment rent, weigh up all the benefits and costs of working compared to being unemployed.
- Costs of working:
 - The disutility of work
 - The cost of travelling to work everyday
- Benefits of working:
 - Wage income
 - Firm-specific assets
 - Medical insurance
 - The social status of being employed
- $\text{Employment rent per hour} = \text{Wage} - \text{Reservation Wage} - \text{Disutility of effort}$
- $\text{Total employment rent} = \text{Employment rent per hour} \times \text{Expected hours of lost work time}$

Wages and Effort

- The employer cannot directly measure the worker's effort
- Large employment rent → large cost of job loss → worker puts in more effort to reduce chance of being fired
- One way to increase the cost of job loss is for the firm to raise wages

Involuntary Unemployment

- Involuntary unemployment – being out of work, but preferring to have a job at the wages and working conditions otherwise identical employed workers have
- There must always be involuntary unemployment in order to exert effort from workers
- In equilibrium, both wages and involuntary unemployment have to be high enough to ensure employment rent is high enough for workers to put in effort
- Employee incentive to supply effort will be affected by changes in:
 - The utility of the things that wage can buy
 - The disutility of effort
 - The reservation wage
 - The probability of getting fired at each effort level
 - The level of unemployment

Incomplete Contracts in General

- Incomplete contracts do not only occur in employment relationships
- Incomplete contracts arise when:
 - Information is not verifiable
 - The relationship covers periods of time
 - There is uncertainty
 - There are difficulties with measurement

- Judiciary is absent
 - Preferences for omitting some information
- Examples:
 - **People and banks** lend money in return for a promise to repay plus some interest.
This may be unenforceable if the borrower is unable to pay.
 - **Insurance** contracts require that the people who purchase insurance should behave prudently and try not to take any **risks**
 - **Families** devote a sizeable fraction of their budgets to purchasing educational and health services, the quality of which is rarely specified in a contract

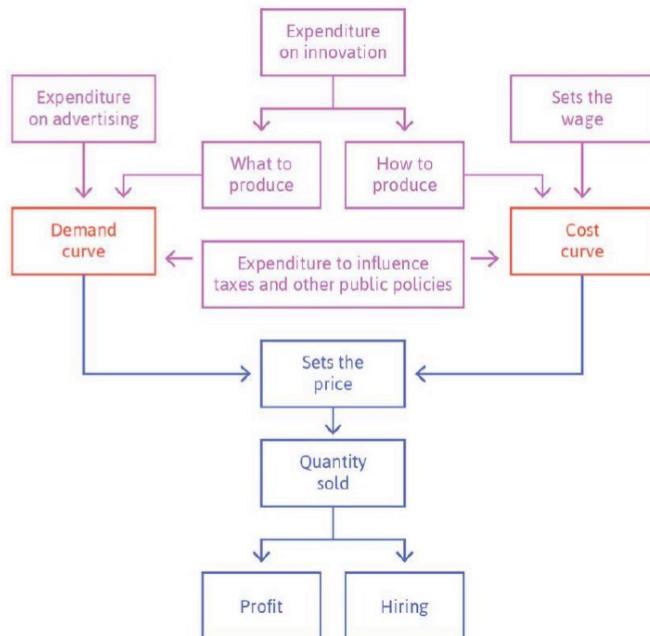
Principal-agent Models

- Principal-agent models capture interactions under incomplete contracts
 - E.g. the firm is the principal, and the worker is the agent
- Agent takes action that is hidden from the principal, which is why the principal cannot verify it
- A hidden action problem occurs when:
 - There is a conflict between the principal and the agent
- The information about the action may be either asymmetric or unverifiable

The Firm and its Customers

The Firm's Decisions

- This figure illustrates key decisions that a firm makes.



- These decisions determine how the firm chooses the pricing of its products and the quantity to produce.
- This depends on the demand of the product and production costs.

Decomposition of Profit

- A firm's profit is given by:
 - $Economic\ Profit = Total\ Revenue - Total\ Cost = P*Q - AC*Q$
- Profits depend on:
 - P: Price that the firms sets in the market
 - Q: Output
 - AC: Cost of acquiring inputs

Production and Pricing Decisions

- In order to maximise profits, the firms needs to:
 - Set Q and P as high as possible (at least cover production costs)
- To make these decisions, managers need to know:
 - Production cost
 - Product demand

Describing Production Technology

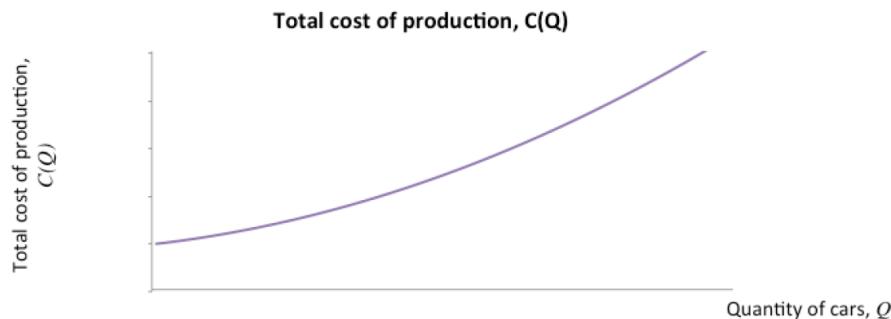
If inputs increase by a given proportion, and production...	Then the technology exhibits...
Increases more than proportionally	Increasing returns to scale in production Economies of scale
Increases proportionally	Constant returns to scale in production
Increases less than proportionally	Decreasing returns to scale in production Diseconomies of scale

Advantages of Large Scale Production

- Large firms can be more profitable than small firms due to **economies of scale**:
 - Fixed production costs spread over a larger scale of production means lower cost per unit
 - Larger firms also have greater bargaining power
- Large firms can also suffer from diseconomies of scale (e.g. additional layers of bureaucracy due to too many employees)
- Large firms can have demand advantages: value of output rises with number of users (e.g. Facebook)

Cost Functions

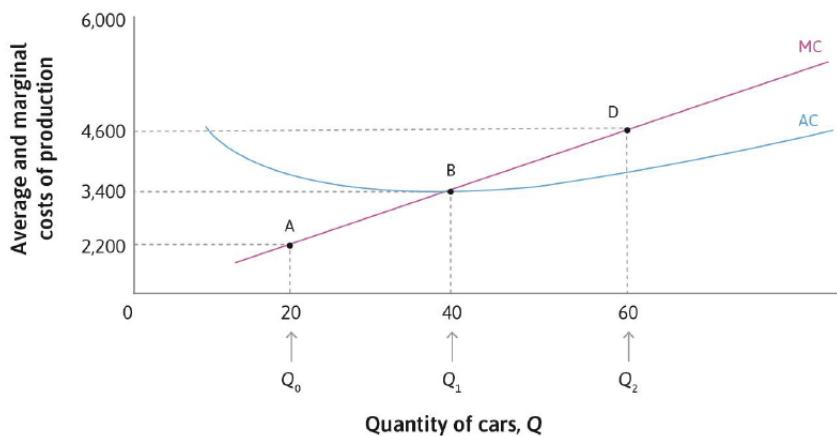
- Cost functions show how production costs vary with quantity produced. E.g.:



- **Average Cost (AC):** Calculated as the slope of the ray from the origin to a given point on the function
- **Marginal Cost (MC):** The effect on total cost of producing one additional unit of output. Calculated as the slope of the function at a given point

Relationship between MC and AC

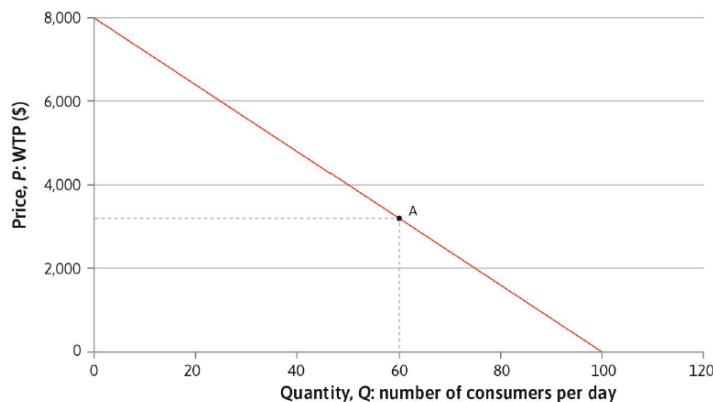
- By calculating marginal cost at every value of Q , we can draw the marginal cost curve.



- The following statements are always true:
 - If $AC > MC$: AC is always decreasing
 - If $AC < MC$: AC is increasing
 - The MC curve always intersects the AC curve at its lowest point

Demand Curve

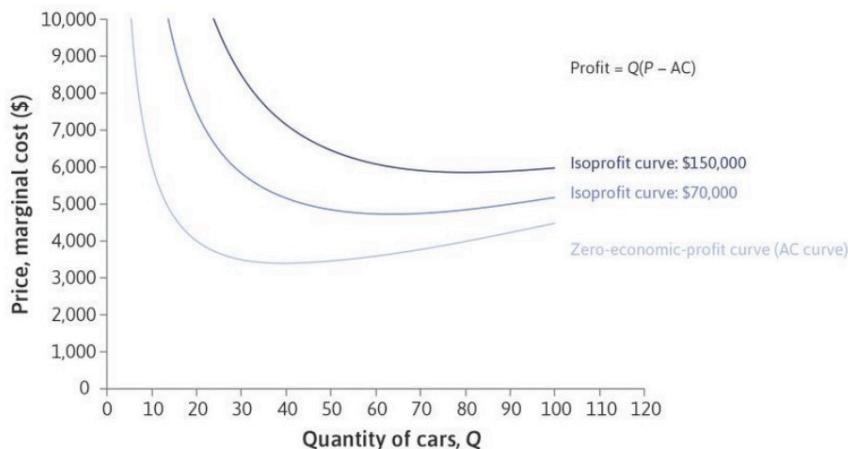
- Demand Curve: Quantity that consumers will buy at each price.



- In theory, firms can estimate the demand curve for their product by surveying a large number of consumers. This is difficult in reality.
- Each customer has a willingness to pay (WTP), which depends on how much the customer personally values the product
- A consumer will buy a product if the price is less than or equal to their WTP

Isoprofit Curve

- Isoprofit curves show the price-quantity combinations that give the same profit.
- The shape of a firm's cost function affects the shape of their Isoprofit curves
- The zero-economic profit curve: This is when $P = AC$, and it's the curve that shows all the combinations of P and Q that give zero economic profit.

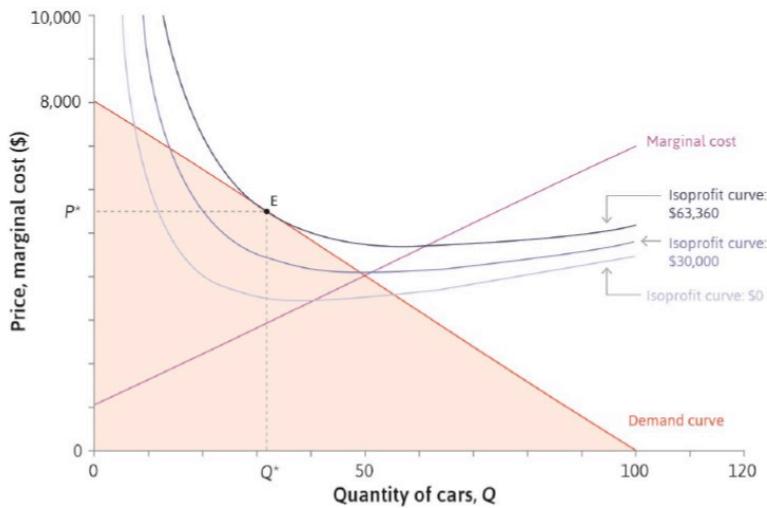


- The other curves show combinations of P and Q that give higher levels of profit
- Higher prices give higher profits, so curves that are further from the origin would be preferred.

Profit Maximisation

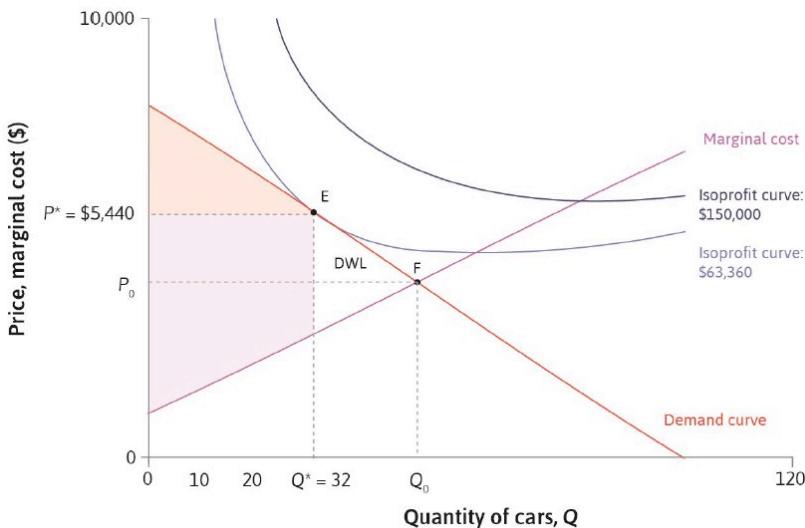
- This is a constrained optimisation problem
 - Demand curve: Firm's feasible frontier (MRT)

- Isoprofit Curves: Firm's indifference curves (MRS)
- The firm maximises profit by choosing a point where $MRS = MRT$



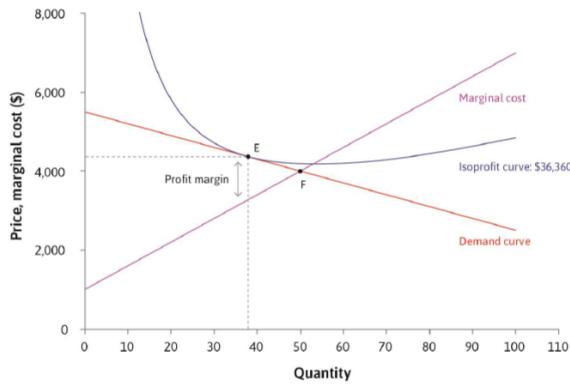
Measuring Surplus

- Consumer Surplus (CS): The total difference between willingness to pay, and purchase price
- Producer Surplus (PS): The total difference between revenue and marginal cost
- *Total Surplus = Consumer Surplus + Producer Surplus (= Total gains from trade)*
- Deadweight Loss: A loss of total surplus relative to a Pareto efficient allocation (unexploited gains from trade)
- Total surplus is highest when $Demand = Marginal Cost$

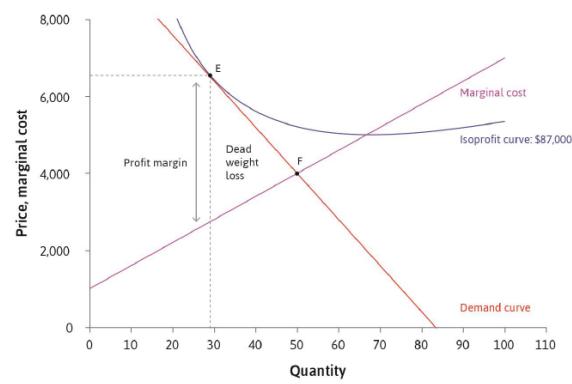


Price Elasticity of Demand

- Price elasticity of demand: degree of responsiveness to a price change:
$$\epsilon = \frac{-\% \text{ change in demand}}{\% \text{ change in price}}$$
- A firm's mark-up is inversely proportional to price elasticity of demand.



Elastic demand



Inelastic demand

- The effect of good-specific taxes depends on the elasticity of demand for those goods
- Governments raise more tax revenue by levying taxes of price-inelastic goods

Market Power

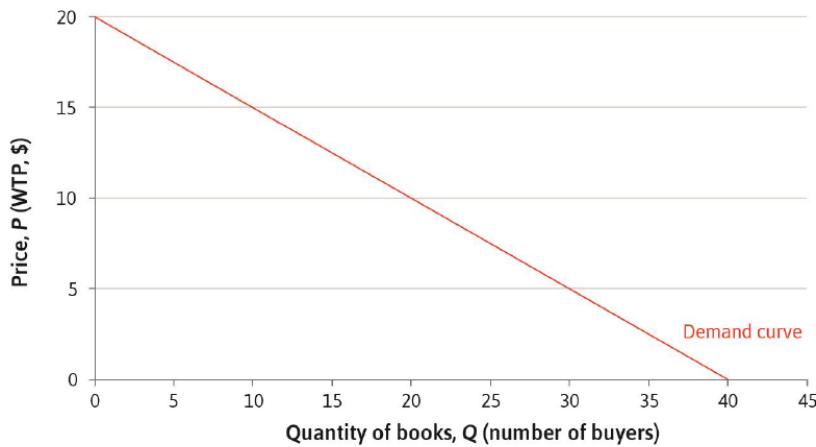
- Elasticity is determined by competition:
 - Demand is relatively inelastic if there are a few close substitutes
 - Firms with market power have enough bargaining power to set prices without losing customers to competitors.
- Competition policy (limits of market power) can be beneficial to consumers when firms collude to keep prices high.
- A **monopoly** is when one firm sells a specialised product, so they have little to no competition, hence inelastic demand
 - They can set prices above marginal cost without losing customers, thus earning **monopoly rents**
 - This is a form of market failure because there is deadweight loss
- A **natural monopoly** arises when one firm can produce at lower average costs than two or more firms e.g. utilities
- Instead of encouraging competition, policymakers may put price controls or make these firms publicly owned.
- Firms can increase their market power by:
 - Innovating: Allows firms to differentiate their products
 - Advertising: Firms can attract customers away from competing products and create brand loyalty.

Supply and Demand: Price-Taking and Competitive Markets

- Model of interactions between price-taking firms and customers
 - Perfect competition – special case of this model
 - Two different perspectives: market and firm

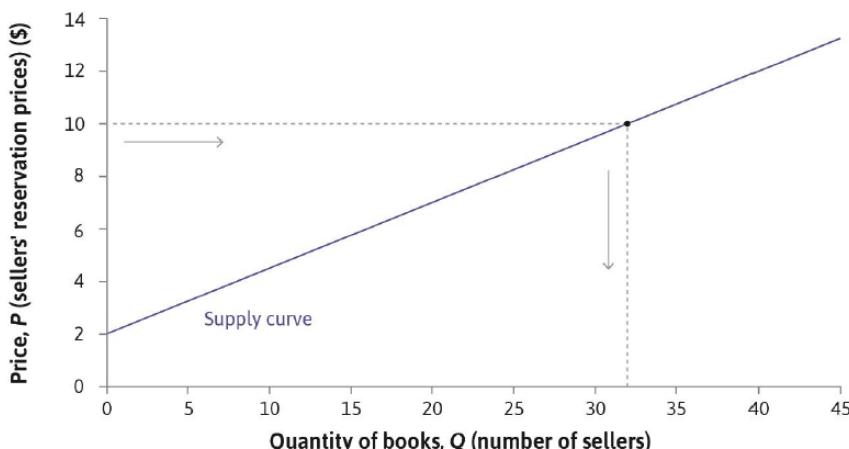
Demand and Willingness to Pay

- Consider: trading in second-hand copies of a textbook for an economics course
- Demand for the book comes from students and are about to begin the course, and they will differ in their willingness to pay (WTP)
 - No one will pay more than the price of a new copy in the campus bookshop.
 - Below that, students' WTP may depend on how hard they work, how important they think the book is, etc.
- This is the demand curve for these students:



Supply Curve

- The supply curve of second-hand books comes from students who have previously completed the course
 - **Reservation Price** – the amount they are willing to accept
- The reservation price of a potential seller represents the value of keeping to book.
- Poorer students and those no longer studying economics may have lower reservation prices.
- **Supply Curve** – total quantity that all firms together would produce at any given price
 - Represents the willingness to accept (WTA)



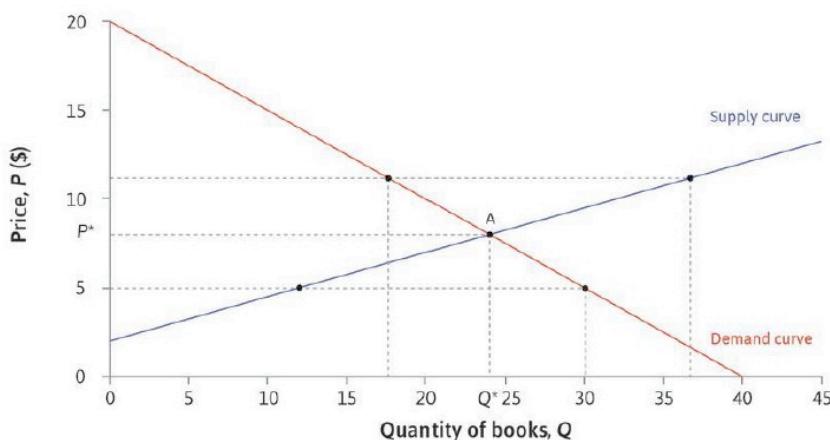
- For any price, the supply curve shows the number of books that will be supplied to the market at a certain price

Markets

- The market for this textbook would depend on the institutions that bring the buyers and sellers together.
 - Each buyer would like to find a seller with a low reservation price, and each seller would like to find a buyer with a high willingness to pay.
 - Before concluding a deal with one trading partner, both parties would like to know about other trading opportunities.
- Traditional market institutions (face to face) often brought many buyers and sellers together in one place.
- With modern communications, sellers can advertise their goods and buyers can more easily find out what is available, and where to buy it.
 - However, in some cases it is still convenient for buyers and sellers to meet each other (e.g. meat or flowers, where buyers can inspect the quality)
- Second-hand goods can now also be easily sold directly through online marketplaces such as eBay.

Equilibrium Price

- Economist Alfred Marshall introduced his model of supply and demand.
- **Equilibrium price** – the price that equates the supply and demand curves
- At the equilibrium market-clearing price (P^*), supply equals demand.
- At any other price:
 - If price was above P^* , then there would be excess supply, so some sellers could benefit from charging a lower price.
 - If price was below P^* , then there would be excess demand, so some sellers could benefit from charging a higher price
- In this example:

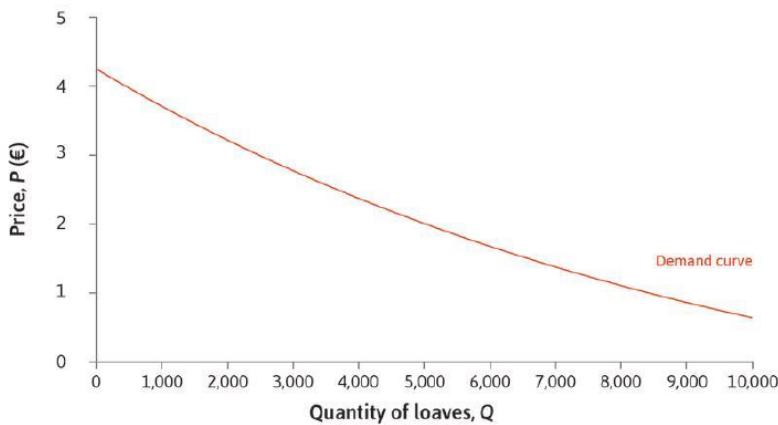


- The market clearing price:
 - Price $P^* = \$8$ and quantity $Q^* = 24$.
 - The market is in equilibrium
- A price above P^* :
 - At a price greater than \$8 more students would wish to sell, but not all of them would find buyers.
 - There would be excess supply, so these sellers would want to lower their price

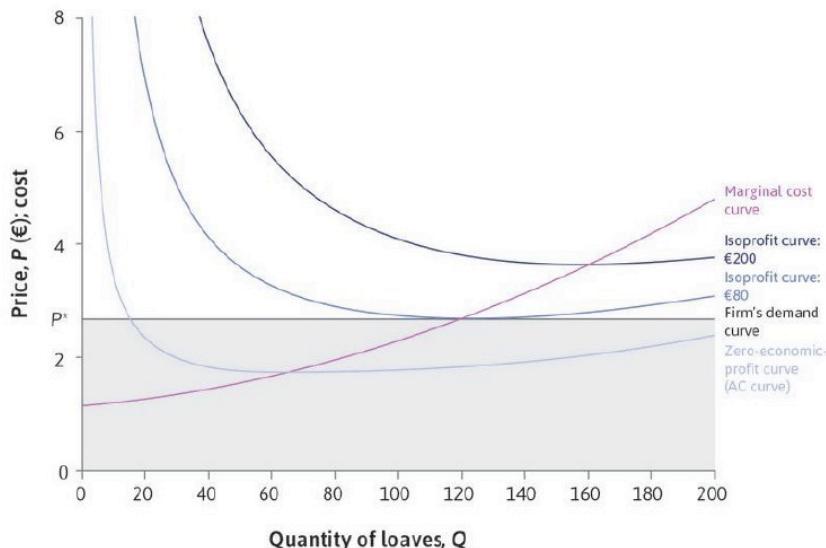
- A price below P^* :
 - At a price less than \$8, there would be more buyers than sellers – excess demand – so sellers could raise their prices.
- Only at $\$8$ there is no tendency for change.

Price-taking Firms

- In the second-hand textbook example, both buyers and sellers are individual consumers. Now we look at markets where sellers are firms.
- If there are many firms producing identical products, and consumers can easily switch from one firm to another, then firms will be price-takers in equilibrium.
 - They will be unable to benefit from attempting to trade at a price different from the prevailing price.
- Consider: a city where many small bakeries produce bread and sell it to consumers.
- This is the demand curve:

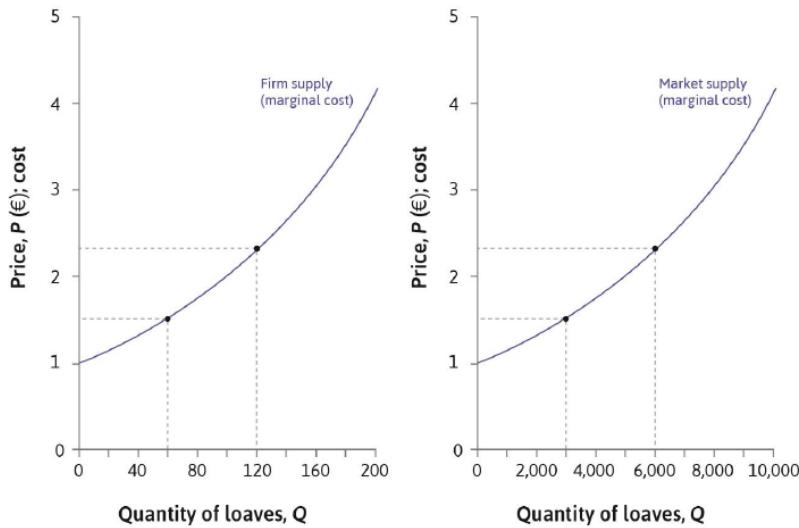


- Suppose you are the owner of one small bakery and the prevailing market price is \$2.35.
- The bakery is a price-taker and $P^* = \$2.35$.



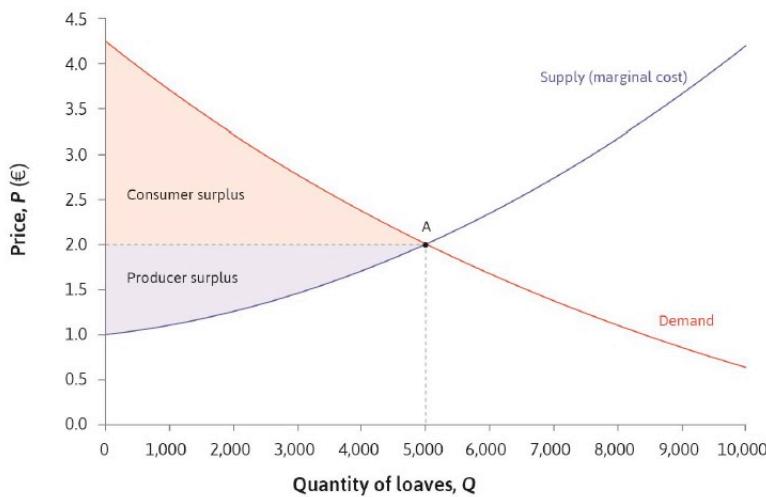
- If you choose a higher price, customers will go to other bakeries. Your feasible set of prices is the area below the horizontal line at P^* .
- The profit maximising quantity in this case is where the Isoprofit curves meet the horizontal line. $Q^* = 120$.

- This tells us that the bakery should make 120 loaves per day and sell them at \$2.35 each to make a maximum profit of \$80 per day.
- Price-taking firms choose to produce a quantity where the marginal cost is equal to the market price ($P^* = MC$). To explain this:
 - If $MC > P^*$, the last unit would cost more than P^* to make, so the firm would make a loss on this unit and could make higher profits by reducing output
 - If $MC < P^*$, the firm could produce at least one more unit and sell it at a profit
- Therefore, profits are maximised at $P^* = MC$.
- **Market Supply Curve** – the total amount produced by all firms at each price.



- If firms have identical cost functions:
 - *Market supply curve = market marginal cost curve.*

Competitive Equilibrium

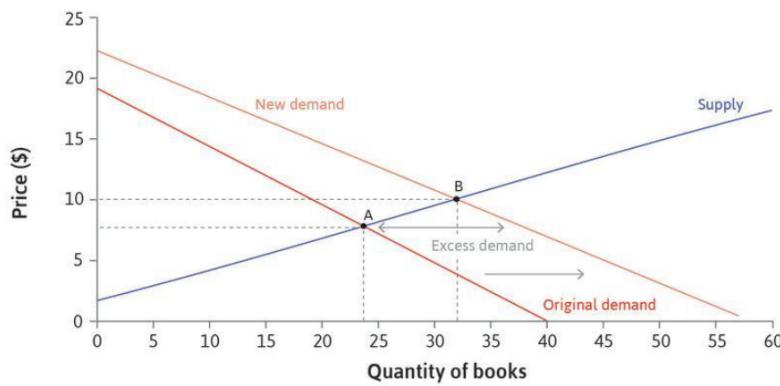
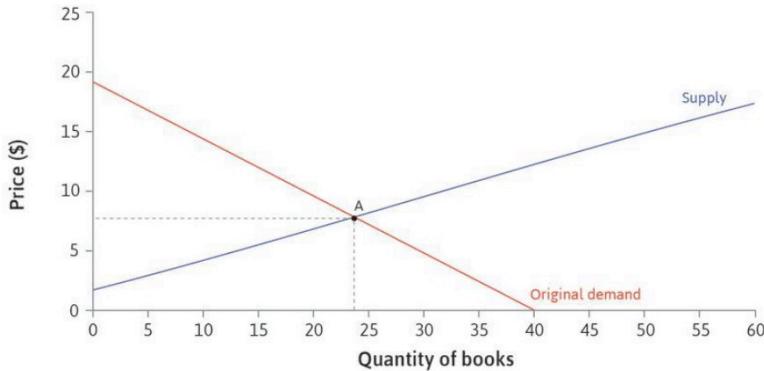


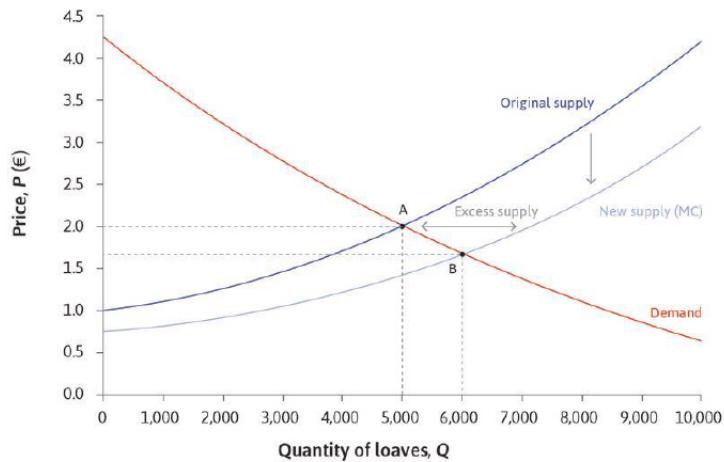
- All gains from trade are exploited in equilibrium (no deadweight loss)
- Equilibrium allocation is Pareto efficient, assuming:
 - Participants are price-takers
 - Contracts are complete
 - Transaction only affects buyers and sellers (no external effects)

Factors that Affect Equilibrium

Changes in Supply and Demand

- Initially:
 - The initial equilibrium point: Price is \$8 and 24 books are sold
-
- An increase in demand: demand is higher at each possible price, so the demand curve has shifted
 - If there were more students enrolling in one year, there would be more students wanting to buy the book at each price
 - The demand curve shifts to the right
-
- An increase in supply: the entire supply curve can shift due to exogenous shocks. E.g. improved technology
 - The initial equilibrium is \$2 per loaf and a quantity of 5000 loaves of bread
 - The market supply curves shifts because of the fall in marginal costs





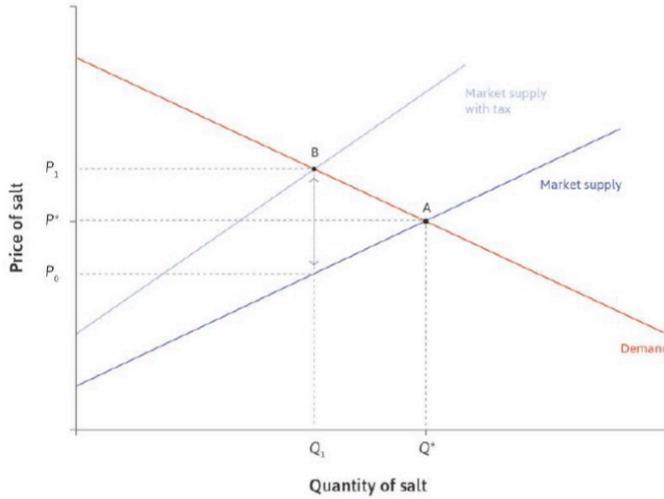
- The supply curve shifts down, because at each level of output, the marginal costs and therefore the price at which they are willing to supply bread is lower
- Essentially, the amount that bakeries will supply at each price is greater – an increase in supply
- There is excess supply when the price is \$2
- New equilibrium at point B (more bread is sold, and the price is lower)

Market Entry

- The supply curve can also shift due to market entry/exit
- If existing firms are earning economic rents and costs of entry are not too high, other firms may enter the market

Taxes

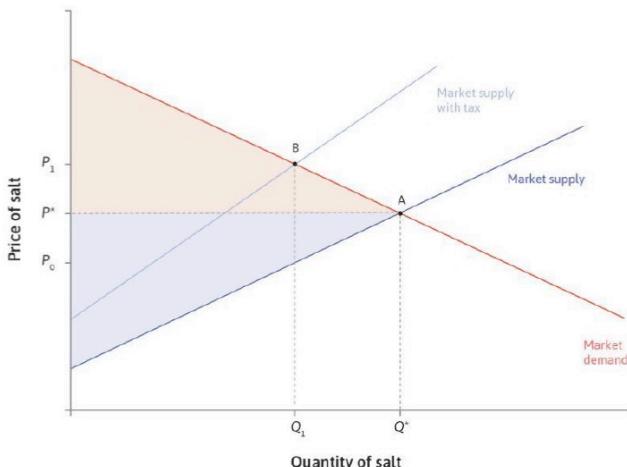
- Governments can use taxation to raise revenue
 - Finance government spending
 - Redistribute resources
 - Affect the allocation of goods and services in other ways
- Using the supply and demand curve to analyse the effects of taxation
- Taxes on suppliers/consumers shift the supply/demand curve because the price is higher at each quantity



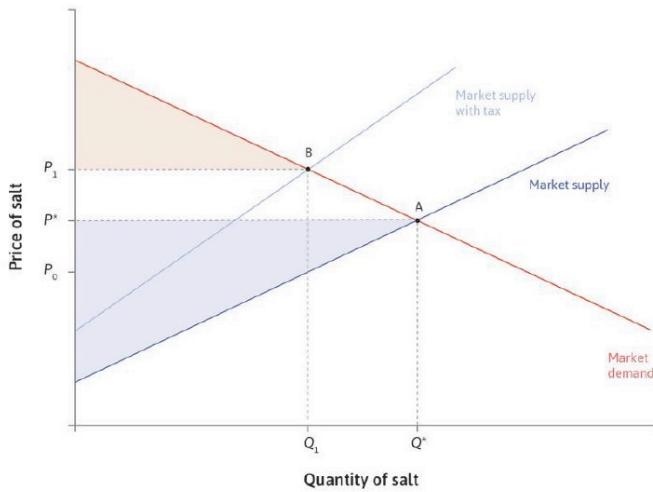
- Example: Taxation of salt
- Initially, the market equilibrium is at point A. Price P^* , quantity Q^* .
- If a 30% tax is imposed on suppliers, their marginal costs are effectively 30% higher at each quantity. The supply curve shifts
- The new equilibrium is at point B. Price has risen to P_1 and quantity has fallen to Q_1 .
- The price received by the suppliers (after tax is paid) is P_0 .
- The double-headed arrow shows the tax paid to the government on each unit of salt sold.

Taxes: Welfare Effects

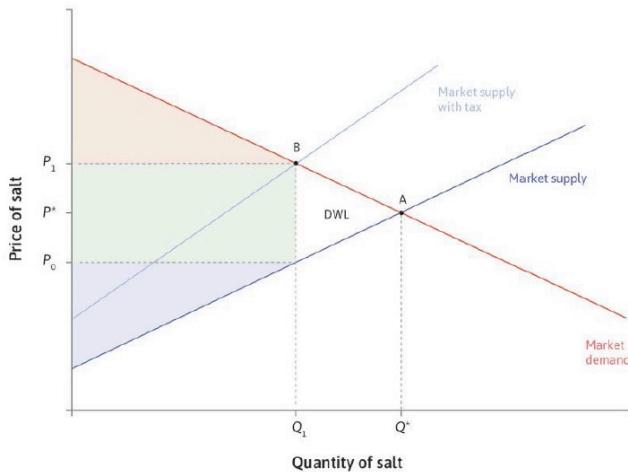
- It is not necessarily the taxpayer who feels the main effect of taxes
- In the example, although the suppliers pay the tax, the tax incidence falls partly on consumers and partly on producers
- **Tax incidence** depends on relative elasticity of consumers and producers. The less elastic group bears more of the tax burden.
- Maximised gains from trade.
- Before the tax is imposed, the equilibrium allocation at A maximises the gains from trade
- In the upper panel the red triangle is the consumer surplus, and the blue triangle is the producer surplus



- A tax reduces consumer surplus
- The tax reduces the quantity traded to Q_1 and raises the price to P_1



- A tax equal to $P_1 - P_0$ is paid on each of the Q_1 units of salt that are sold
- The green rectangular area is the total tax revenue
- There is a deadweight loss equal to the area of the white triangle



- Taxes change prices, and prices change buying/selling decisions
 - This creates dead weight loss
- To maximise revenue, the government would prefer to tax a good for which demand is not very responsive to price
 - i.e. a good with low elasticity of demand
- The overall effect of the tax depends on what the government does with the revenue that it collects:
 - If the government spends the revenue on goods and services that enhance wellbeing of the population then the tax may enhance public welfare
 - If the government spends the revenues on an activity that does not contribute to wellbeing, then the lost consumer surplus is just a reduction in living standards.

Perfect Competition

- We expect to see price-taking buyers and sellers in a perfectly competitive market
- A perfectly competitive market has the following properties:
 - The good or service being exchanged is homogenous
 - Very large number of potential buyers and sellers
 - Buyers and sellers all act independently of one another
 - Price information easily available to buyers and sellers

Characteristics of Perfect Competition

- Law of one price: All transactions take place at a single price
 - At this price, the market clears
- Buyers and sellers are price-takers
- All potential gains from trade are realized
- Perfect competition may not hold in reality, but can be a good approximation to actual firm behaviour

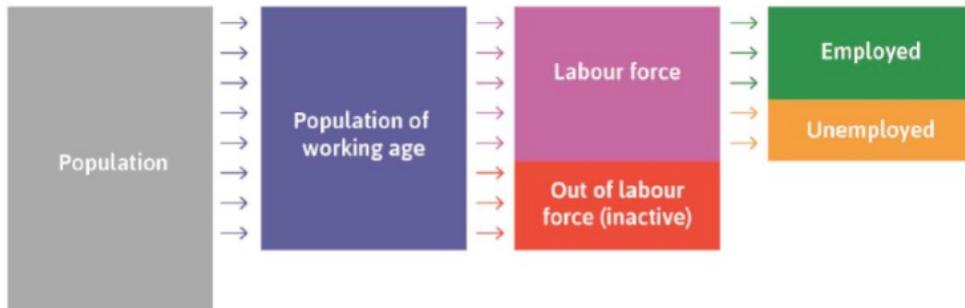
Price-setters vs Price-takers

Price-setters (Monopoly)	Price-takers (Perfect Competition)
MC < Price	MC = Price
Deadweight losses (Pareto inefficient)	No deadweight losses (can be Pareto efficient)
Owners receive economic rents in both long- and short-run	No economic rents in the long-run
Firms advertise their unique product	Little advertising expenditure
Firms invest in R&D, seek to prevent copying	Little incentive for innovation

The Labour Market

Measuring Unemployment

- The unemployed are people who:
 - Are not in paid employment or self-employment
 - Are available for work
 - Are actively seeking work
- The labour market:



Labour Market Statistics

$$\text{participation rate} = \frac{\text{labour force}}{\text{population of working age}}$$

$$\text{unemployment rate} = \frac{\text{unemployed}}{\text{labour force}}$$

$$\text{employment rate} = \frac{\text{employed}}{\text{population of working age}}$$

- The structure of the labour market differs widely across countries.
 - Two countries with the same unemployment rate can differ in their employment rates if one has a high participation rate.

Price-setting and Wage-setting

- **Wage-setting** – Firms and employees: firms set wage sufficiently high to make job loss costly, in order to motivate employees to work hard in the absence of complete contracts
- **Price-setting** – Firms and customers: firms set a mark-up above the cost of production to maximise their profits subject to demand

The Real Wage

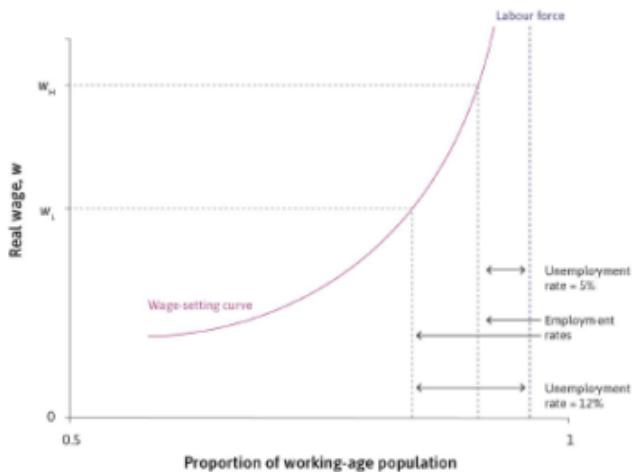
- The real wage is the nominal wage divided by the price level of the bundle of consumer goods purchased

$$\text{real wage} = \frac{W}{P}$$

- Each firm decides on its: price, wage, how many people to hire
- Adding up all of these across all firms gives the total employment in the economy and the real wage

The Wage-setting Curve

- The wage-setting curve is the real wage necessary at each level of economy-wide employment to provide workers with incentives to work hard.



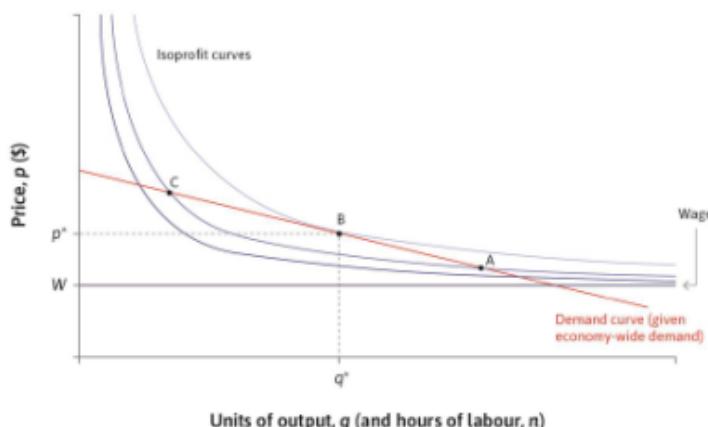
- The labour force has a value less than 1, depending on the participation rate
- Inactive workers are to the right of the labour force line
- The employment rate is the vertical line to the left of the labour force, indicating the share of the population who are actually working
- The unemployment rate is the proportion of those in the labour force who are not employed: workers in between the employment rate line and the labour force line

Firms Hiring Decisions

- A firm's hiring decisions depend on the amount that it produces
- The amount produced depends on the amount the firm can sell, which in turn depends on the price that it charges

Profit-maximising Price

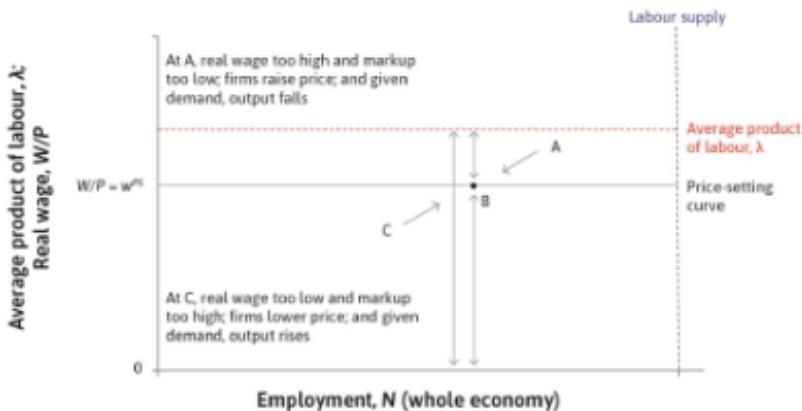
- A firm's optimal price lies where the demand curve is tangent to an isoprofit curve
- The firm hires a number of employees necessary to produce the quantity of output demanded at that price:



- This decision determines the division of the total revenue between profits and wages
 - Point A: firm is making lower profits because the isoprofit curve at A is lower than at point B.
 - Point C: firm should lower its price and produce more, to meet the higher sales at the lower price

The Price-setting curve

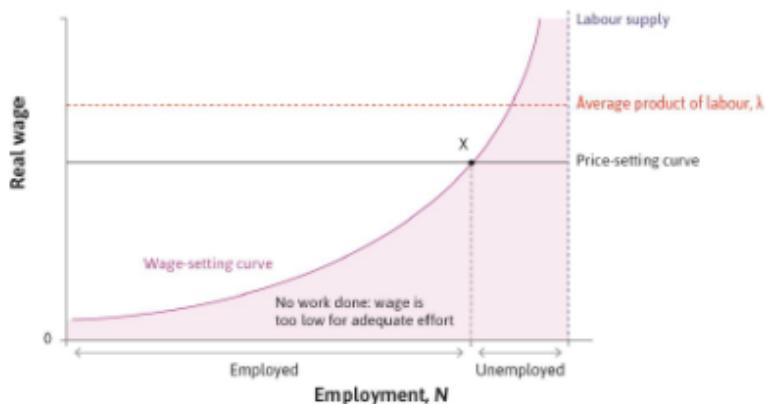
- Model of the outcome of the price-setting decisions of all firms in the economy



- The top horizontal line shows the average product of labour:
 - Firms' revenues per worker in real terms
- The price setting curve is a single number of the real wage that is consistent with the mark-up over costs when all firms set their price to maximise their profits
- The value of the real wage consistent with the mark-up does not depend on the level of employment in the economy, so it is shown as a horizontal line
- Point A is above the price-setting curve, which means that the real wage is higher than is consistent with a firm's profit maximising mark-up. If the real wage is too high, it means the mark-up is too low.
- The firm will raise its price so as to move towards higher profits as point B. The increased price means that fewer goods are sold, and as this is true of all firms, total employment falls.
- Below the price-setting curve, at point C, firms lower their price and hire more people.
- **Point B is the firms profit maximising price** and profit margin. Given economy-wide demand, total profits are lower at A and C for firms facing the demand curve.
- Price-setting curve: The real wage paid when firms choose their profit-maximising price.
- It depends on:
 - Competition (determines mark-up)
 - Labour productivity (determines real wage for a given mark-up)

The Labour Market Equilibrium

- The wage-setting and price-setting curves are two sides of the economy.
- The equilibrium of the labour market is where the wage and price-setting curves intersect.



- All parties are doing the best they can, given what everyone else is doing:
 - The firms are offering the least wage to ensure workers' effort
 - Employment is the highest it can be, given the wage
 - Those who have jobs cannot improve their situation by asking for higher pay or working less hard
 - Those who do not have jobs would like to work, but cannot persuade firms to hire them by accepting lower wage

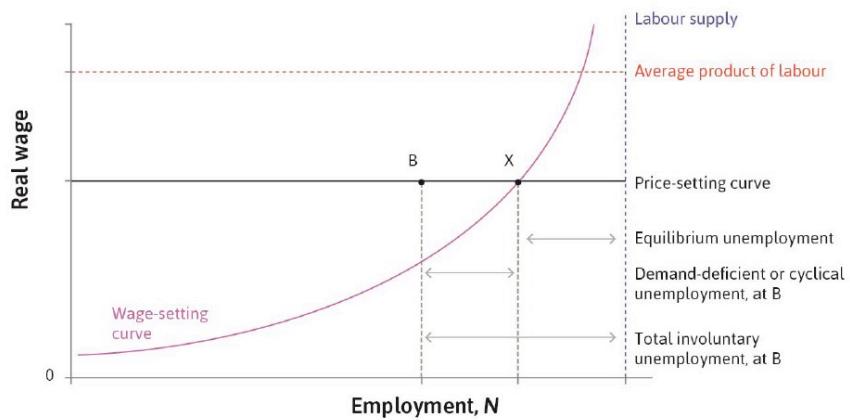
Involuntary Unemployment

- Unemployment – excess supply in the labour market
- There will always be unemployment in labour market equilibrium
 - No employment \rightarrow zero cost of job loss \rightarrow no effort
 - Therefore some unemployment is necessary to motivate workers
 - These are the involuntarily unemployed

Unemployment and Aggregate Demand

- The firm's demand for labour depends on the demand for their goods and services
- **Aggregate demand** – the sum of the demand for all the goods and services produced in the economy
- The increase in unemployment caused by the fall in aggregate demand is called the **demand-deficient unemployment**

Demand Deficient Unemployment



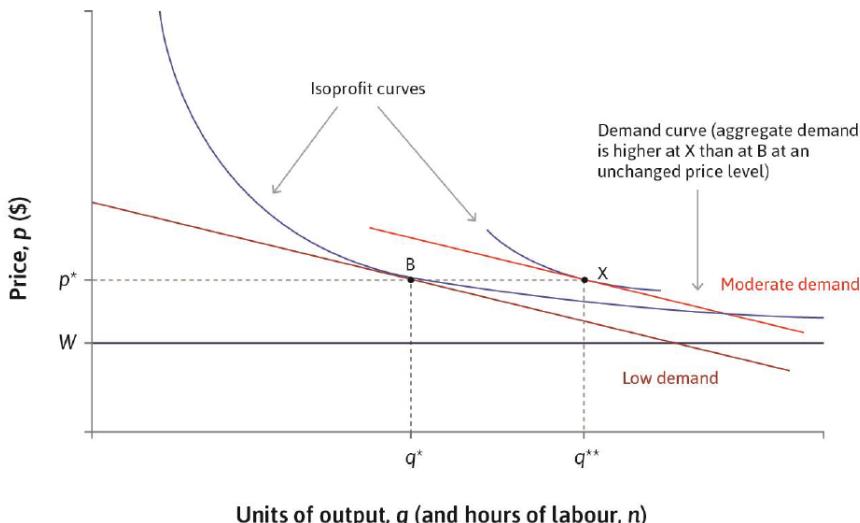
- Low aggregate demand moves the economy from the labour market equilibrium to point B.
- B is not an equilibrium
 - Firms could lower wages without lowering workers' effort
 - Lower costs mean lower prices
 - Lower prices stimulate demand – output rises
 - Firms hire more workers to produce more
 - *Unemployment falls back to point X*

Automatic Adjustment in Practice

- Real economies do not function so smoothly:
 - Workers resist cuts to their nominal wage (lower morale, strikes)
 - Lower wages means people spend less -> aggregate demand falls further
 - Falling prices across the economy may lead consumers to postpone their purchases in hope to get an even better bargain price

Government Intervention

- The government could increase its own spending to expand aggregate demand:
 - Monetary policy
 - Fiscal policy



- At B, firms would find it optimal to produce more instead of reducing wages

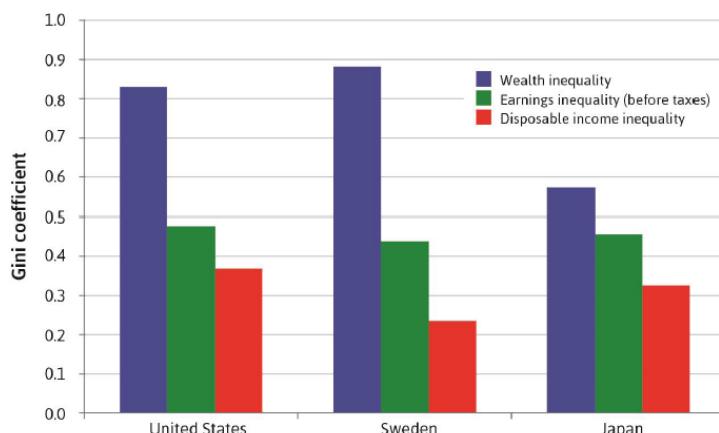
Labour Market Policies

- Shifts in the price-setting curve:
 - Increasing education & training – labour productivity increases
 - Giving wage subsidies – production costs and prices decrease
- Shifts in the wage-setting curve:
 - Lower unemployment benefit – reservation wage decreases
- Shifts in labour supply curve:
 - Immigration policies – labour supply goes up
 - Childcare provision – female labour participation increases

Economic Inequality

Income inequality within countries

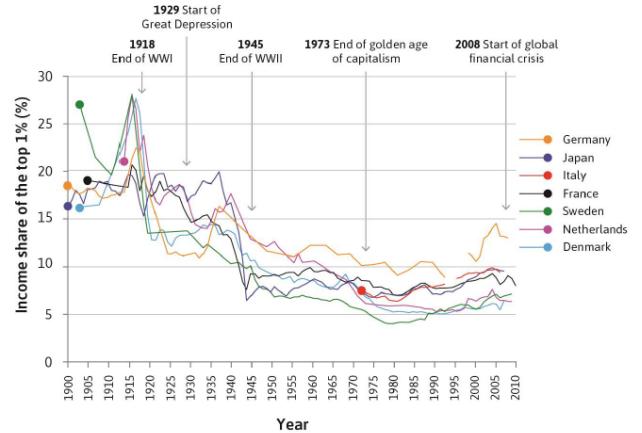
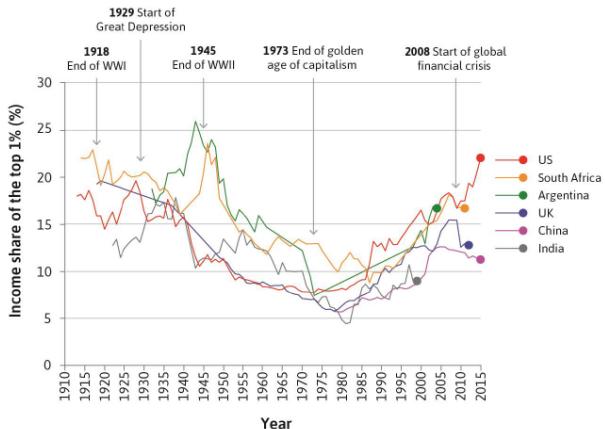
- **Market income:** Income from wages, businesses and investments
- **Disposable income:** Market income minus taxes and transfers
- The Gini coefficient measures the degree of inequality
 - $0 \leq \text{Gini Coefficient} \leq 1$



- Wealth is much more unequally distributed than market income, which is more unequally distributed than disposable income
- More equality in disposable income can be due to the tax and transfer system

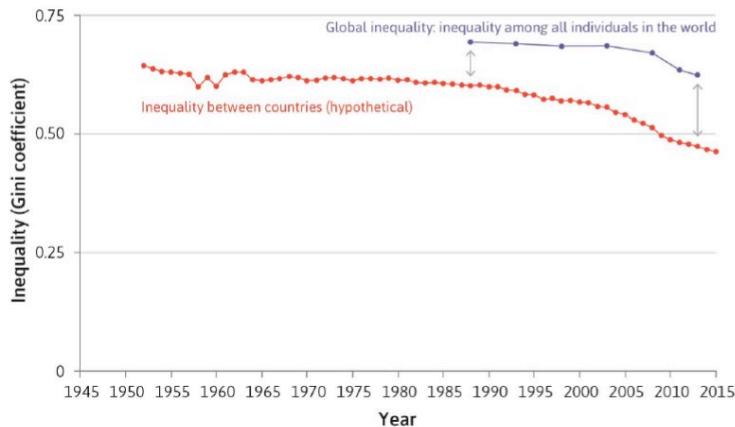
Trends in Inequality across Countries

- There are cross-country differences in the level of inequality, but also common trends (e.g. a fall in inequality over 1920-1980)
- Countries experienced different trends after 1980



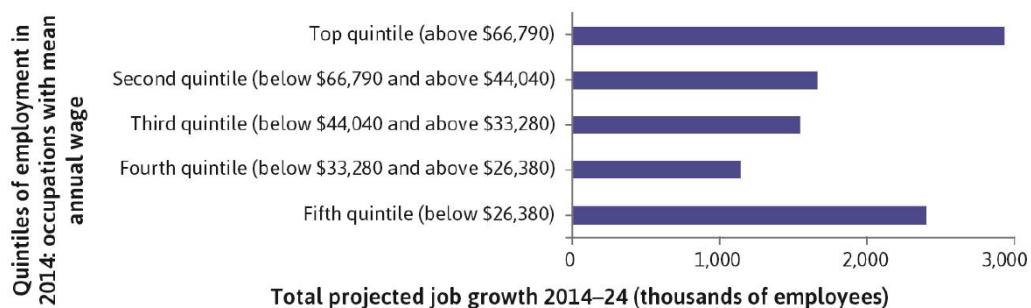
Global Inequality

- Since 1980, between-country inequality fell rapidly, but within country inequality increased
- The net result is that global inequality has started to decline



Within-Country Inequality

- Increasing inequality within most countries is associated with the changing distribution of jobs.
- *Missing Middle* – Low paying jobs and high-paying jobs are increasing in quantity, while middle income jobs are becoming scarcer (perhaps due to automation in these areas)



Types of Inequality

Categorical Inequality

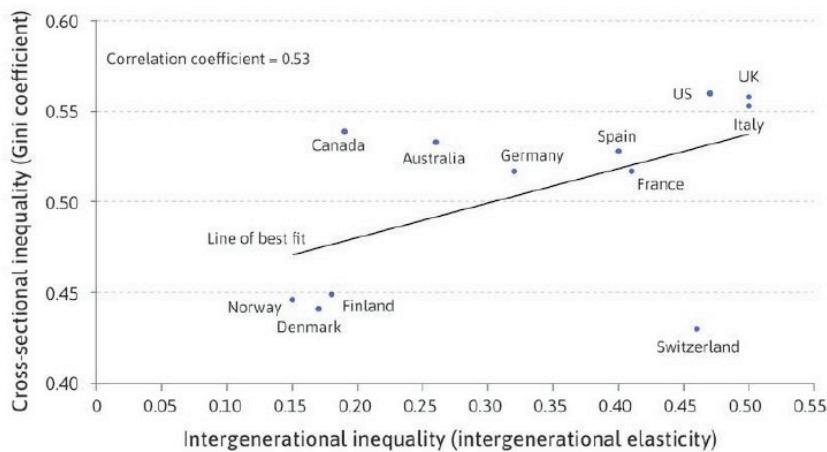
- Economic differences among people who are treated as different categories
- Usually based on ‘accident of birth’:
 - Country of citizenship – Passports and border limit access to certain economic opportunities
 - Gender or Ethnic group (e.g. income disparities between men and women with the same level of education)

Inherited Inequality

- *Intergenerational inequality*: The extent to which differences in parental generations are passed on to the next generation
- *Intergenerational transmission* process takes many forms:
 - Inheriting parents’ wealth
 - Inheriting parents’ genetic makeup
 - Parental influence on growth
- *Intergenerational elasticity*: The percentage difference in the second generation’s status associated with a 1% difference in the adult generation’s status (High Elasticity = Low intergenerational mobility)

Relation to cross-sectional inequality

- Ability to move into ‘better-off’ sections of society
- Inequality in earnings tend to be positively correlated with intergenerational inequality

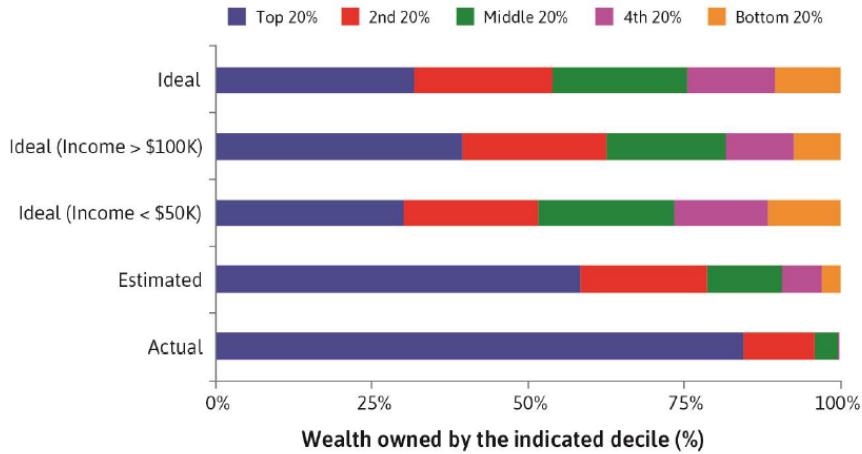


- Possible reasons:
 - Societies with strong culture of fairness tend to have policies that reduce cross-sectional inequality and promote intergenerational mobility
 - Effects of good/bad shocks (luck) are passed onto the next generation, contributing to cross-sectional inequality.

Evaluating Inequality

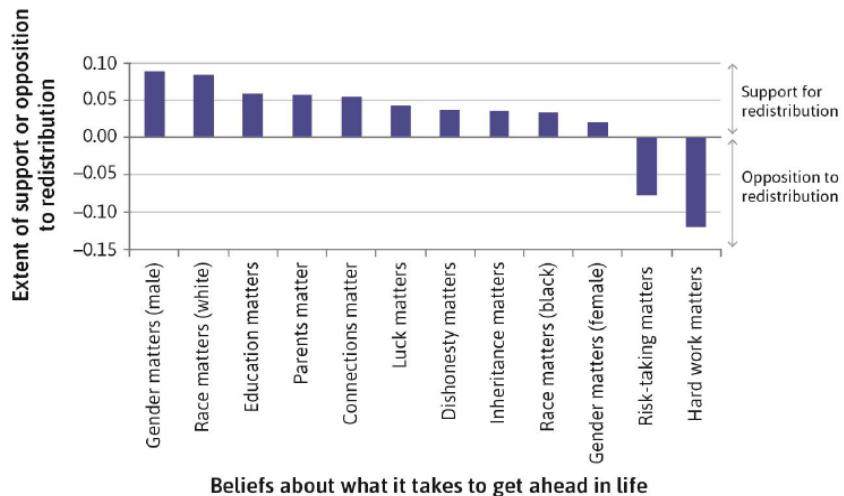
Wealth Distribution

- Example: In the US, actual wealth inequality is much higher than what people estimate it to be, which is also higher than their ideal wealth distribution
- People's ideal wealth distribution depends on income, but these differences are small in comparison.



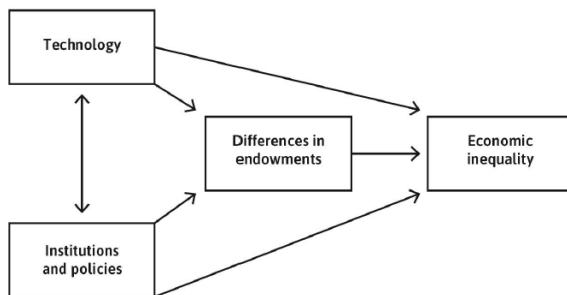
Unfair Inequality

- Many people believe categorical inequality is 'unfair' and should be addressed, but not inequality based on hard work or taking risks.

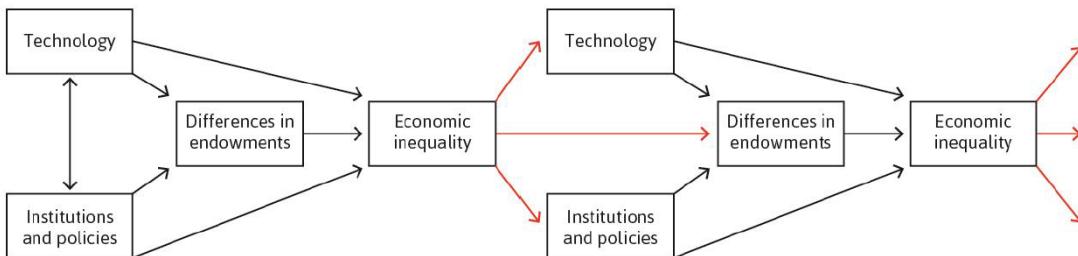


Economic Inequality: Sources

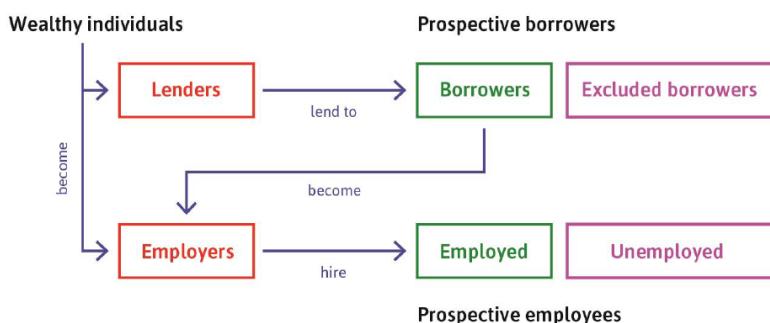
- An individual's income depends on:
 - Their endowments – facts about an individual that may affect their income (e.g. wealth, physical assets, human capital)
 - The value of each item in their endowment
- Technology and institutions affect the value of particular endowments



- Economic Inequality is due to changes in institutions, technology and differences in endowments.
- Economic inequality can also influence institutions in future periods (e.g. political advantages for the rich), as well as technology (e.g. automation due to minimum wage introduction)



- Differences in endowments affect the balance of power in interactions
 - In principal-agent relationships, the principal can exercise power over agents, but not vice versa



- Differences in endowments also determine the ability to become the principal or the agent

Addressing Unfair Inequality

- Government policies can influence economic inequality by:
 - Redistribution – Taxes and transfers to reduce differences in disposable income, and expenditure on public services

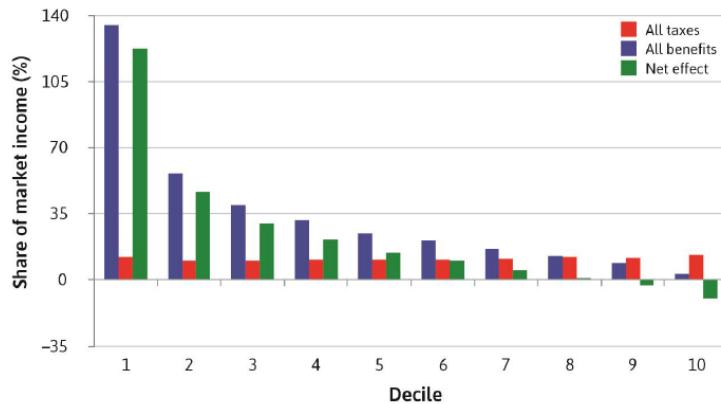
- Predistribution – Greater equality of endowments, e.g. property redistribution, or raising the value of endowments of the poor via legislation

Predistribution Policies

Endowment	Policy	Direct effect	Indirect effect
Labour	Free high quality primary education for all children.	Increases opportunities for poorer children to attain more advanced levels of schooling, which increases the market value of their endowment of labour.	Raises average productivity of labour, shifting up price-setting curve, which increases wages and employment (ceteris paribus).
Labour	Raise the share of the harvest going to the farmer.	Increases the value of the farmer's endowment of labour.	Raises farmers' incomes.
Labour	Eliminate ethnic, racial, or gender discrimination.	Increases the value of the labour endowment of those targeted by discrimination.	Raises incomes of targeted groups.
Labour	Minimum wage.	Increases value of labour endowments among those who were previously unable to work for more than the minimum wage.	Raises incomes of the poor and reduces incomes of employers (unless employment effects dominate).
Labour	Laws and policies to increase workers' bargaining power (e.g. trade unions).	Increases value of labour endowments of trade union members and improves working conditions.	Raises incomes of trade union members (unless negative employment or productivity effects dominate) and reduces incomes of employers.
Ownership of firms	Policies to ensure competition.	Reduces price mark-up .	Raises real wages, reduces profits.
Intellectual property	Restrict IPR's (e.g. shorter patents or copyrights).	Reduces value of endowment of intellectual property among IPR holders.	May discourage innovation but enables quicker diffusion of innovations.
Professional license	Allow easier access to licenses (e.g. for taxis).	Increases supply and reduces incomes of license holders.	Greater equality (if license holders are richer than average).

Redistribution Policies

- Welfare state – policies that turn market income into final income
 - Policies are usually a combination of taxation and expenditure
- Progressive policies directly reduce inequality; regressive policies directly increase inequality



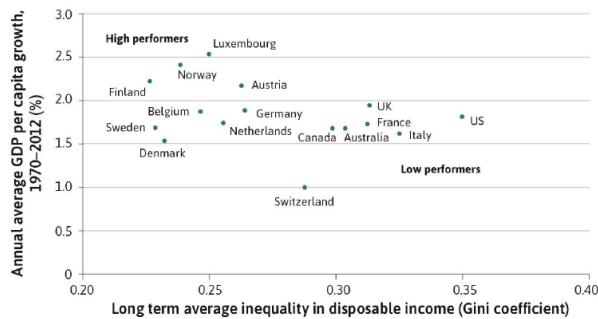
Explaining Trends in Inequality

Trends	Contributing causes
Declining within-country inequality (1920-1980)	a) Increasing education and productivity reduced unemployment. b) Reduced labour market segmentation and other sources of inequality among workers (including c, below). c) Technological improvements that were complementary to low and middle-skill workers.
Stable or rising within-country inequality (1980-2017)	a) Increased inequality among workers due to new technologies that were: i) complementary to the skills of higher paid workers ii) substitutes for workers doing routine tasks b) Weaker trade unions and conservative political parties in power saw bargaining power shift in favour of employers, whilst the resulting higher profits after taxes were not translated into expanding employment (in some countries).
Stable or decreasing between-country inequality (1995-2017)	Reduced global labour market segmentation due to rapid growth of labour productivity and demand in China and other poorer countries.

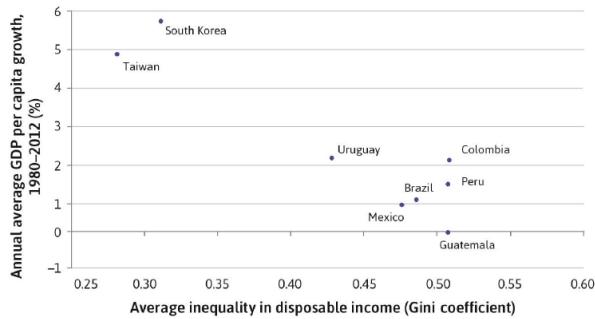
Inequality and Economic Growth

- Most countries grow at similar rates and there is no correlation with the level of inequality.
 - High taxes and transfers do not necessarily reduce incentives to work hard or innovate.

Rich countries



Catch-up countries



Economic benefits of lower inequality:

- High levels of cooperation and trust
 - An economy based on services such as the production of knowledge and care of other cannot perform well if people are entirely self-interested
 - Cooperation and trust are essential to the modern economy, but they are difficult to sustain among people paid vastly different sums of money
- Policies that enhance endowments of the poor
 - High quality health services and education contribute to the more productive use of an economy's resources.