Economics II – Macroeconomics

V. The labour market

Prof. Dr. Hanna Hottenrott

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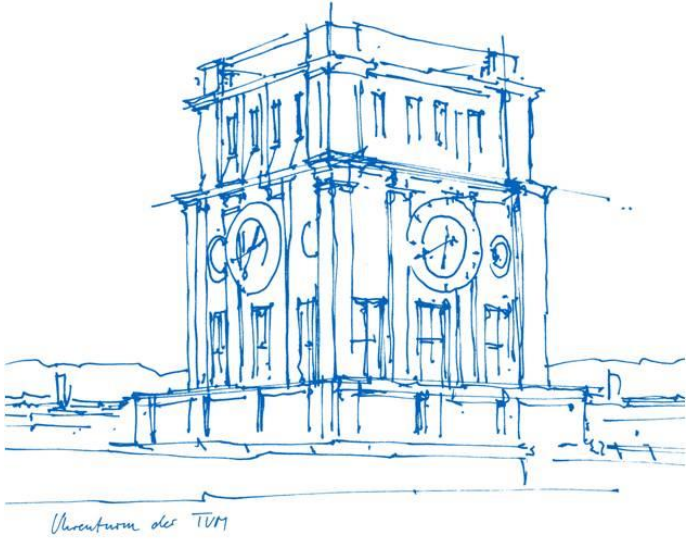

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Outline

I. Introduction to macroeconomics (chapter 1)
II. Technological change and economic growth (chapter 2)
III. The aggregate economy (chapter 13)
IV. Aggregate demand and fiscal policy (chapter 14)
V. The labour market (chapters 6 and 9)
VI. Aggregate demand and unemployment (chapter 14)
VII. Credit, banks and money (chapter 10)
VIII. Inflation and monetary policy (chapter 15)
IX. Technological progress, unemployment and living standards in the long run (chapter 16)
X. Economic and financial crises (chapter 17)

V. The labour market

The Economy Ch. 6+9

I. Measuring labour market performance
II. Wage-setting and price-setting
III. The labour discipline model
IV. The labour market model
V. Labour market equilibrium
VI. Division of output and labour unions

The context

- How are the economy-wide wages and employment determined?
- Why do we have unemployment?
- Can the government affect wages and unemployment by its policies?

- Models of price-setting and wage-setting behaviour of firms, which determines economy-wide unemployment rate and real wage

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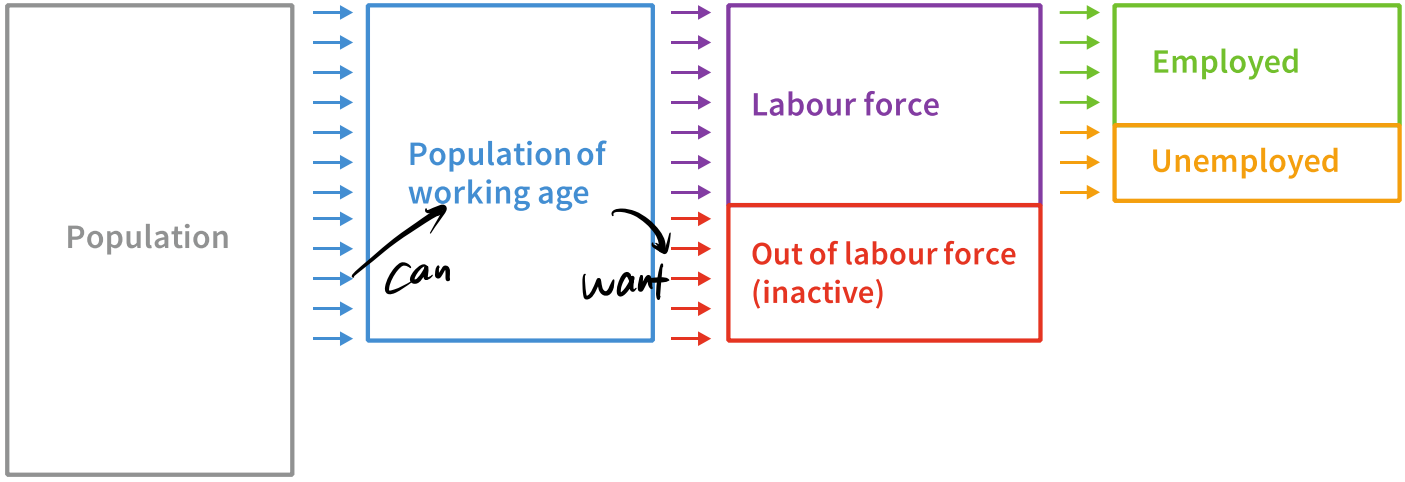
The labour market



Labour force = employed + unemployed
Employed = Share of the labour force that has a job

The unemployed

According to the standardized definition of the International Labour Organization (ILO), the **unemployed** are the people who:

- were without work during a reference period (usually four weeks), which means they were not in paid employment or self-employment
- were available for work
- were seeking work, which means they had taken specific steps in that period to seek paid employment or self-employment

Key statistics

Participation rate: fraction of working-age population in the labor force

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

Unemployment rate: fraction of the labor force that is unemployed

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

Employment rate: fraction of the working-age population that is employed

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

Possible that both unemployment and employment are low

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Labour market statistics

Two countries with the same **unemployment rate** can differ in their **employment rates** if one has a high participation rate and the other has a low one.

The structure of the labour market differs widely across countries.

- South Korea is an example of an economy that has both a low unemployment rate and a low employment rate.

Labour market statistics for Norway and Spain (averages over 2000–2015).

	Norway	Spain
Number of persons, millions		
Population of working age	3.5	37.6
Labour force	2.5	21.6
Out of labour force (inactive)	1.0	16.0
Employed	2.4	18.1
Unemployed	0.1	3.5
Rates (%)		
Participation rate	2.5/3.5 = 71%	21.6/37.6 = 58%
Employment rate	2.4/3.5 = 69%	18.1/37.6 = 48%
Unemployment rate	0.1/2.5 = 4%	3.5/21.6 = 16%

International Labour Association. 2015. *ILOSTAT Database*.

South Korea is an example of an economy that has both a low unemployment rate and a low employment rate.

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Price-setting and wage-setting

Firms and employees: firms set wage sufficiently high to make job loss costly, in order to motivate employees to work hard

Firms and customers: firms maximise their profits subject to demand

Profits are determined by the mark-up above the cost of production

Workers' effort

Firms often can't directly measure effort, so why do 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*

Reservation wage

Employees fear getting fired when they are paid more than their reservation option = they receive an employment rent

Reservation option → reservation wage: the lowest wage at which a worker would be willing to accept a job.

In other words: What an employee would get in alternative employment, or from an unemployment benefit or other support, were he or she not employed in his or her current job.

Employment rents

Employment rent: cost of job loss, which includes

- **Lost income while searching for a new job**

as well as

- Costs required to start a new job e.g. relocation
- Loss of non-wage benefits e.g. medical insurance
- Social costs (stigma of being unemployed)
- …

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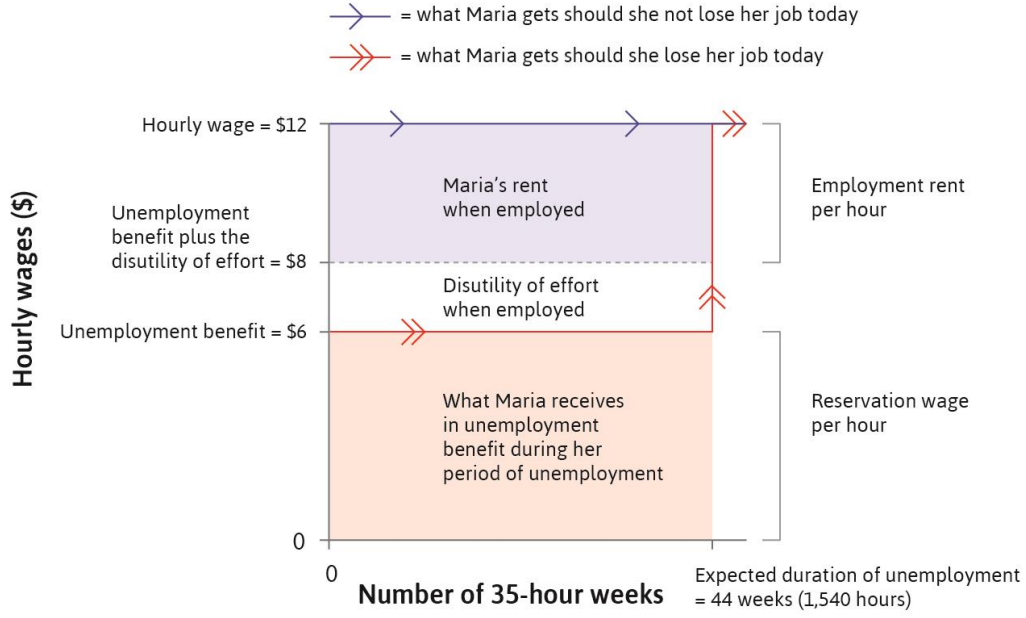
Calculating employment rents



Employment rent:
wage – reservation wage
– disutility of effort

Reservation wage:
value of next best option (other employment or unemployment benefits)

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Source: The Simpsons The World Disney Company

Wages and effort

The employer cannot directly measure the worker's effort

Larger employment rent

→ larger cost of job loss

→ worker puts in more effort to reduce chance of getting fired

One way to increase the cost of job loss is for the firm to raise wages!

The employment game

1. The employer chooses a wage. As long as the worker works hard enough, she will keep her job at the offered wage.

2. The worker chooses a level of work effort, taking into account the costs of losing her job if she does not provide enough effort.

Payoffs:

- Firm: profit = worker's output – wage
- Worker: employment rent

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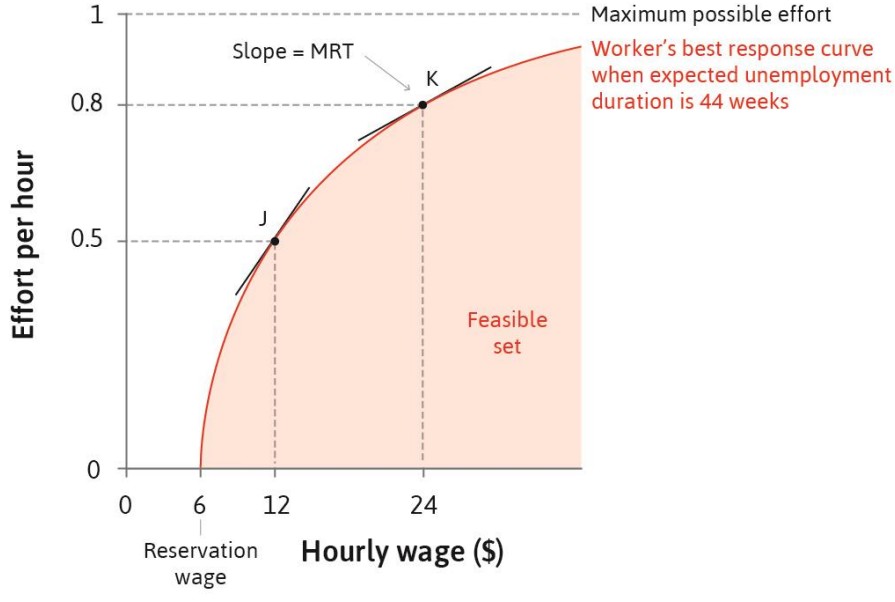
Worker's best response curve

Best response curve shows the optimal amount of effort workers will exert for each wage offered

Represents the firm's **feasible frontier** for wages and effort

Slope of best response curve: **MRT**



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Cost per unit of effort

The wage, w, is the cost to the employer of an hour of a worker's time

But what matters for production is **not** the hours Maria provides, but how many units of effort:

- With 0.5 units of effort per hour the cost to the employer of a unit of effort is $2w$.
- In general, with e units of effort per hour, the cost of a unit of effort is

$$c = \frac{w}{e}.$$

Firm's best response

To maximise profits, firms want to *minimise* the costs of production.

Because there is a trade-off between wages and effort, the employer should find a *feasible* combination of effort and wage that minimises the cost per unit of effort.

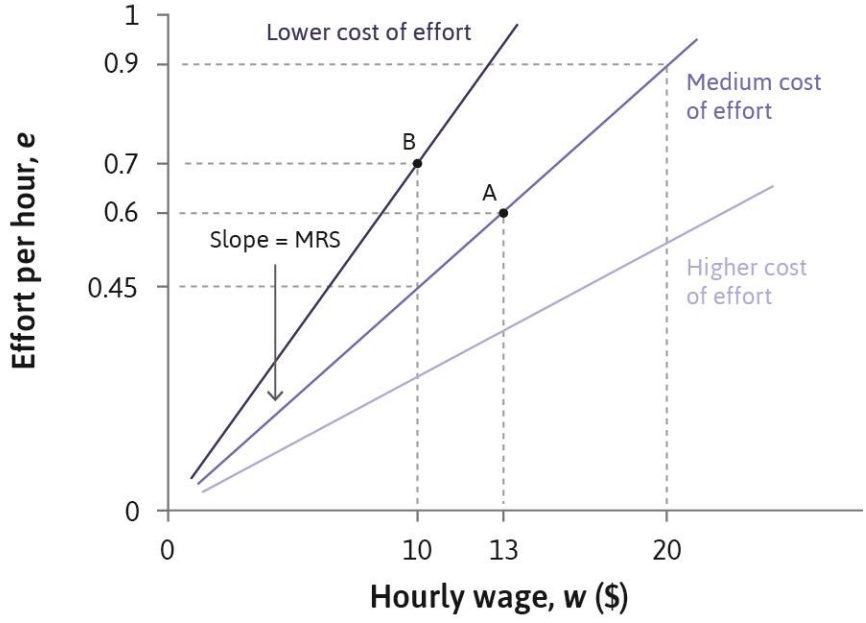
[Or: the employer should *maximize* the number of units of effort (efficiency units) per dollar of wage cost, e/w.]

Isocost lines for effort

The cost of effort $c = \frac{w}{e}$ is the same at all points on an **isocost line**.

Slope of isocost curve = **MRS**
Marginal the **R**ate of **S**ubstitution at which the employer is willing to increase wages to get higher effort.

Example: here a unit of effort costs \$10/0.45 = \$22.2 (medium cost of effort line)



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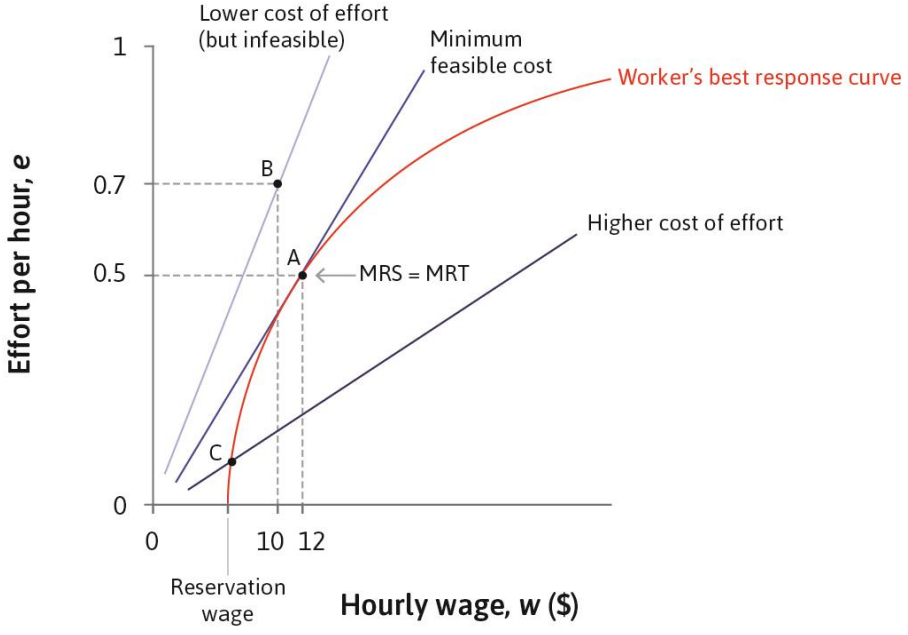
Determining wages

Profits are maximised at the steepest isocost line, subject to the worker's best response curve.

MRS = MRT

Efficiency wage = wages set higher than the reservation wage so workers will care about losing the job and provide more effort.



Conclusions from the LDM

***Equilibrium*:** In the owner-employee game, the employer offers a wage and the employee provides a level of effort in response. Their strategies are a Nash equilibrium.

***Rent*:** In this allocation the employee provides effort because she receives an employment rent that she might lose if she were to slack off on the job.

***Power*:** Because the employee fears losing this economic rent, the employer is able to exercise power over her, getting her to act in ways that she would not do without this threat of job loss. This contributes to the profits of the employer.

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Involuntary unemployment

Involuntary unemployment: being out of work, but preferring to have a job at the wages and working conditions that otherwise identical employed workers have.

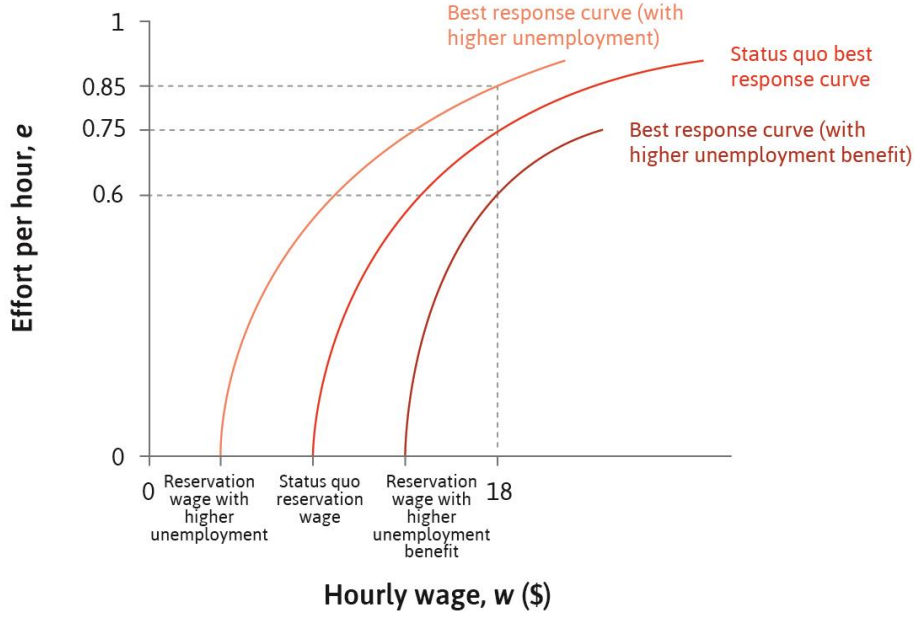
There must always be **involuntary unemployment** in the labour discipline model.

Why? 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.

Factors shifting the equilibrium

The best response function will shift in reaction to changes in:

- the utility of the things that the wage can buy
- the disutility of effort
- **the reservation wage**
- the probability of getting fired at each effort level



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The labour market

Deriving the **wage-setting curve** for an entire sector or country from decisions by all firms and employees

- The real wage and employment are jointly determined in the labour market

- What does this tell us about real wages in an economy?
- How does it relate to unemployment?
- What does it tell us about aggregate demand?

The real wage

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

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

- First, each firm decides what nominal wage to pay, what price to charge for its products, and how many people to hire.
- Then, adding up all of these decisions across all firms gives the total employment in the economy and the **real wage**.

The wage-setting curve

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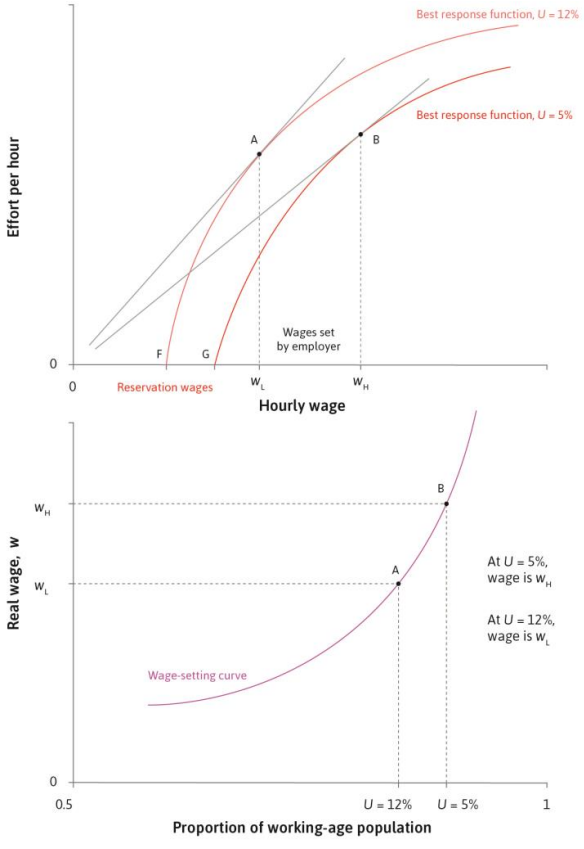
The wage-setting curve

- Start with the **labour discipline model**
- Lowering the unemployment rate will shift worker's best response curve to the right (reservation wage↑) and increases the wage
- This results in **upward-sloping wage-setting curve**



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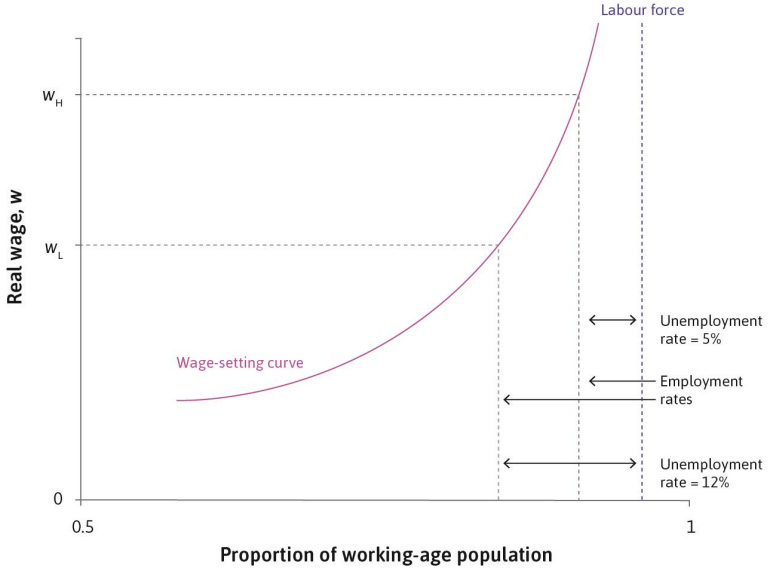
The wage-setting curve

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

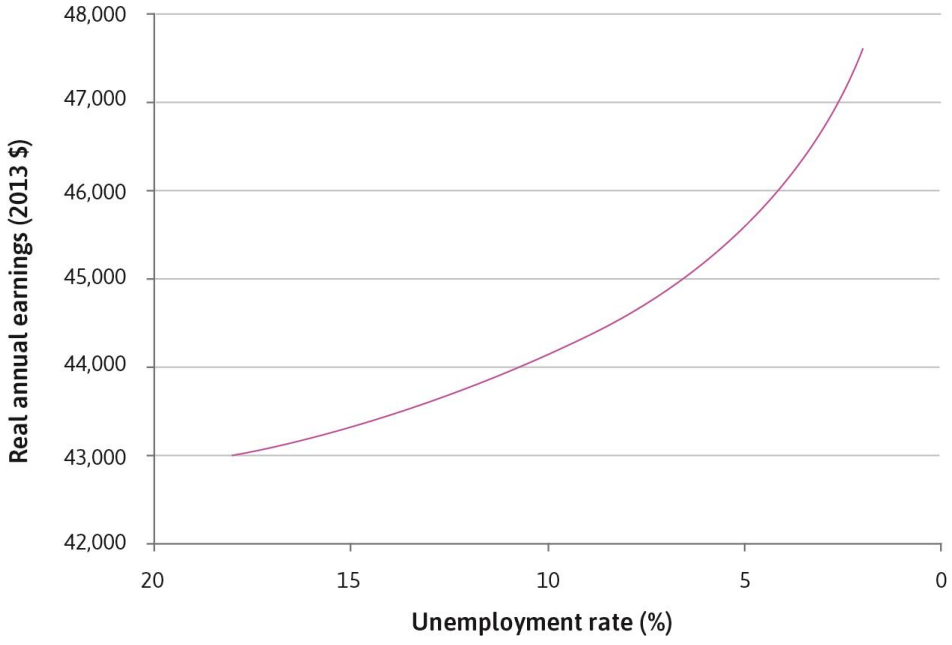
At the employment rate *x*, the wage *w* is the result of both employers and employees doing the best they can in setting wages and responding to the wage with a given amount of effort



If the employment rate is X, then the equilibrium wage will be Y.

An estimated wage curve

- Estimated from US data
- Uses data on unemployment rates and wages in local areas



The price-setting curve

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The chain of firm's decisions

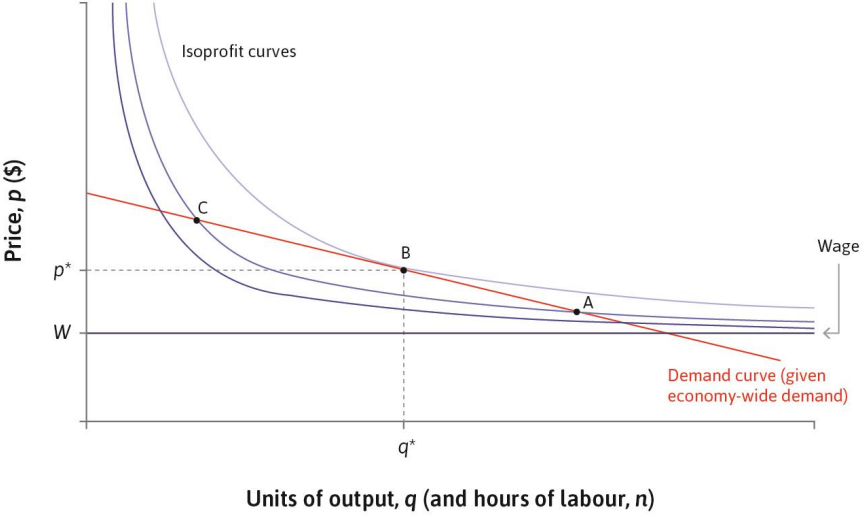
Nominal wage = f(other firms' prices and wages, unemployment rate)

Price = f(own nominal wage, demand for own product)

Output = f(optimal price, demand curve)

Number of employees = f(output, production function)

Profit-maximizing price



Firm's **optimal price** lies where the demand curve is tangent to an isoprofit curve.

The firm then hires a number of employees necessary to produce the quantity of output demanded at that price.

Distribution of output

The firm's choice of profit-maximizing price also determines the firm's optimal mark-up above the marginal (= average in the model context) cost of production ($markup = (\frac{profit}{output})/price$):

$$price = \frac{profit}{output} + \frac{nominal\ wage}{output}$$

For the economy as a whole, when all firms set prices this way, output per worker (labour productivity, or equivalently, the average product of labour, λ) is split into real profit per worker Π/p and the real wage W/p:

$$\lambda = \frac{\pi}{p} + \frac{W}{p}$$

Distribution of output

For the economy as a whole, this translates into how output is distributed between the firm-owners and the workers.

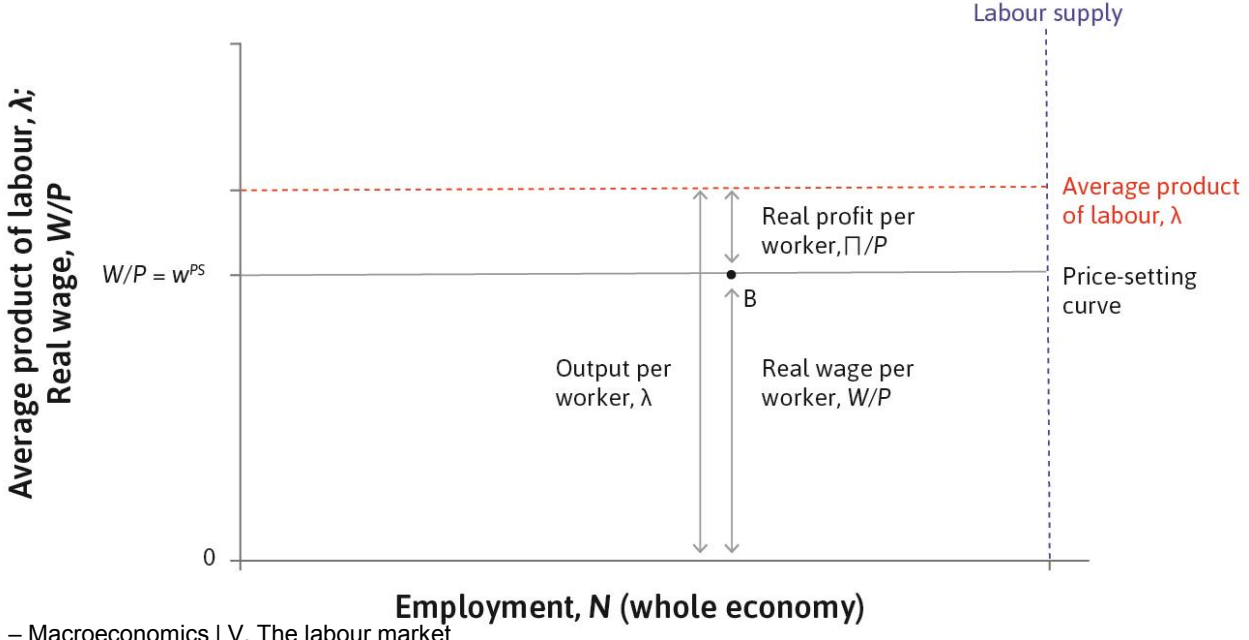
$$\frac{output}{worker} = real\ profit + real\ wage$$

Once firms set their prices, this determines the level of output and mark-up in the economy. This then pins down the real wage:

$$\frac{output}{worker} - real\ profit = real\ wage$$

Deriving the price-setting curve

The price-setting curve: the real wage paid when firms choose their profit-maximizing price.



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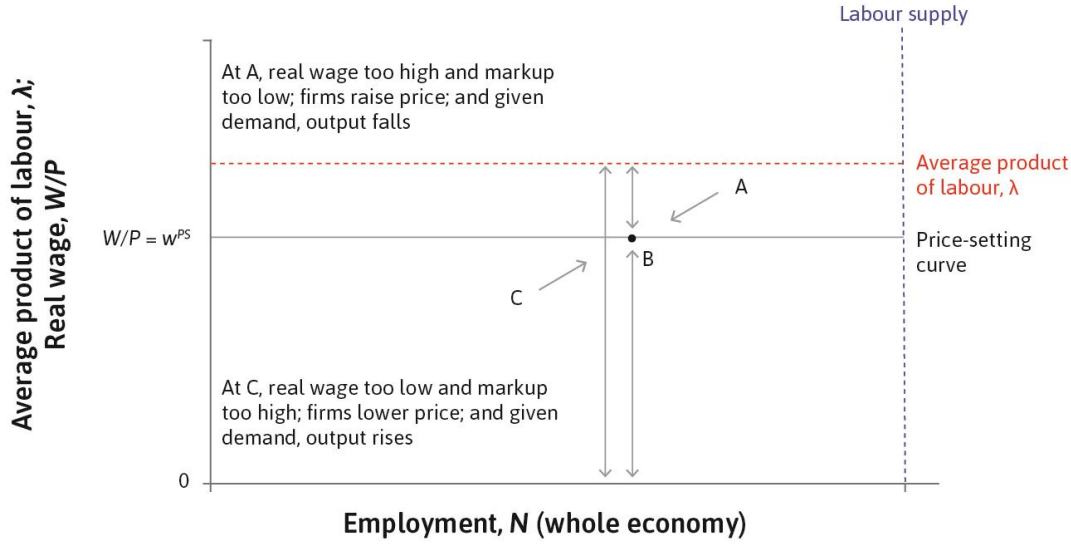
The price-setting curve

The price-setting curve depends on:

- competition, which determines mark-up (μ)
- labour productivity, which determines real wage for given mark-up:
  W/P = λ(1-μ)



Mid-summary

1. Firms: owners and managers have power over workers
   - Contracts are **incomplete** – do not cover worker effort
   - **Employment rents** motivate workers to exert effort
   - An example of a **hidden action problem** between a principal (firm) and an agent (worker)

2. **Labour-discipline model** of wage-setting within firms
   - **Isocost curves** = firm's 'indifference curves'
   - **Best response curve** = maximum feasible effort, given wages
   - Profit-maximising choice where **MRS = MRT**
   - **Involuntary unemployment** as a feature of the equilibrium

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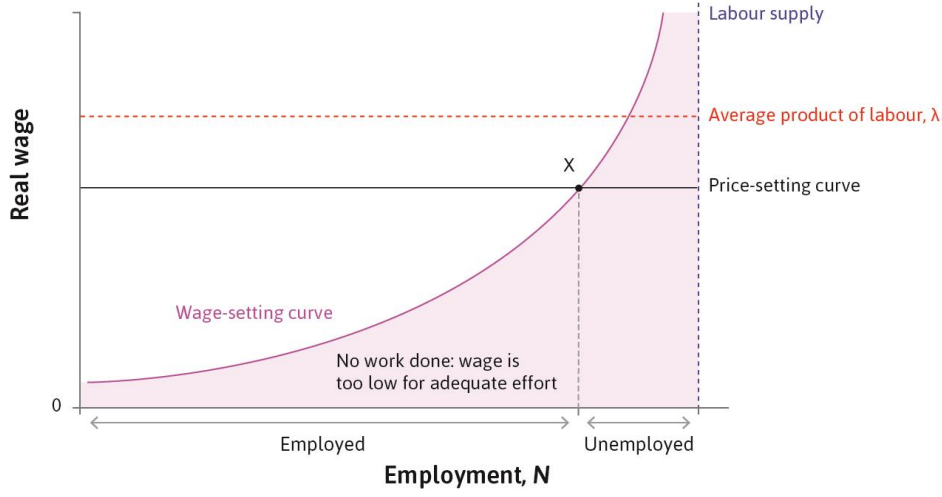
The labour market equilibrium

The wage-setting and price-setting curves are two sides of the economy.

The Nash equilibrium of the labour market is where the wage- and price-setting curves intersect.



The labour market equilibrium

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 (labour discipline concerns)

Unemployment and aggregate demand

The firm's demand for labour depends on the demand for their goods and services (derived demand for labour).

Aggregate demand: sum of demand for all goods and services produced in the economy.

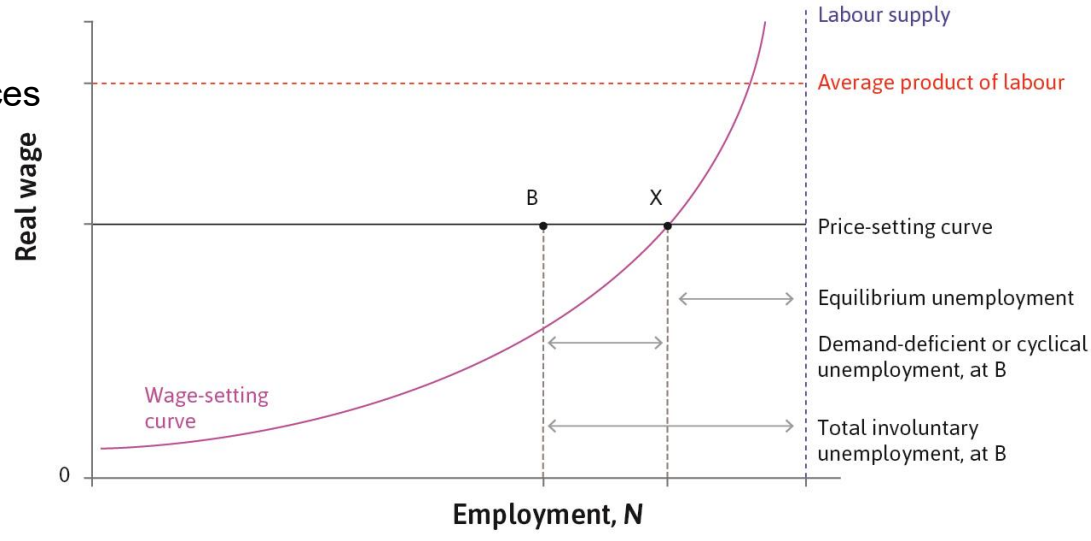
An increase in unemployment caused by the fall in aggregate demand is called **demand-deficient unemployment**.

Demand-deficient unemployment

Low aggregate demand moves the economy from labour market equilibrium (X) to point B.

B is not a Nash equilibrium:

- Firms could lower wages
- Lower costs → lower prices
- Increase output and employment



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Automatic adjustment

Point B is not a Nash equilibrium:

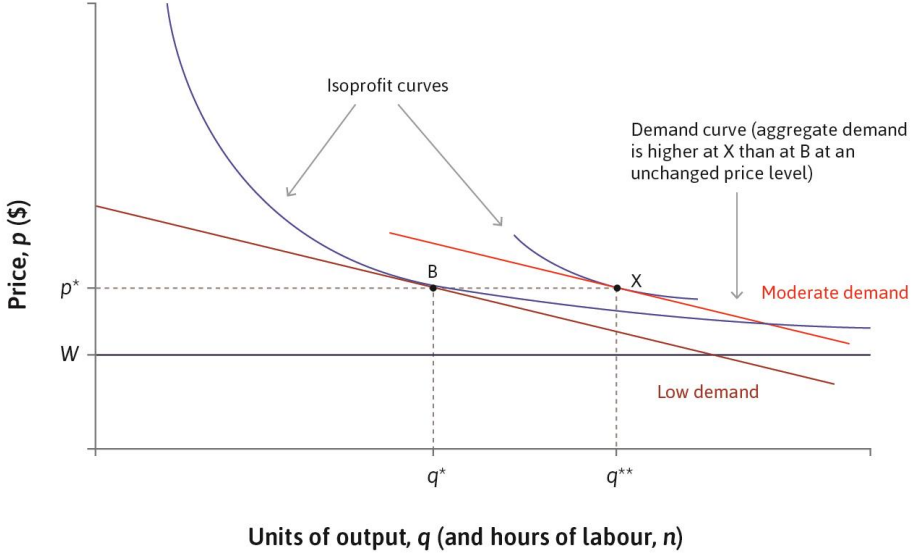
- Firms could lower wages without lowering workers' effort
- Lower wages allow them to cut their prices
- Lower prices stimulate demand → output rises
- Firms hire more workers to produce more

… **unemployment falls back to 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 even better bargain later → aggregate demand falls further

Government intervention



The government could increase its own spending to expand aggregate demand.

- **fiscal policy**
- **monetary policy**

The firm moves on to a new higher isoprofit curve if demand rises as a result of higher economy-wide demand following monetary or fiscal policy actions.

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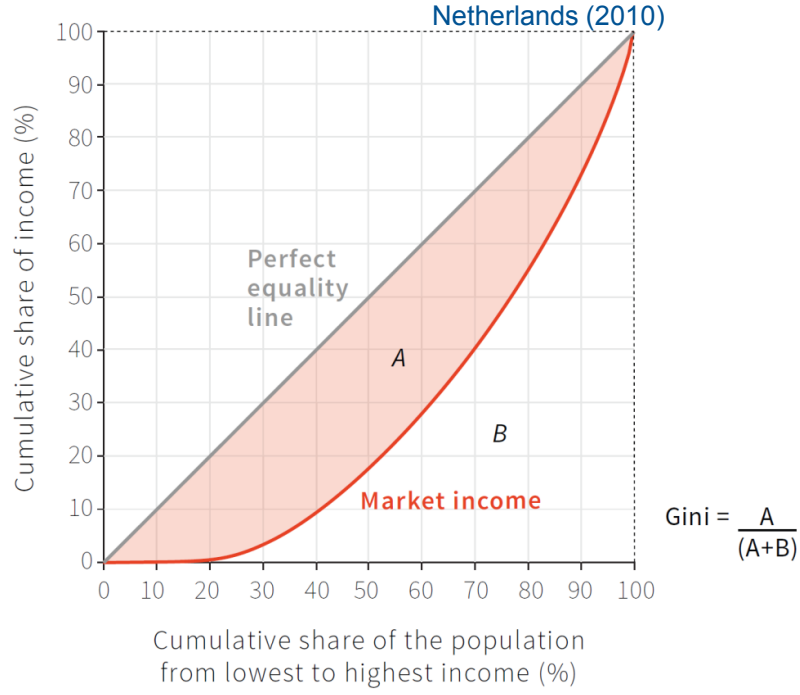
Division of output and labour unions

[see also chapter 19 for details on economic inequality]

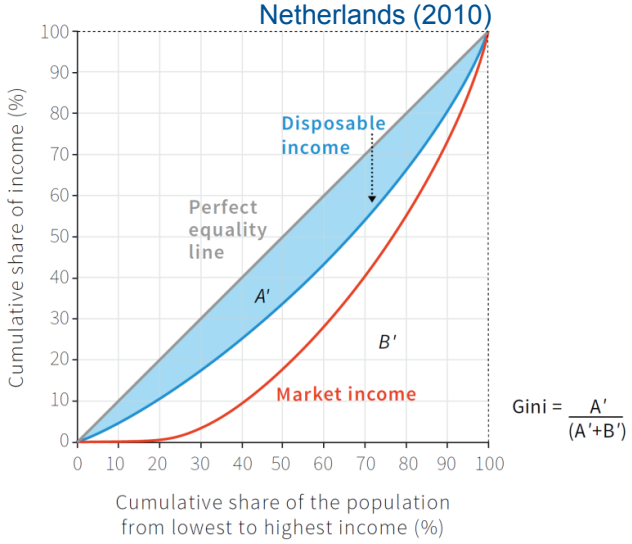
Gini coefficient

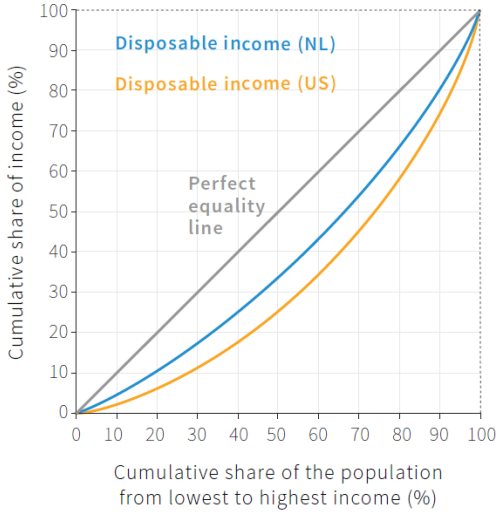
- **Gini coefficient** (Corrado Gini, 1884-1965) measures inequality, e.g. in income
- It indicates how much disparity there is in income, or any other measure, across the population:
  - If everyone has the same income, so there is no inequality: Gini = 0
  - If a single individual receives all the income: Gini = 1
- The Gini coefficient is based on a statistical construct called the ***Lorenz curve*** (invented in 1905 by Max Lorenz, 1876-1959)



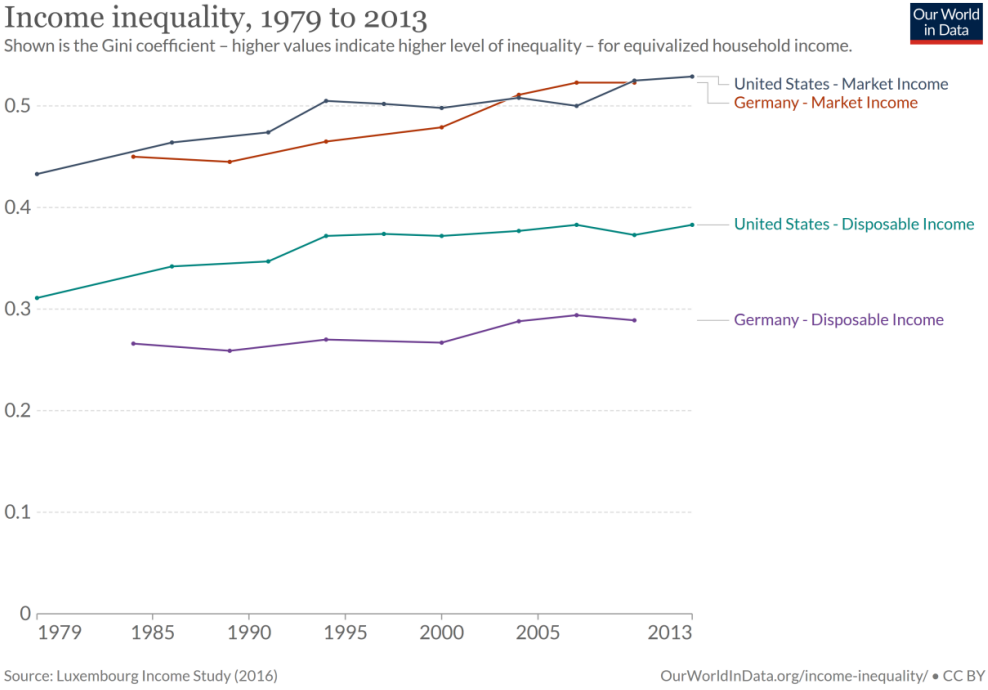
Disposable income

- Disposable income: after taxes and social contributions (+ transfer payments)



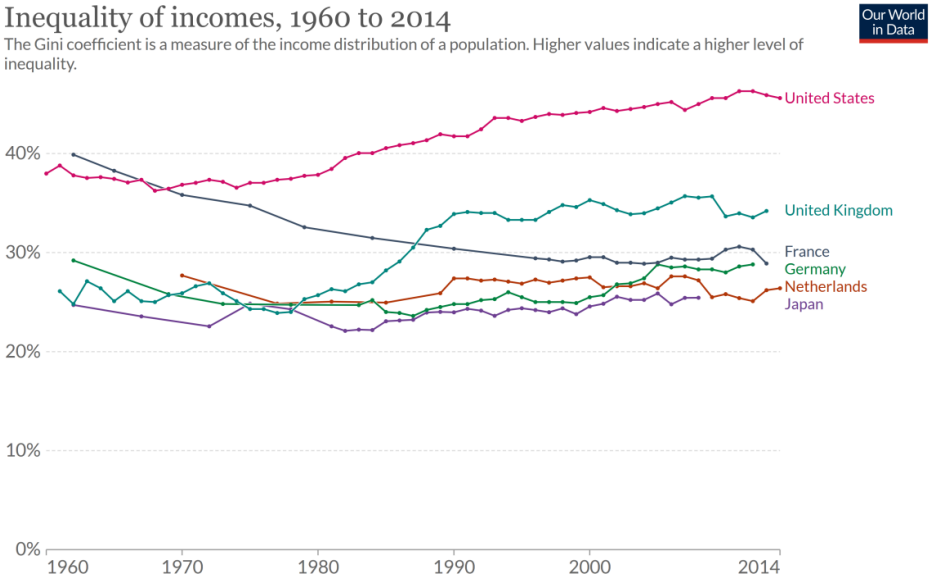


- Redistribution can make disposable income more equal



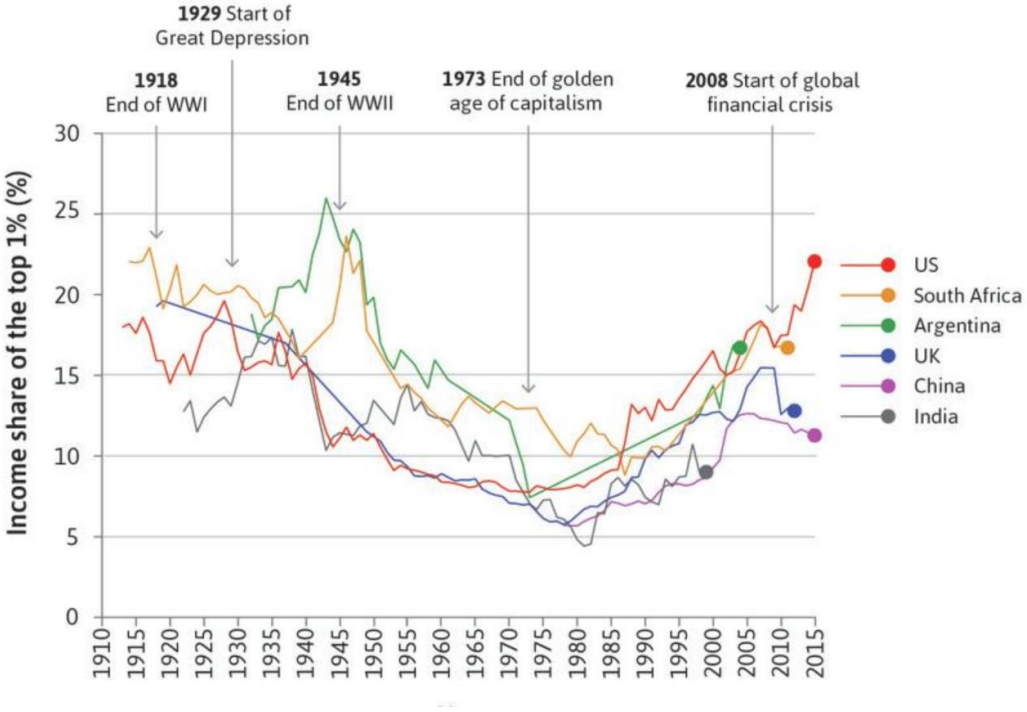
https://ourworldindata.org/grapher/inequality-before-and-after-taxes-and-transfers-thewissen-et-al-data?country=DEU-0+DEU-1+USA-0+USA-1

Income inequality over time



Income inequality

- The fraction of all wealth held by the richest 1% (10%)
- Income share of the top 1% (10%) of earners
- “U-turn” in inequality over past century for many (but not all) countries
- *World-wide* it declined since the end of the 20th because of the rapid economic growth of China and India



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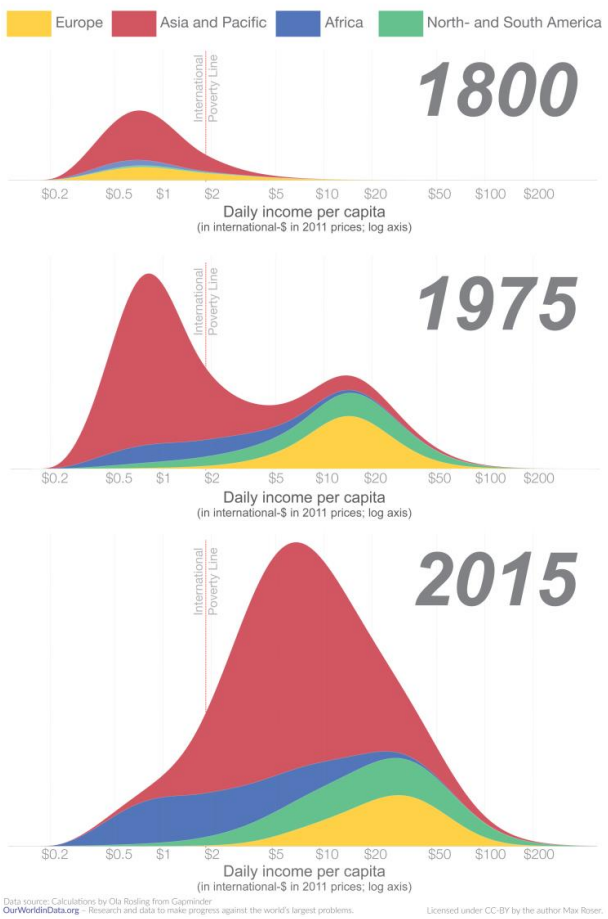
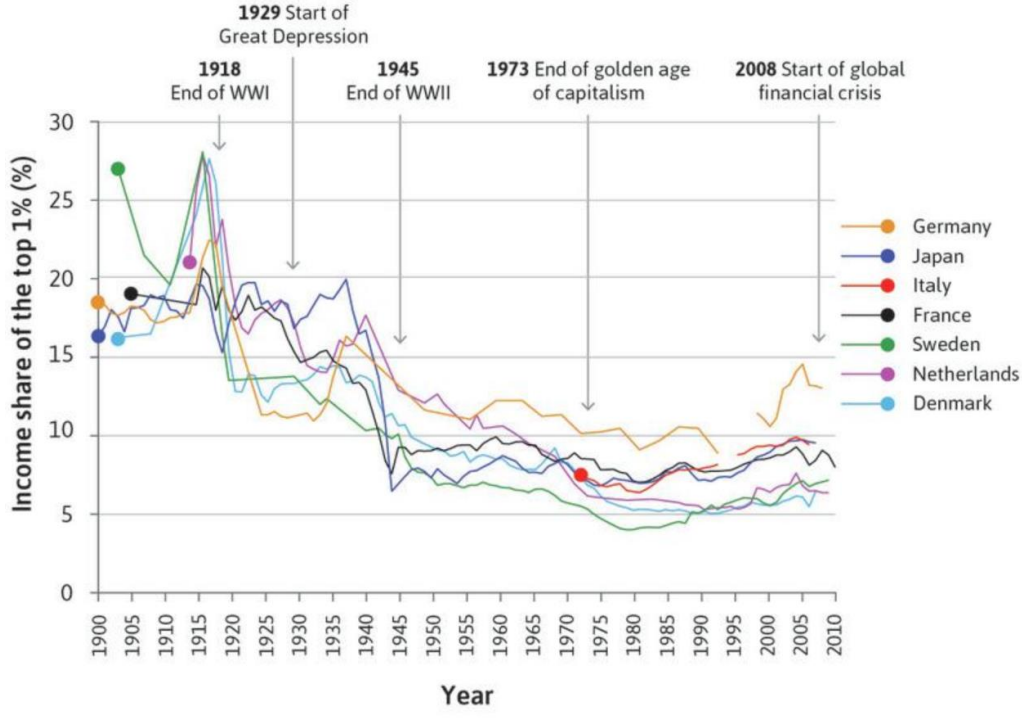
Global income



Income inequality

"U-turn" in inequality over past century less pronounced in most of Europe

[World inequality data base: https://wid.world](https://wid.world)



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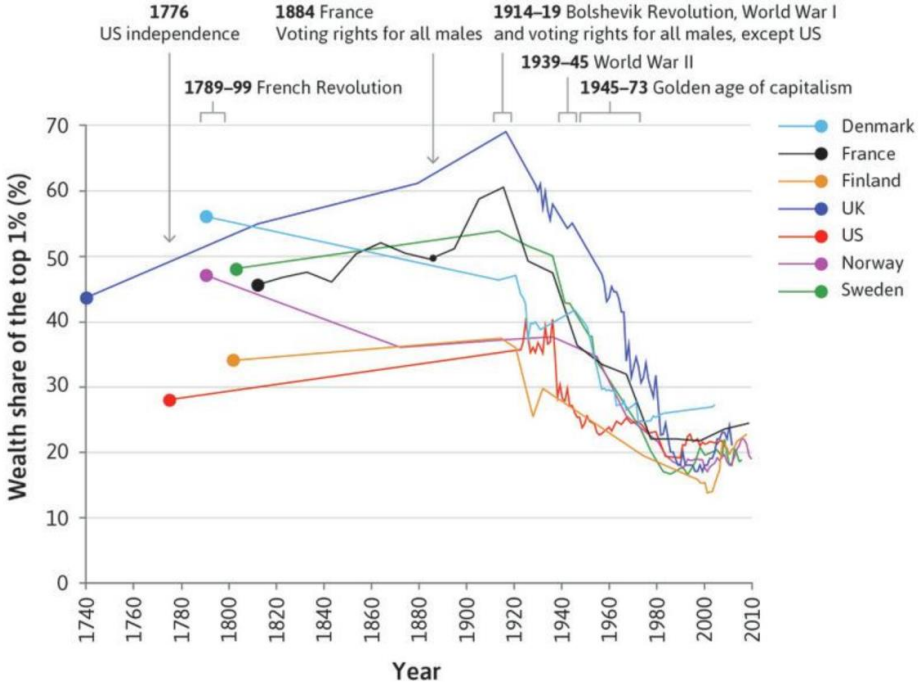
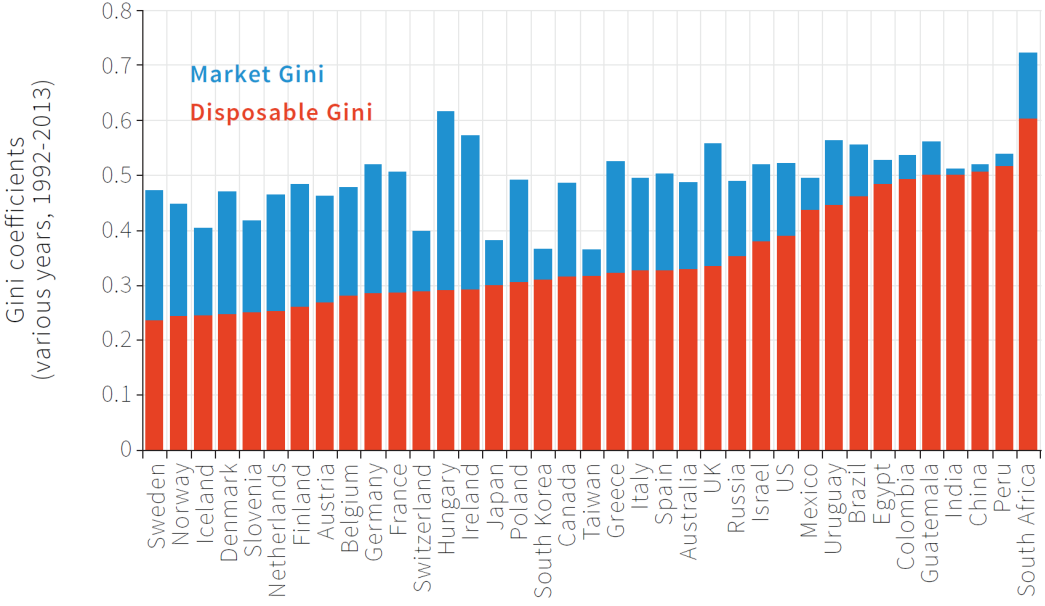
Alternative measure: wealth inequality

There appear to be three distinct periods:

1) 18th and 19th centuries up to about 1910 show increasing wealth inequality (excepting Norway and Denmark)
2) 20th century until 1980 shows decreasing wealth inequality
3) 1980 – today shows a modest increase in wealth inequality

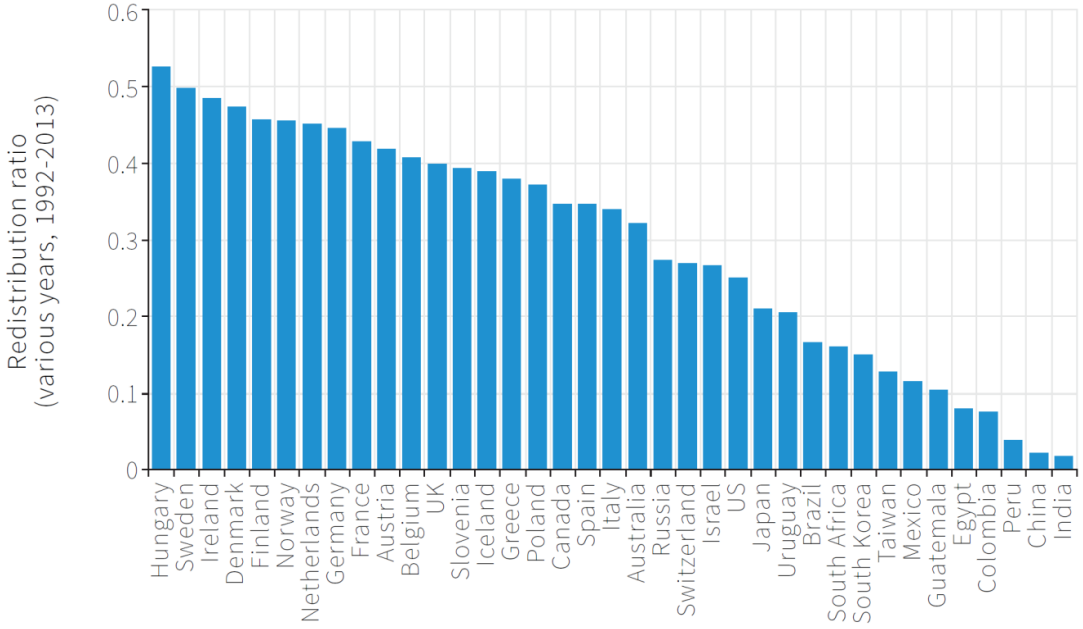


Income inequality across countries



- The differences between countries in inequality in disposable incomes are much greater than inequalities in income before taxes and transfers (the top of the upper bars)
- The US and the UK are among the most unequal of the high-income economies
- The few poor and middle income countries for which data are available are even more unequal in disposable income than the US.

Redistribution across countries



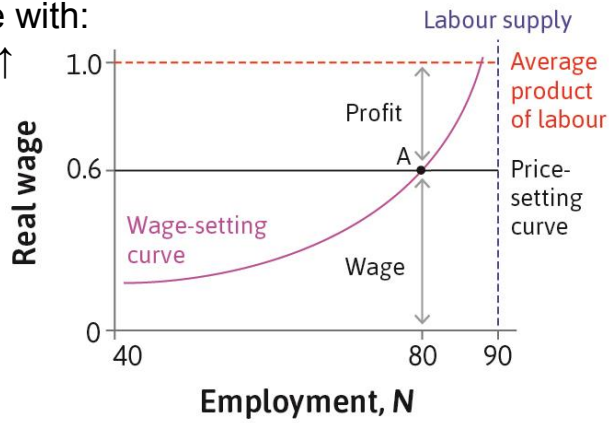
The **redistribution ratio** is the length of the blue segment in the Figure on the previous slide divided by the total height of the bar

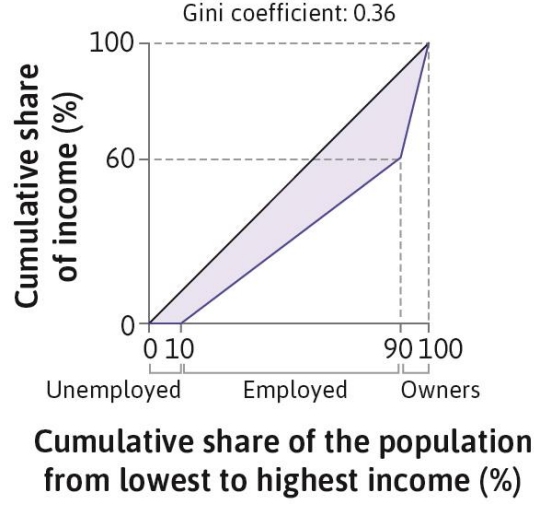
Division of output

The labour market determines the division of the economy's output between **employed workers, the unemployed, and firm-owners**.

Gini coefficient will rise with:

- unemployment rate ↑
- real wage ↓
- mark-up ↑
- productivity ↑

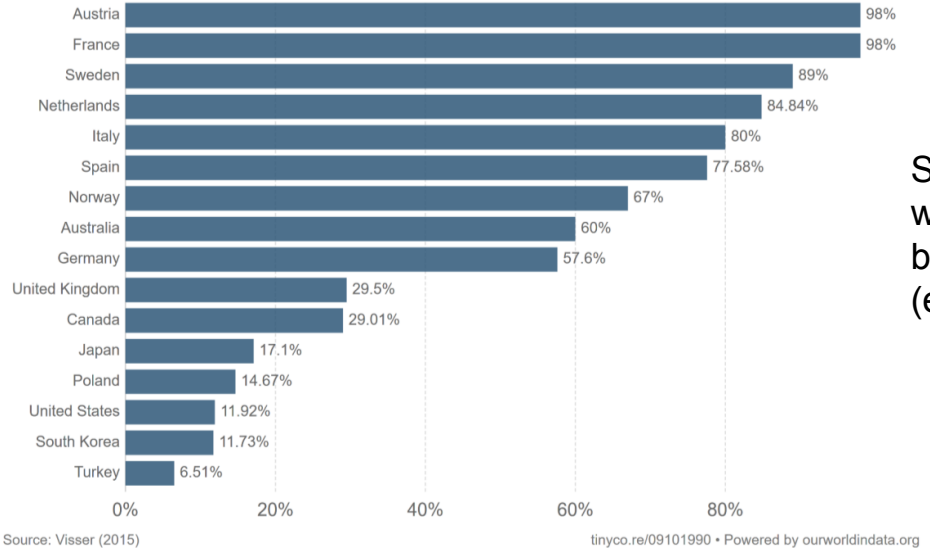




Labour unions

Labour unions

Labour union: an organization consisting predominantly of employees. Its main activities include the negotiation of rates of pay and conditions of employment for its members.



Share of employees whose wages are coverd by collective bargaining agreements (early 2010s)

Wage bargaining

Where workers are organized into trade unions, the wage is not set by the employer but instead is negotiated between union and firm.

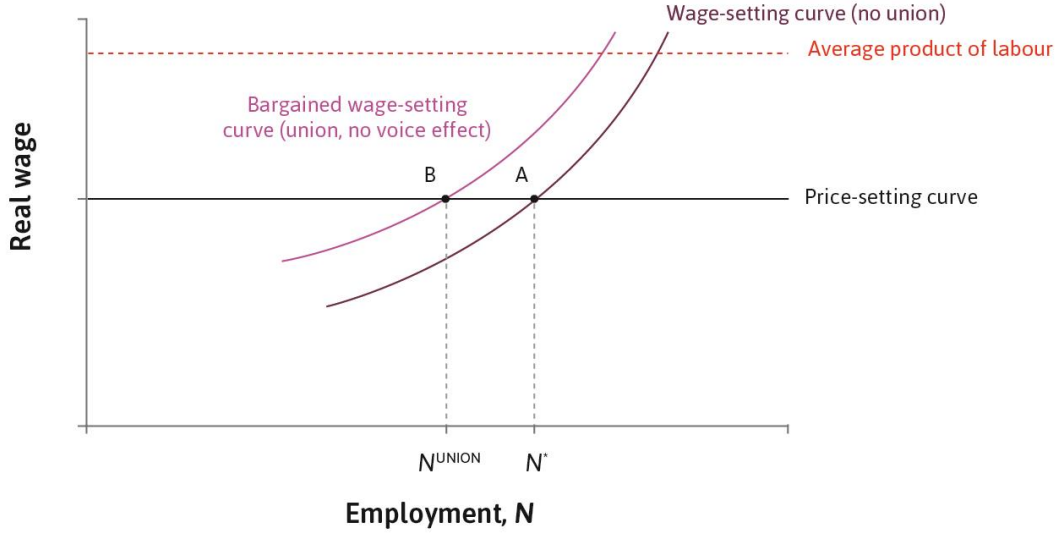
The **bargained wage** can be above the wage-setting curve

- the wage-setting curve is about the employer's threat of firing a worker
- the union can threaten to "dismiss" the employer by going on strike

Bargaining curve

Bargaining curve indicates the wage that the union-employer bargaining process will produce for every level of employment.

Its position above the wage-setting curve depends on the relative bargaining power of the union and the employer.



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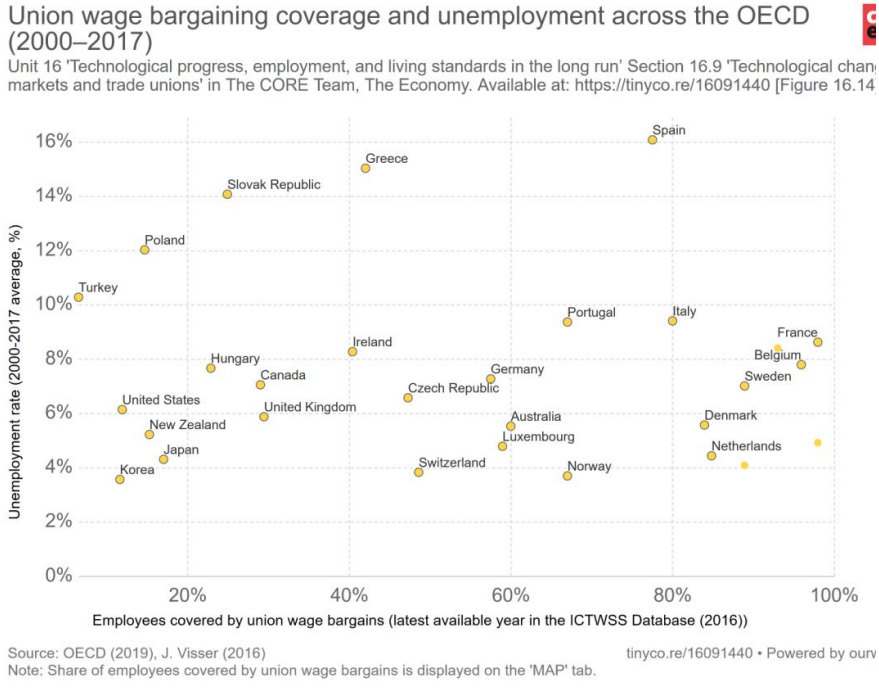
Labour unions and unemployment

In equilibrium, wage is unchanged, but employment and firm's profits are lower.

The model tells us that labour unions will increase unemployment rates.

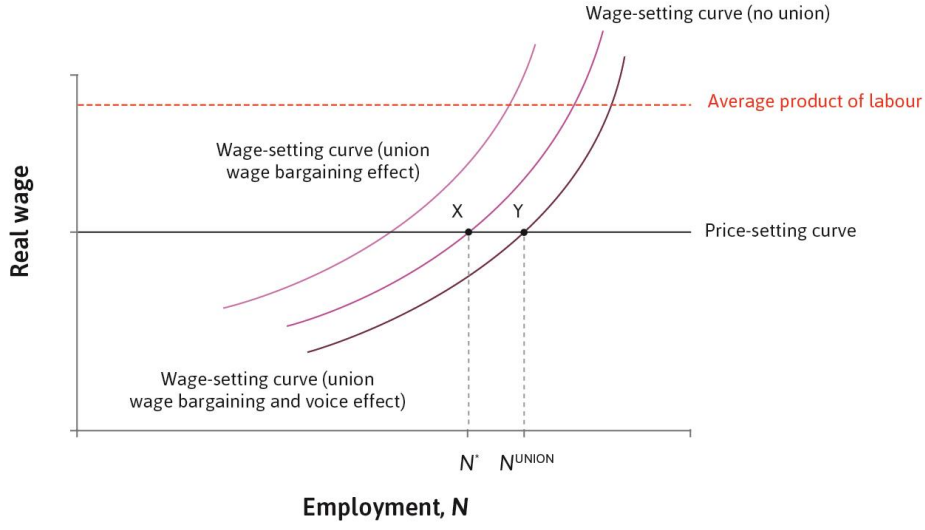
However, this is **not** clear in the data!



The union voice effect

Providing employees with a **voice** in how decisions are made may induce them to provide more effort for the same wage.

- The bargained wage curve shifts downward.
- The overall effect of labour unions on employment is ambiguous.



Labour market policies

Labour market policies

Shifts in the price-setting curve:

1. Education & training: labour productivity ↑
2. Wage subsidy: Production costs and prices ↓

Shifts in the wage-setting curve:

1. Lower unemployment benefit: reservation wage ↓

Shifts in labour supply curve:

1. immigration policies: labour supply ↑
2. childcare provision: female labour participation ↑

Economics II – Macroeconomics

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