Principles of Economics II

Lecture 8: Inflation, unemployment, and monetary policy

Fall 2020
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Outline

- **Introduction**
- **Inflation**
- **The Phillips Curve**
- **Monetary Policy**

Introduction

Context

- **Governments can use fiscal policy e.g. spending, taxation to stabilize the economy during recessions**
- **Besides unemployment, fluctuations in GDP also affect prices**
  - What factors affect the price level in an economy?
  - What is the ideal level of inflation and how do central banks achieve it?
  - How do central banks respond differently to supply-side and demand-side shocks?

This lecture

- **Inflation: causes and effects on the economy**
- **The trade-off between inflation and unemployment**
- **How central banks can use monetary policy to respond to shocks in the economy**
- **The importance of expectations and how central banks can manage them**

Inflation

Inflation: key concepts

- **Inflation = an increase in the general price level**
  - Zero inflation = A constant price level from year to year
- **Deflation = A decrease in the general price level**

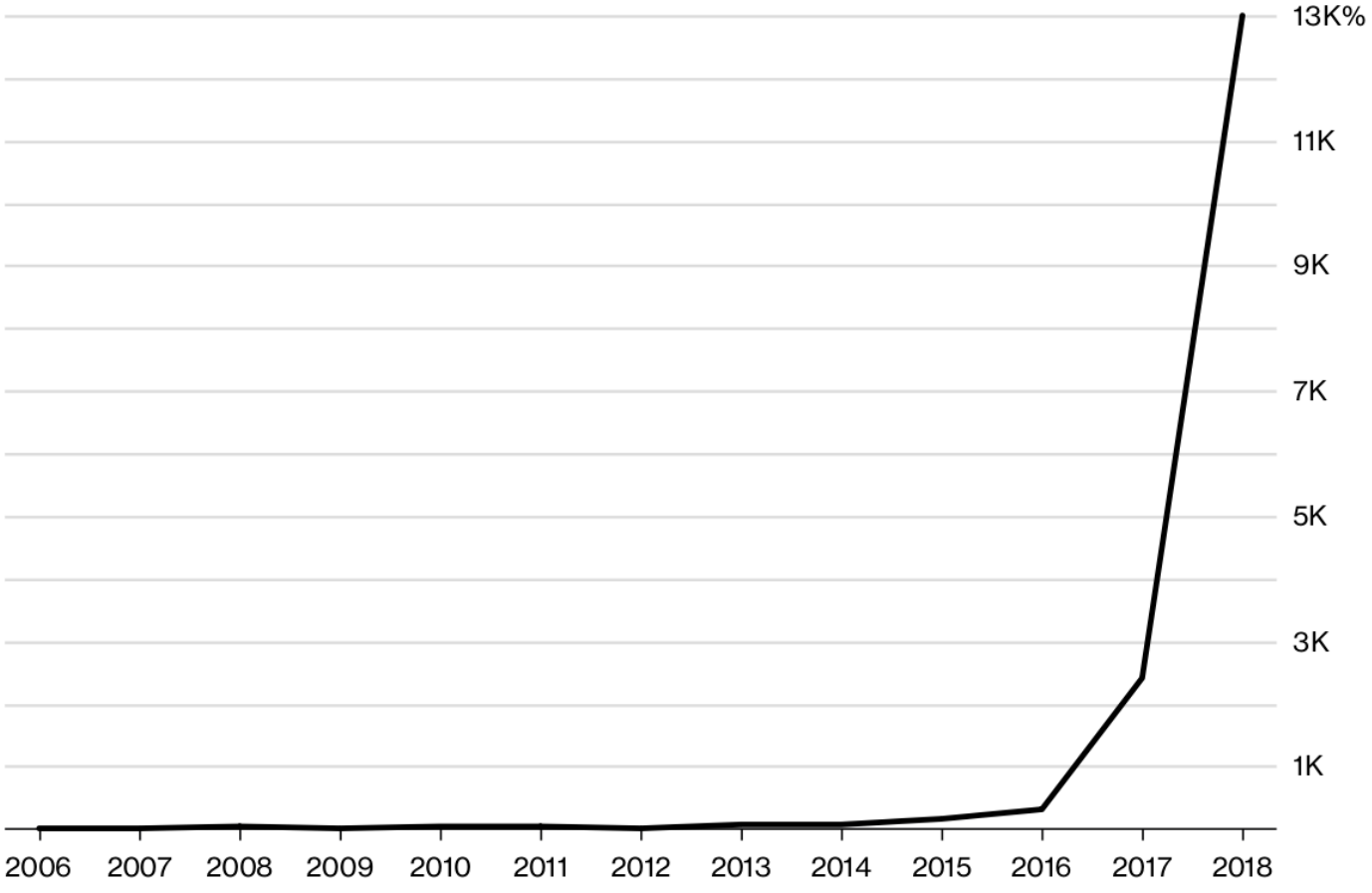
- **Real interest rate = Nominal interest rate – Inflation rate**
  - This is the so-called Fisher equation

What's wrong with inflation?

- **For people on fixed nominal income (e.g. pensioners), higher inflation means lower real value of income**
  - But lot of benefits are indexed
- **Inflation reduces the real value of debt – good for borrowers, bad for creditors**
- **High rate of inflation makes the economy work less well:**
  - High inflation is often volatile → uncertainty
  - It is harder for producers to distinguish between changes in relative prices and inflation
  - Menu costs as firms have to update their prices more frequently

Hyperinflation Spiral

IMF sees Venezuela inflation accelerating to 13,000% by end-2018



Note: IMF estimate is higher than all eight estimates from economists surveyed by Bloomberg
Source: International Monetary Fund

Bloomberg

The price of toilet paper before monetary reform:
2,6 M bolivar (€ 0,34), www.hs.fi/ulkomaat/art-2000005798798.html

What's good with modest stable inflation?

- **Inflation greases the wheels of the labour market**
  - In a dynamic economy, in any given year, workers in some firms and sectors will be more in demand than in others
  - With inflation, a fall in real income among the losers may be masked by rising nominal income, or at least not falling
  - The adjustment of workers and resources between different firms and industries in response to changes in relative wages can take place without losers experiencing falling nominal wages
- **Gives monetary policy more room to manoeuvre**
  - Positive inflation allows the real interest rate to go lower in order to offset a major recession than if inflation is zero

What's wrong with deflation?

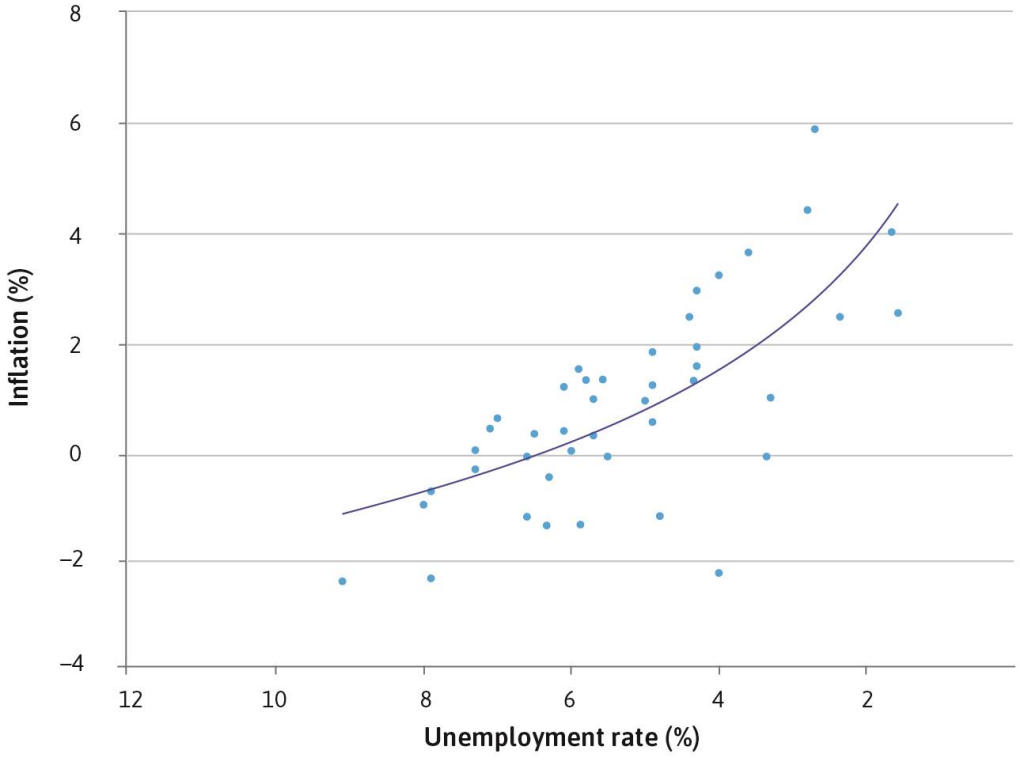
- **Deflation could have even more dramatic consequences than high inflation**
- **When prices are falling, households will postpone consumption (particularly of durables) because they expect goods will be cheaper in the future.**
  - This is similar to a negative shock to aggregate demand
- **Deflation increases the real debt burden, which may lead households to cut consumption to return to their target wealth**

The Phillips curve

Inflation and employment

Higher employment may result in inflation

It increases workers' bargaining position → higher wages → higher cost of production → higher prices



Inflation and aggregate demand

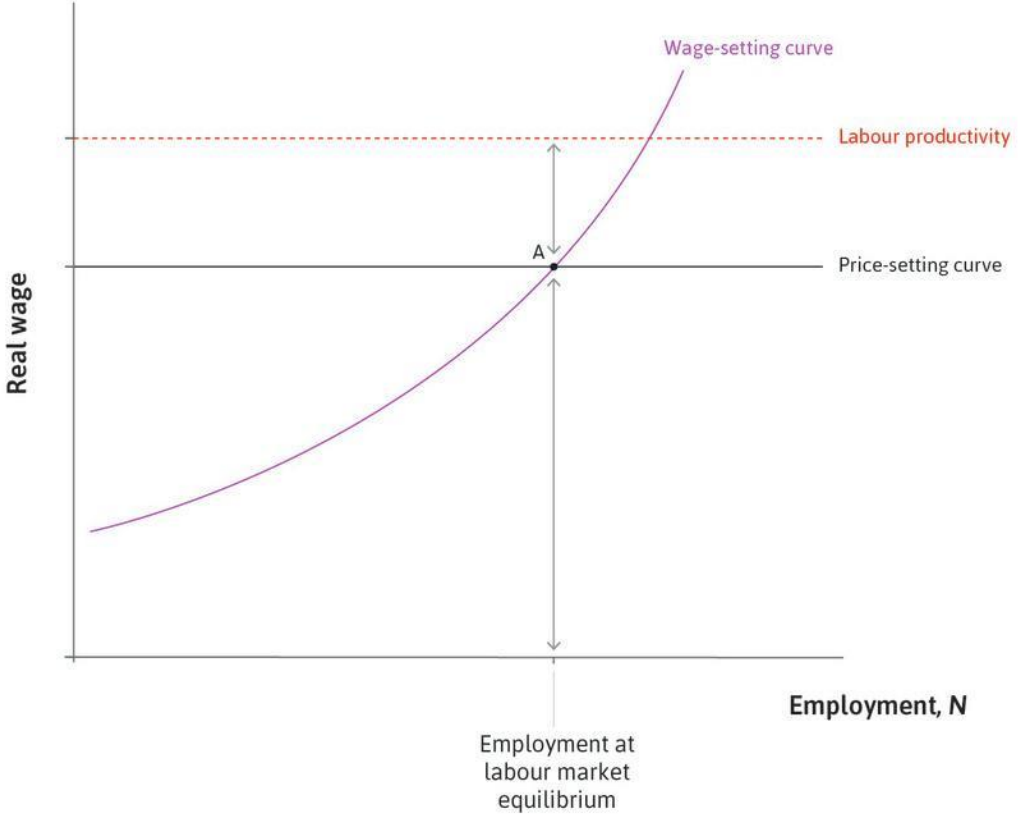
- **An upswing in business cycle is often associated with rising inflation**
  - Higher aggregate demand → higher employment → higher wages → higher cost of production → higher prices
  - The economy experiences price and wage inflation, but the real wage (W/P) has not increased
  - Constant real wage means that employment stays high
  - …and the wage-price spiral continues

Inflation and conflict over the pie at low and high unemployment

At point A, the economy is at labour market equilibrium

The real wage on the wage-setting curve is equal to that on the price-setting curve, so firms' claims to real profit per worker plus the workers' claims to real wages sum to labour productivity

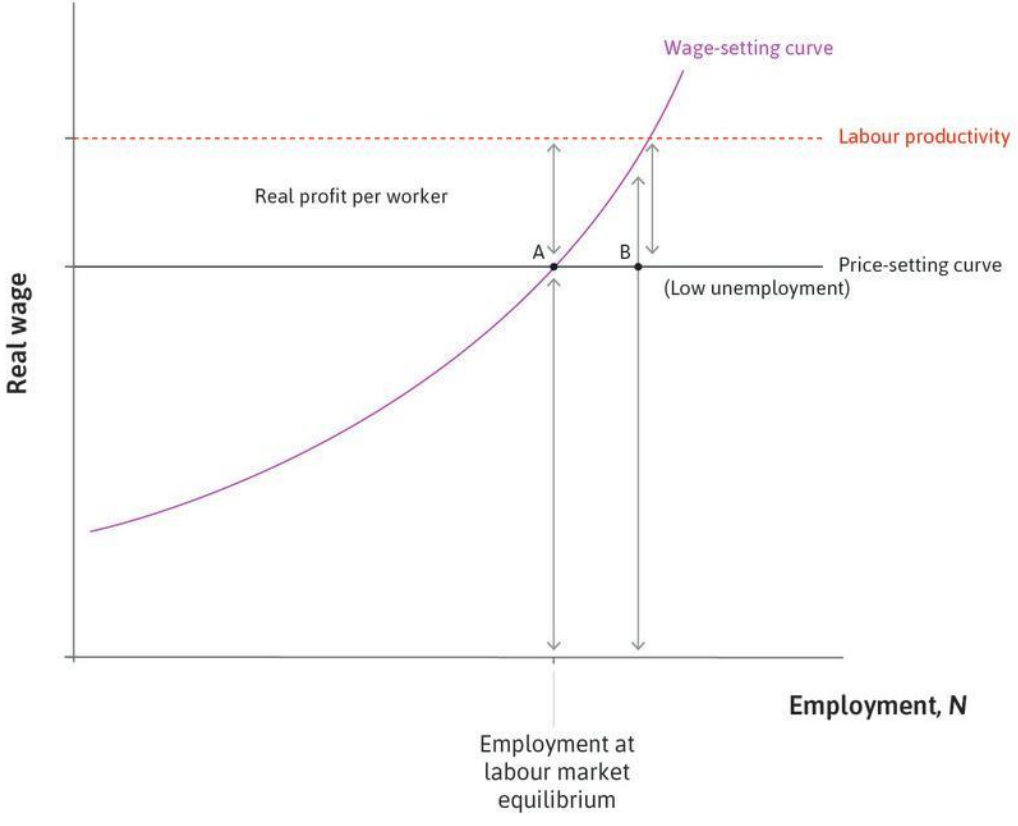
Prices are stable when the labour market is in equilibrium



Inflation and conflict over the pie at low and high unemployment

At low unemployment, the real wage required so that workers will work hard increases so the claims of workers for wages and owners for profits are inconsistent:

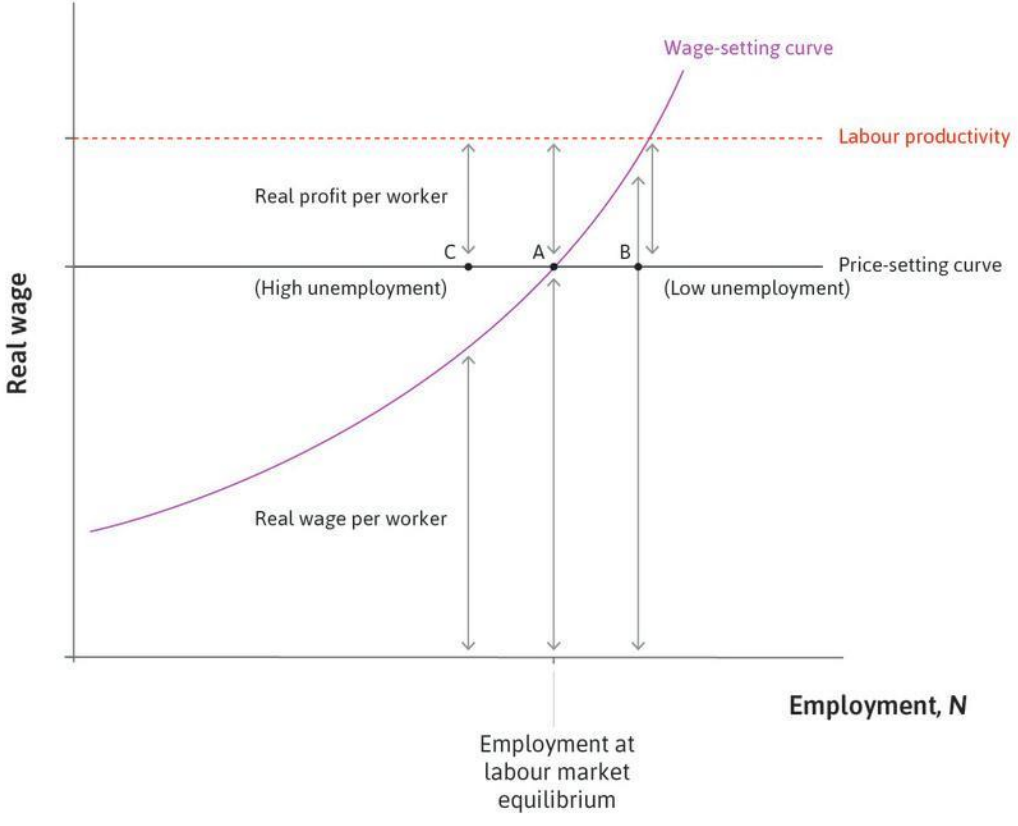
They sum to more than labour productivity



Inflation and conflict over the pie at low and high unemployment

At high unemployment, workers are in a weaker bargaining position

The claims of workers and owners sum to less than labour productivity



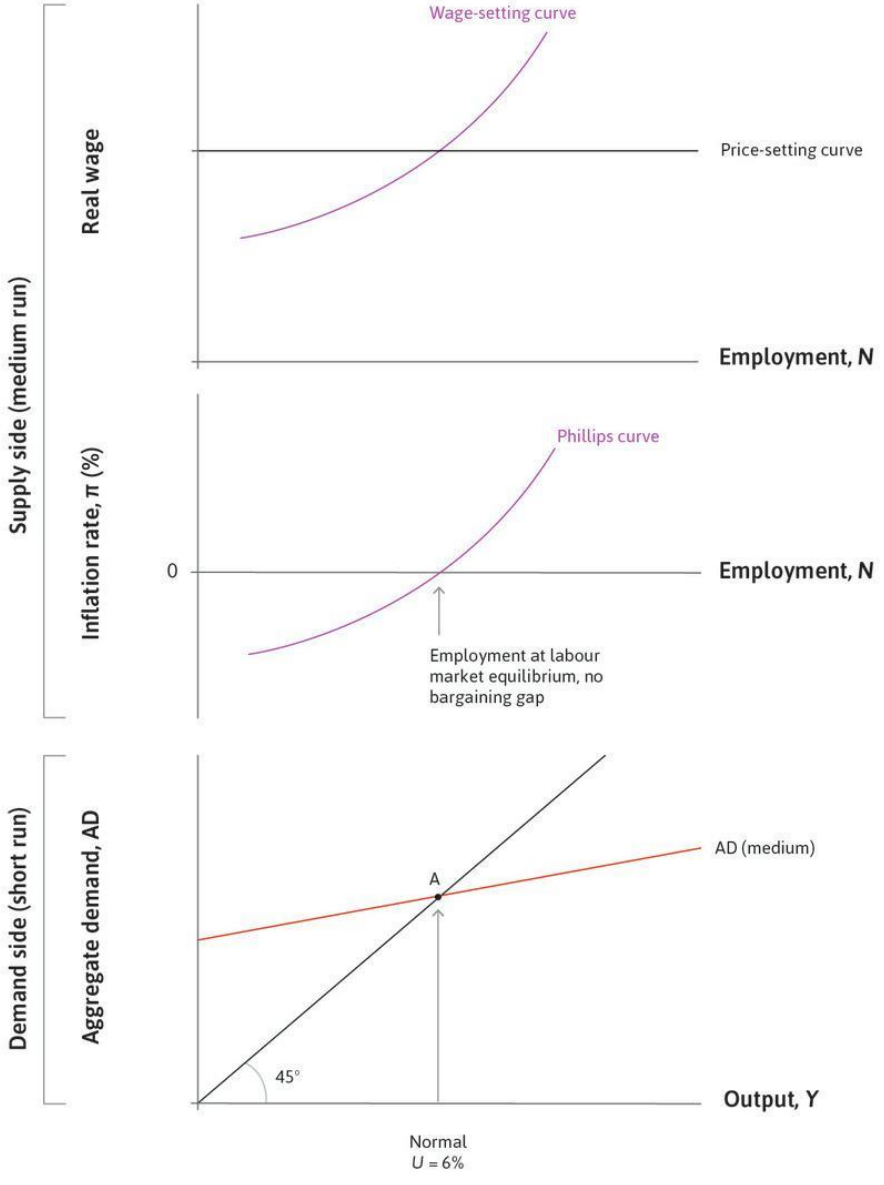
Bargaining gap

- **When the real wage given by the wage-setting curve and that given by the price-setting curve are not equal, we say there is a bargaining gap equal to the vertical distance between the two curves**
  - If unemployment is lower than at the equilibrium: There is a positive bargaining gap and there is inflation
  - If unemployment is higher than at the equilibrium: There is a negative bargaining gap and there is deflation
  - If there is labour market equilibrium: The bargaining gap is zero and the price level is constant

Bargaining gap

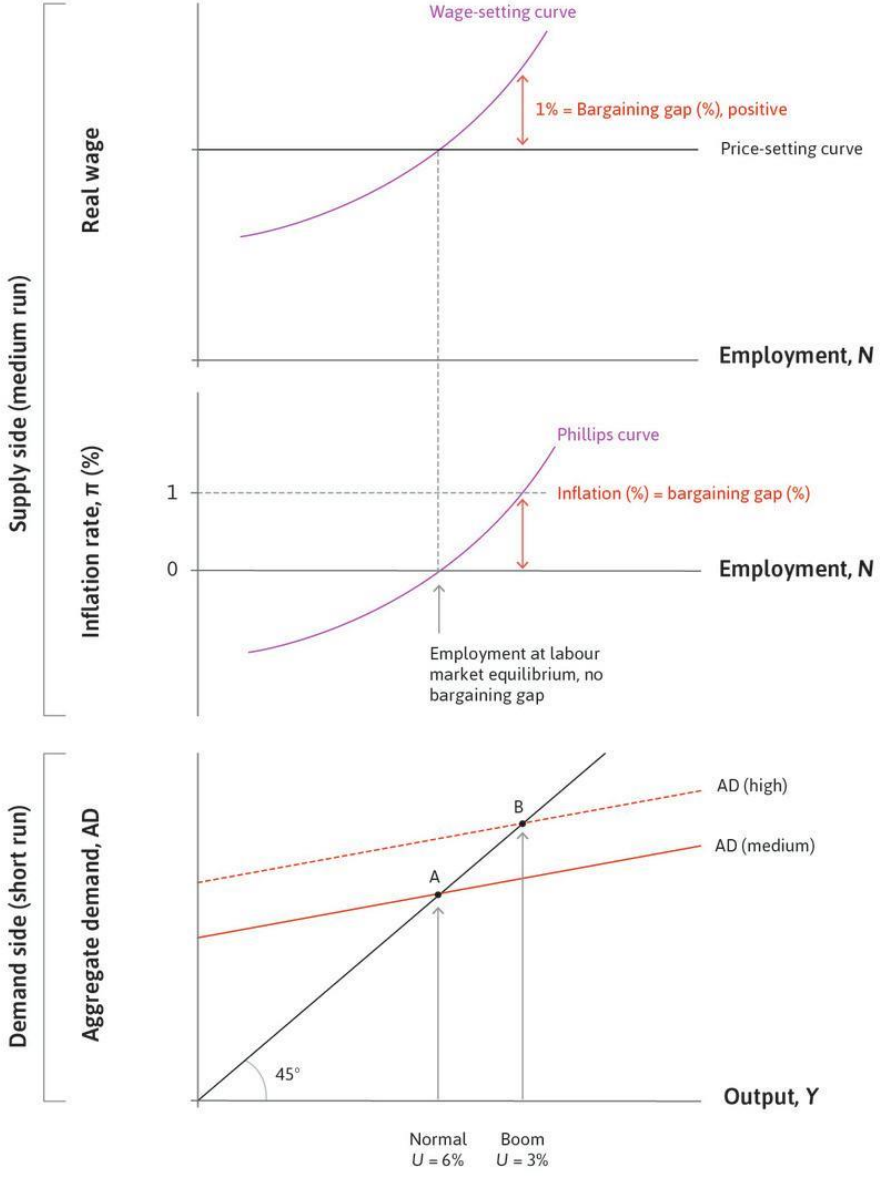
To complete the picture, we include the multiplier model beneath the labour market and Phillips diagrams to bring the short- and medium-run models together

When the level of aggregate demand produces employment at labour market equilibrium (a normal level of activity), the price level is stable (inflation is zero)



Bargaining gap

At a higher level of aggregate demand (a boom), there is a positive bargaining gap and inflation is positive

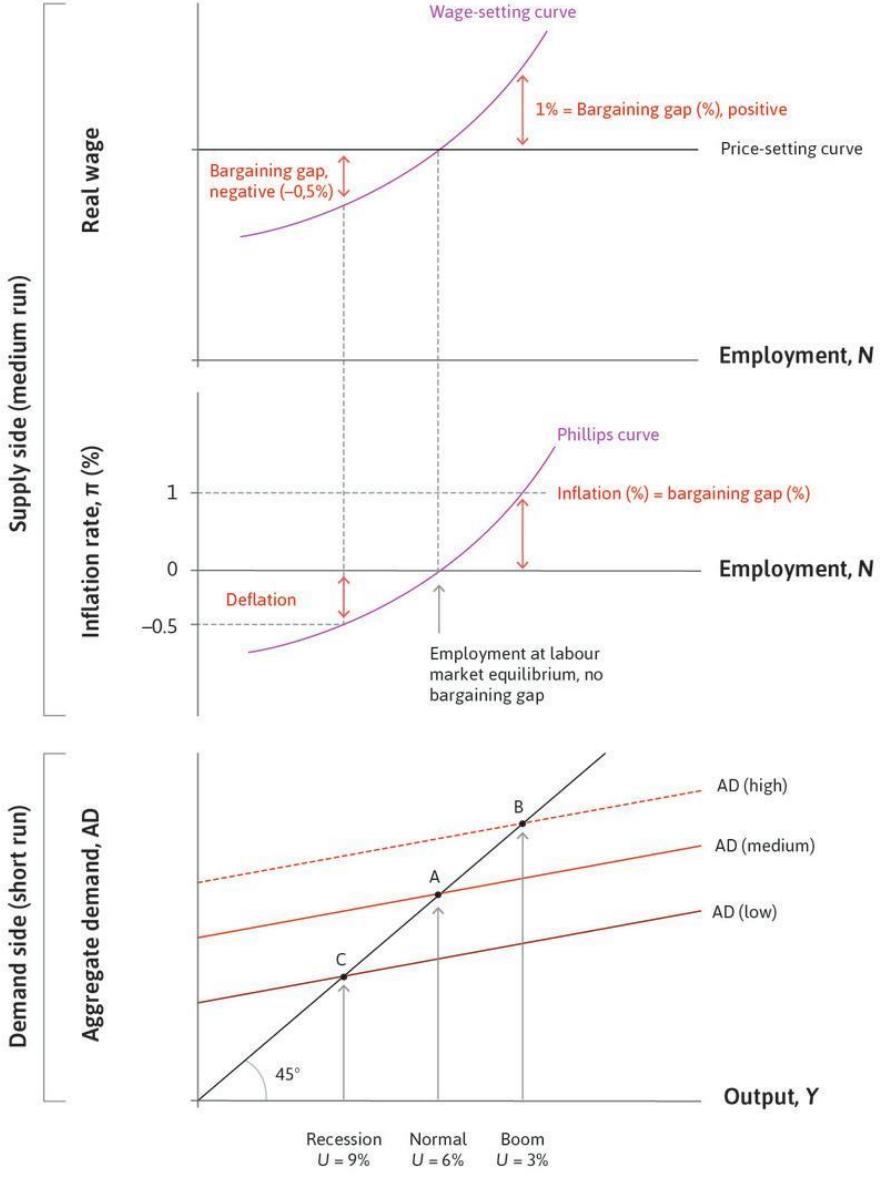


Bargaining gap

This highlights that:

At a higher level of aggregate demand (a boom) inflation is positive:
Unemployment is lower, which means there is a positive bargaining gap, so wages and prices are rising continuously

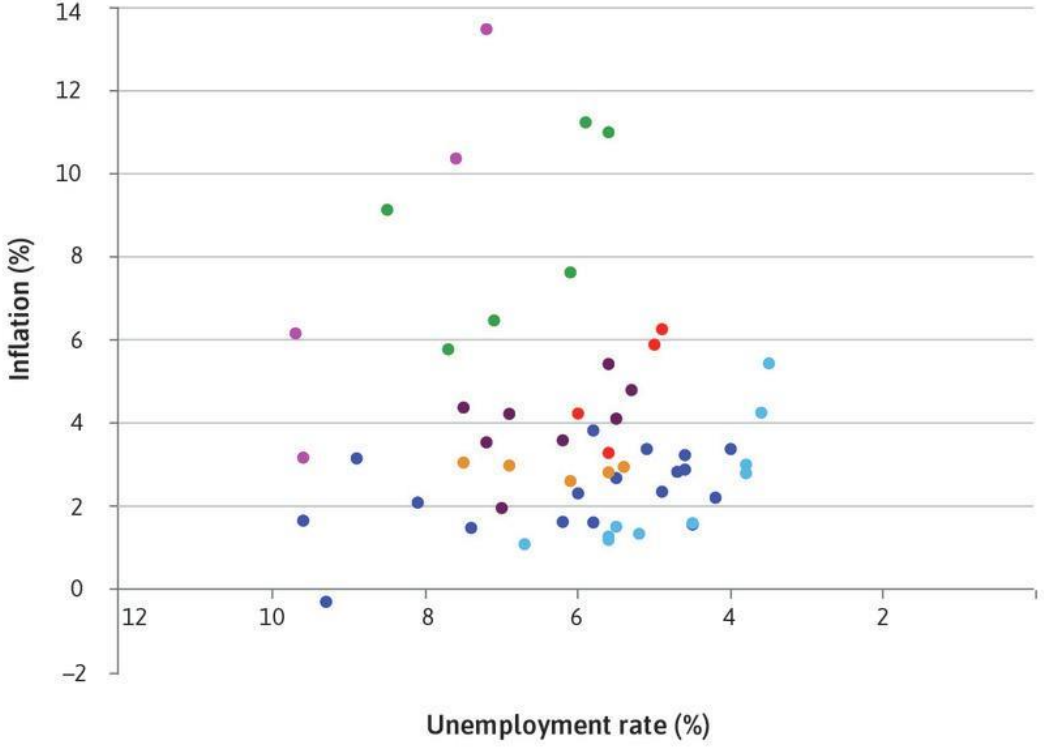
At a lower level of aggregate demand (a recession), there is deflation:
Unemployment is higher, which means there is a negative bargaining gap



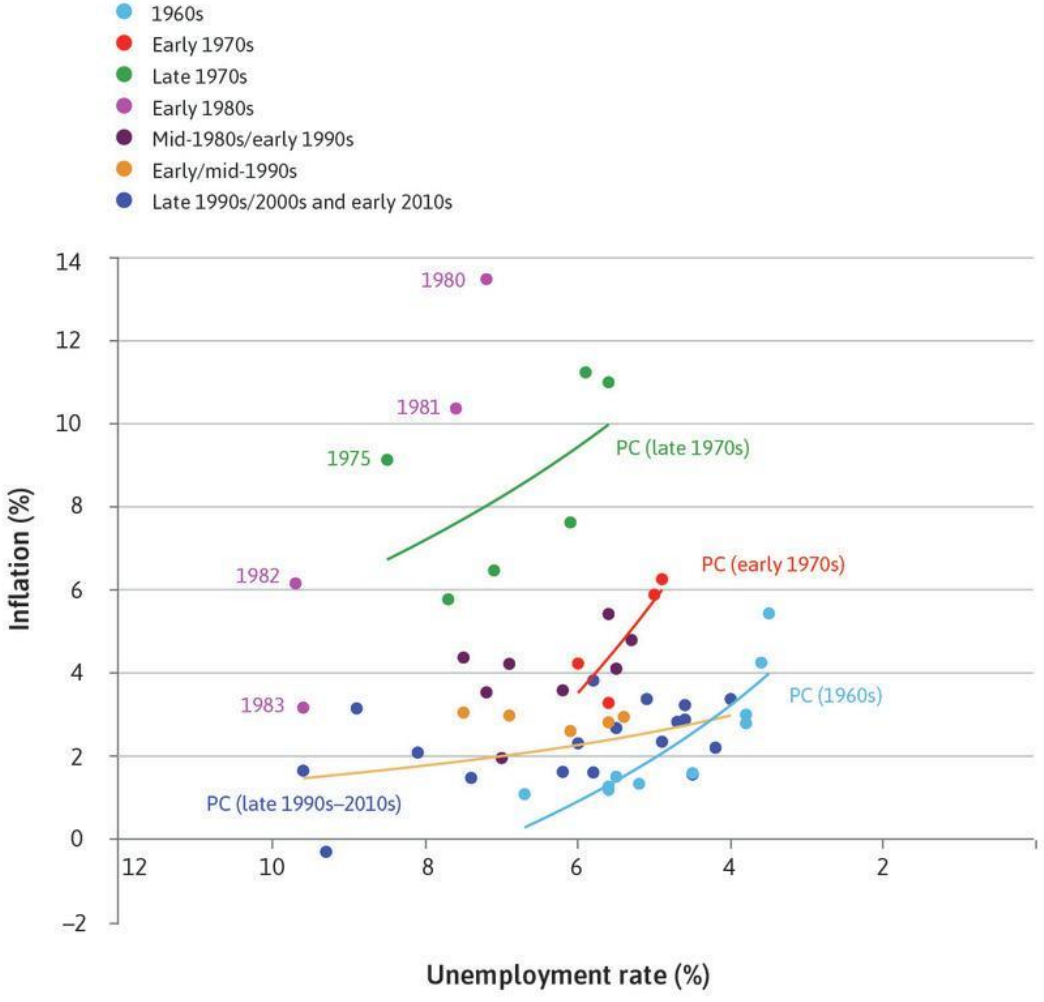
The Phillips Curve Over Time

- **This suggests that a policymaker who is able to adjust the level of aggregate demand can pick any combination of inflation and unemployment along the Phillips curve**
- **But the problem is that the trade-off between inflation and unemployment is not stable:**
  - Phillips Curve shifts over time
  - Keeping unemployment "too low" leads to higher prices, but also rising inflation

The Phillips Curve Over Time



The Phillips Curve Over Time



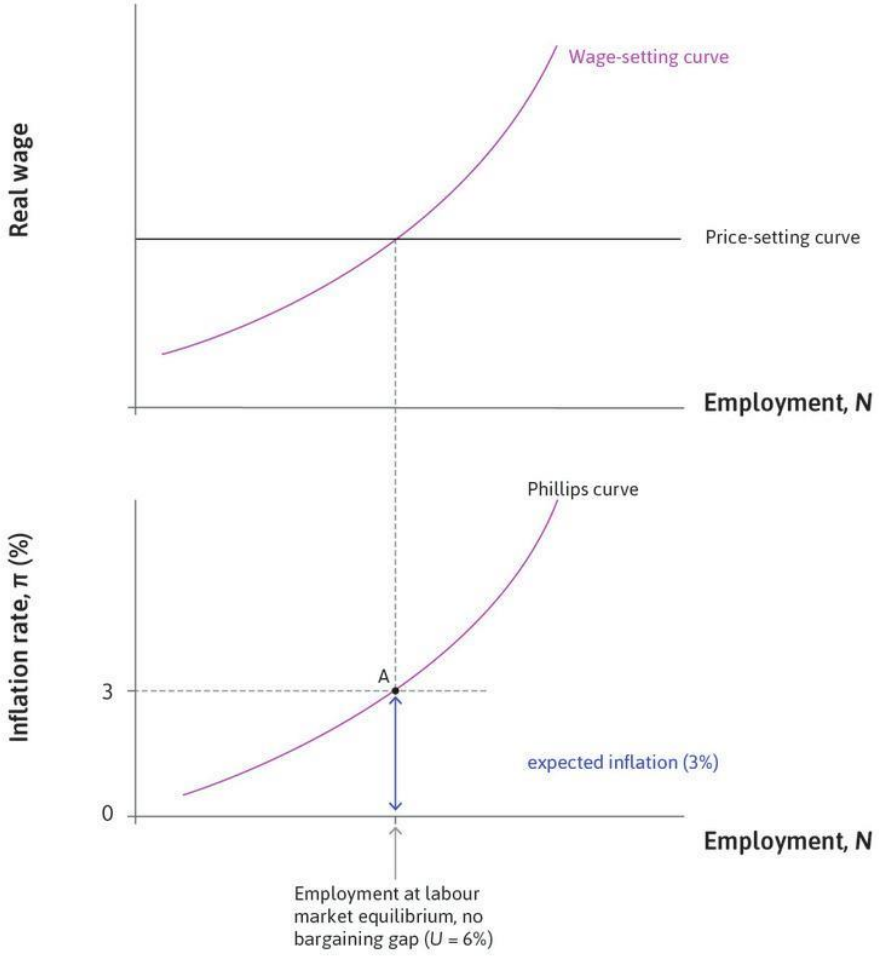
The role of expectations

- **Why does inflation keep rising when governments try to keep unemployment too low?**
- **We need to go back to two familiar points:**
  - People are forward-looking: We explained this in Units 6, 9, 10 and 13. They take actions now in anticipation of things they expect to happen. 'Expectations matter'
  - People treat prices as messages: Friedrich Hayek taught us this (see Unit 11). Therefore people also treat changes in prices as messages about what will happen in the future.
- **Milton Friedman, 1967**

The role of expectations

Let's return to the Phillips curve

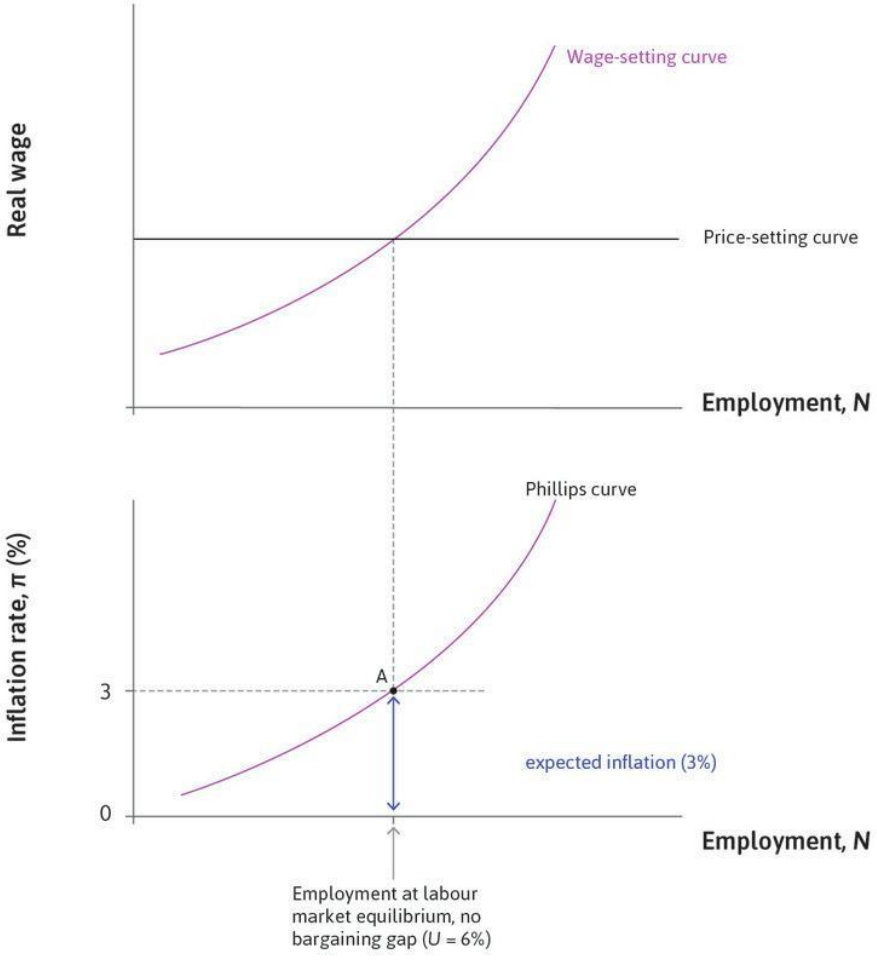
In this figure, you will notice that at the labour market equilibrium with an unemployment rate of 6%, the inflation rate is 3% and not zero as previously



The role of expectations

If wage- and price-setters expect prices to rise by 3% per annum, and the level of aggregate demand is ‘normal’ and keeps unemployment at 6%, then the economy can remain at the labour market equilibrium with inflation remaining constant at 3% per annum

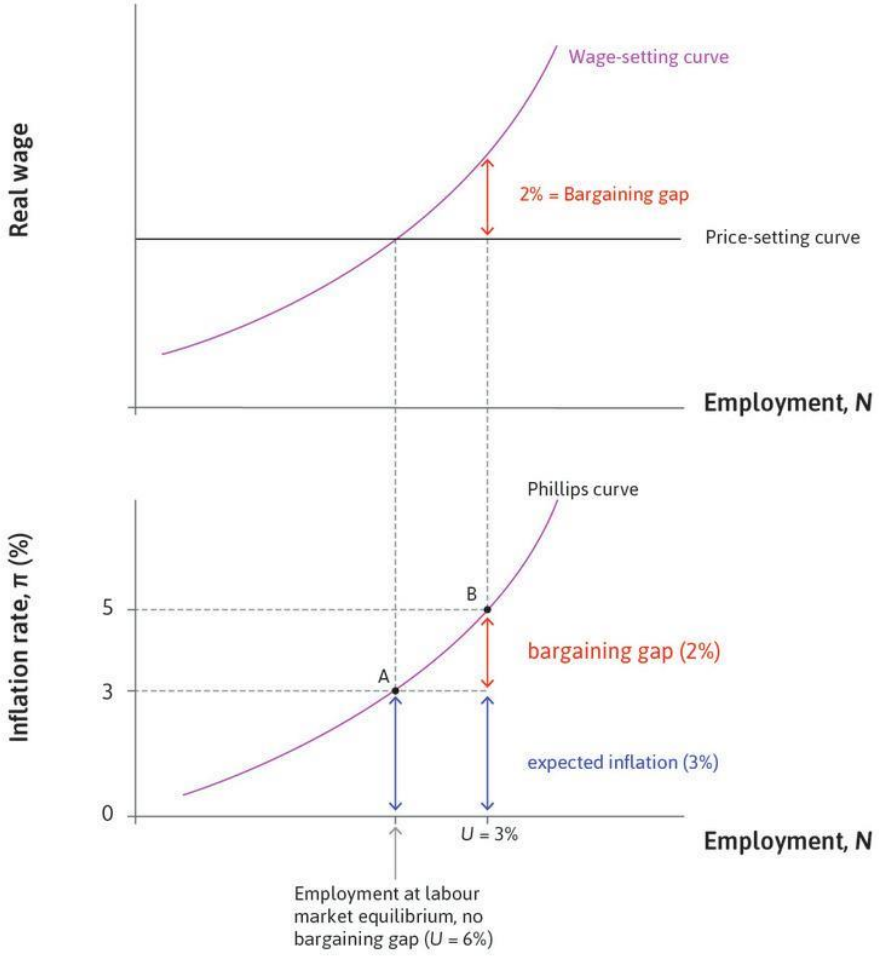
Every year, wages and prices will rise by 3% and the real wage will remain at the intersection of the wage- and price-setting curves



The role of expectations

Now consider a boom, which takes the economy to lower unemployment at point B

What will happen to inflation?

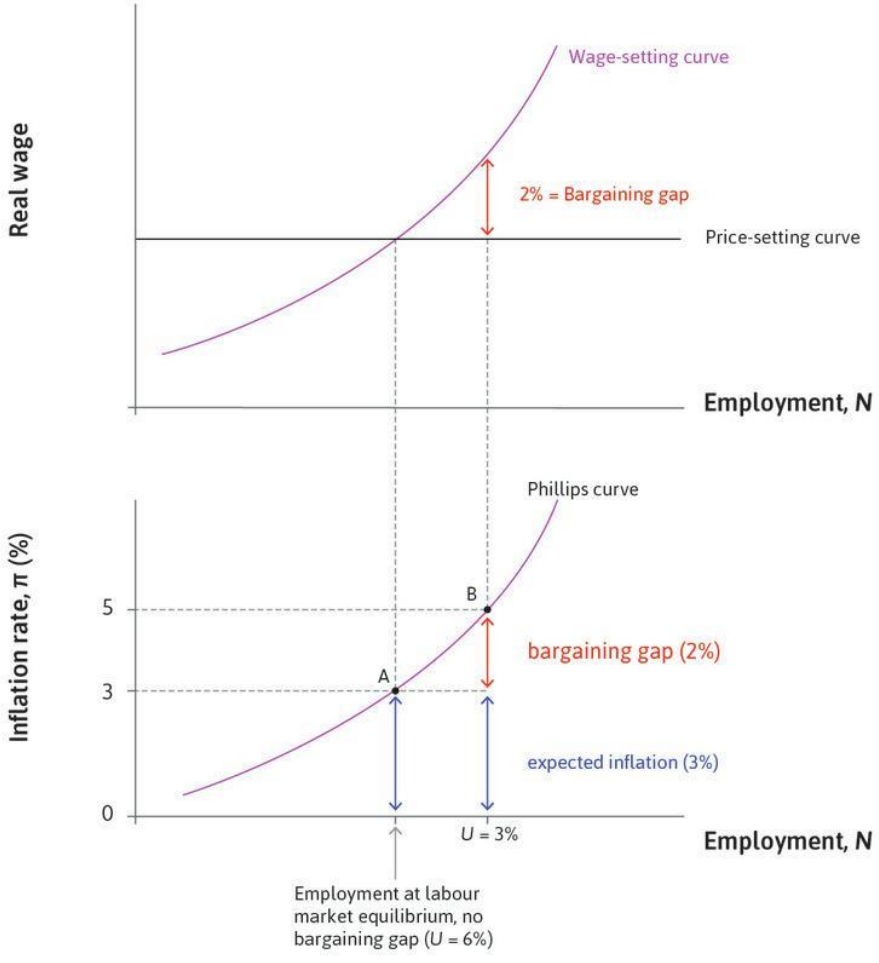


The role of expectations

Workers expect prices to rise by 3% and will require a nominal wage increase of 3% just to keep their real wage unchanged

But they require an additional 2% rise to give them an expected real wage rise on the wage-setting curve, so wages increase by 5%

With their costs rising by 5%, firms will increase prices by 5% => in the boom, inflation will be 5%



The shifting Phillips curve

- **Workers expected a 2% real wage increase at B from their nominal pay rise of 5% (to keep us on the WS-curve), but they did not get this because firms raised their prices by 5%**
  - At low unemployment, both parties cannot be satisfied with the outcome, because their claims are larger than the size of the pie
- **Now, assume that workers expect inflation next year to be equal to inflation last year**
  - At the next wage-setting round, the HR department has to take into account the fact that their employees expect prices to rise by 5%
  - So in order to achieve another real wage increase of 2%, the HR department sets a wage increase of 7%

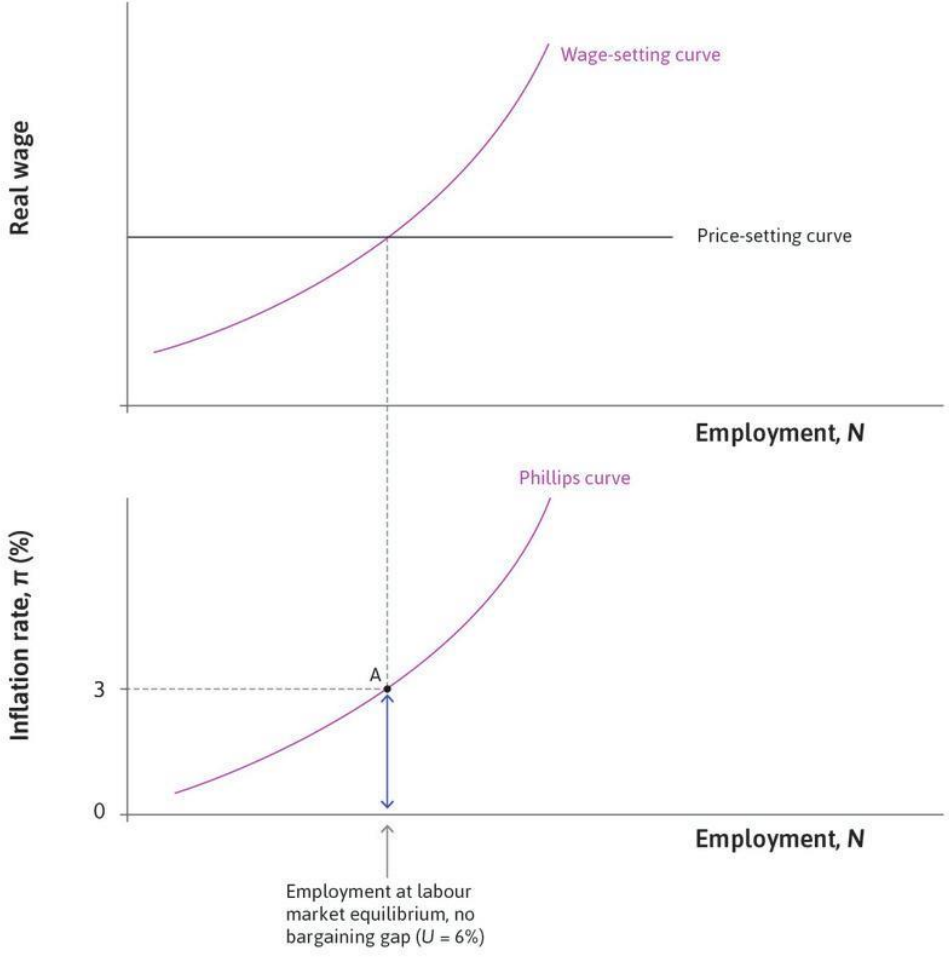
The shifting Phillips curve

	Year	Expected inflation (previous year's inflation)	Unemployment	Bargaining gap	Inflation outcome: expectations plus bargaining gap
Stable inflation	1	3%	6%	0%	3%
	2	3%	6%	0%	3%
	3	3%	6%	0%	3%
Rising inflation	1	3%	3%	2%	5%
	2	5%	3%	2%	7%
	3	7%	3%	2%	9%

The shifting Phillips curve

Labour market equilibrium at A

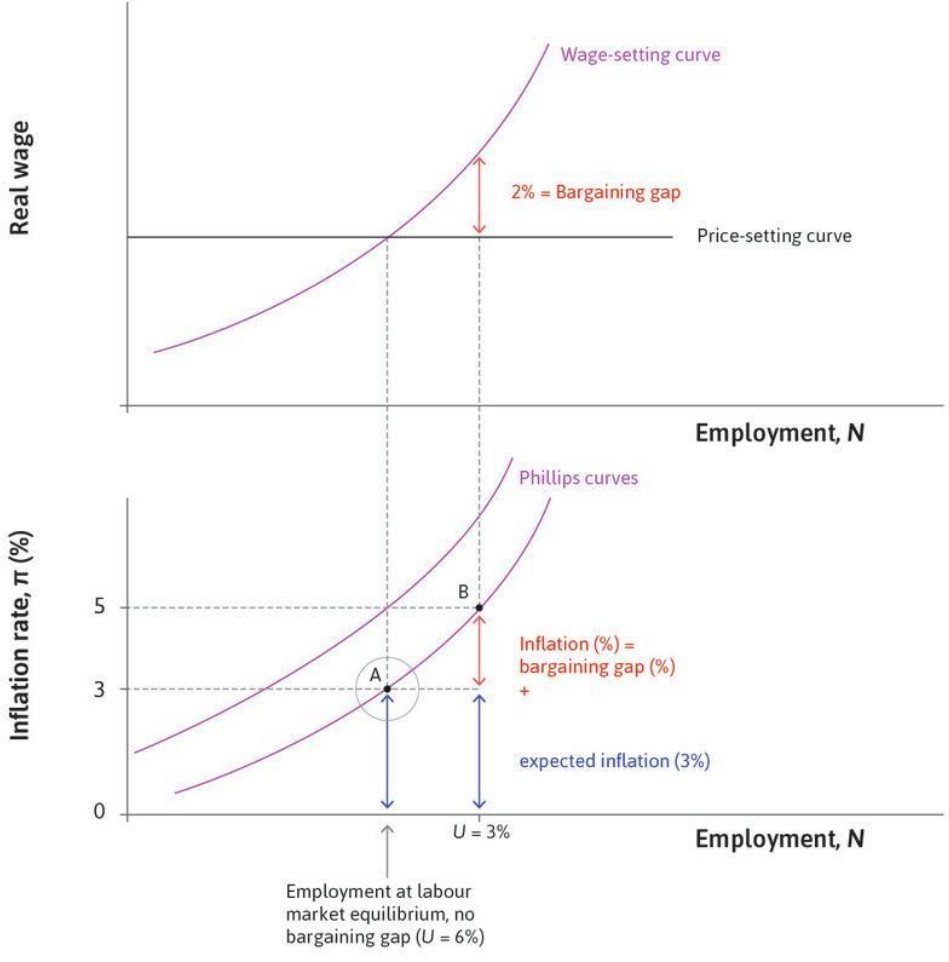
Inflation is 3% as expected



The shifting Phillips curve

A boom: First period at B

At lower unemployment, the bargaining gap is 2%. Inflation is equal to expected inflation plus the bargaining gap

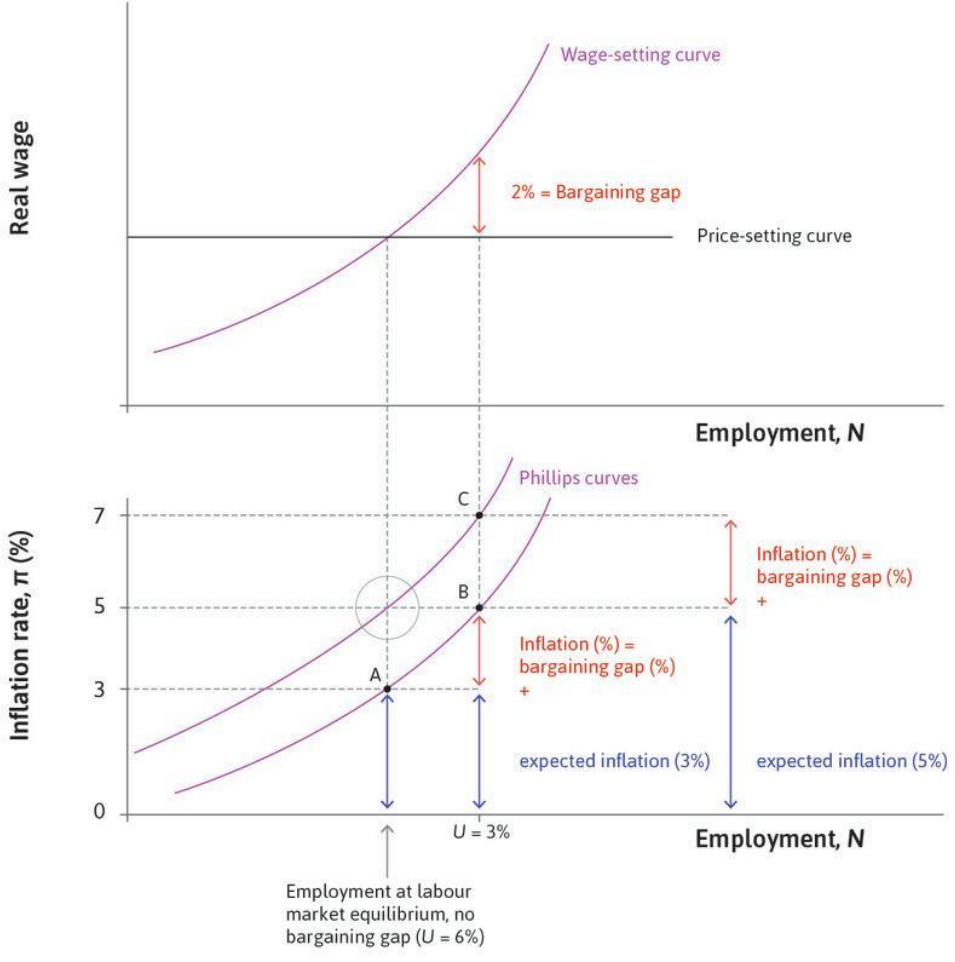


The shifting Phillips curve

A boom: Next period at C

Next period, with unemployment still low at 3%, inflation is equal to expected inflation plus the bargaining gap

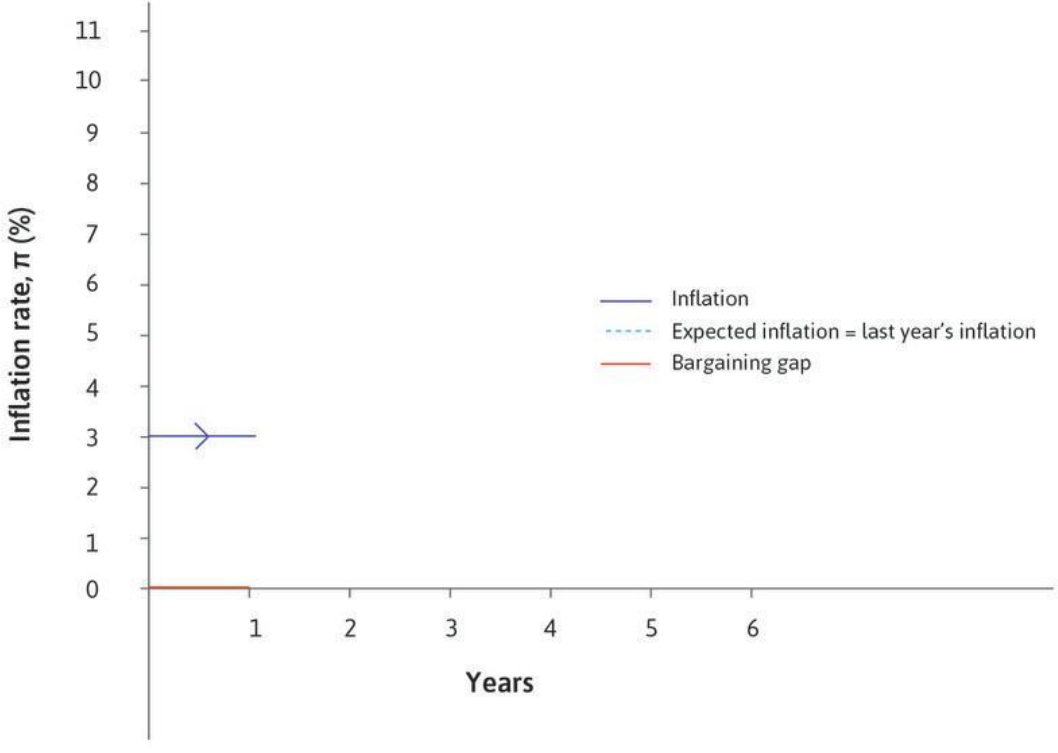
The Phillips curve has shifted up because expected inflation increased



Inflation path

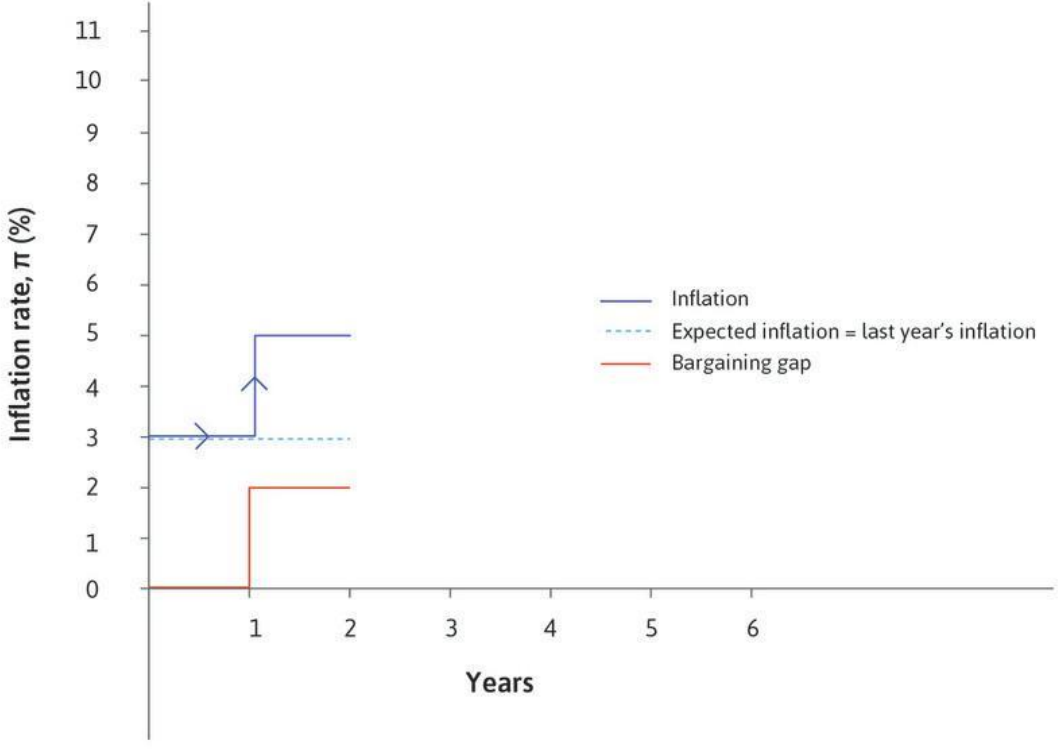
A zero bargaining gap

Inflation is as expected: 3%



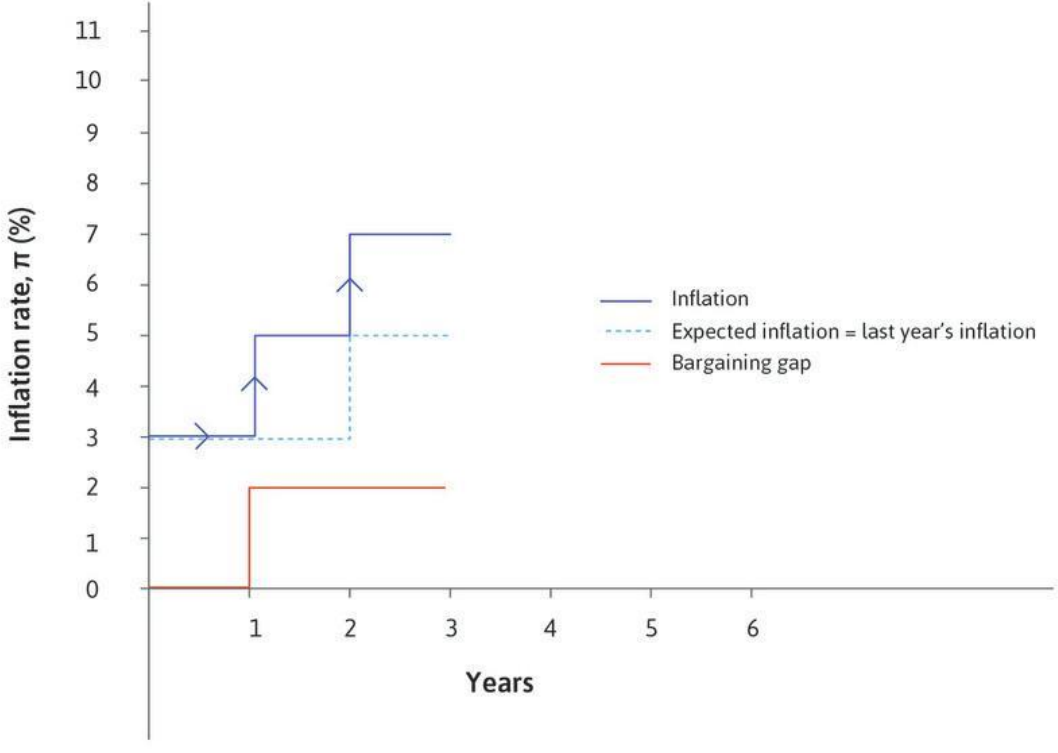
Inflation path

In year 1 following the opening up of the bargaining gap and after wages and prices have been adjusted, inflation is equal to the bargaining gap (2%) plus expected inflation (3%)



Inflation path

At the start of year 2, with no change in the bargaining gap, inflation goes up to 7%, equal to the bargaining gap plus expected inflation

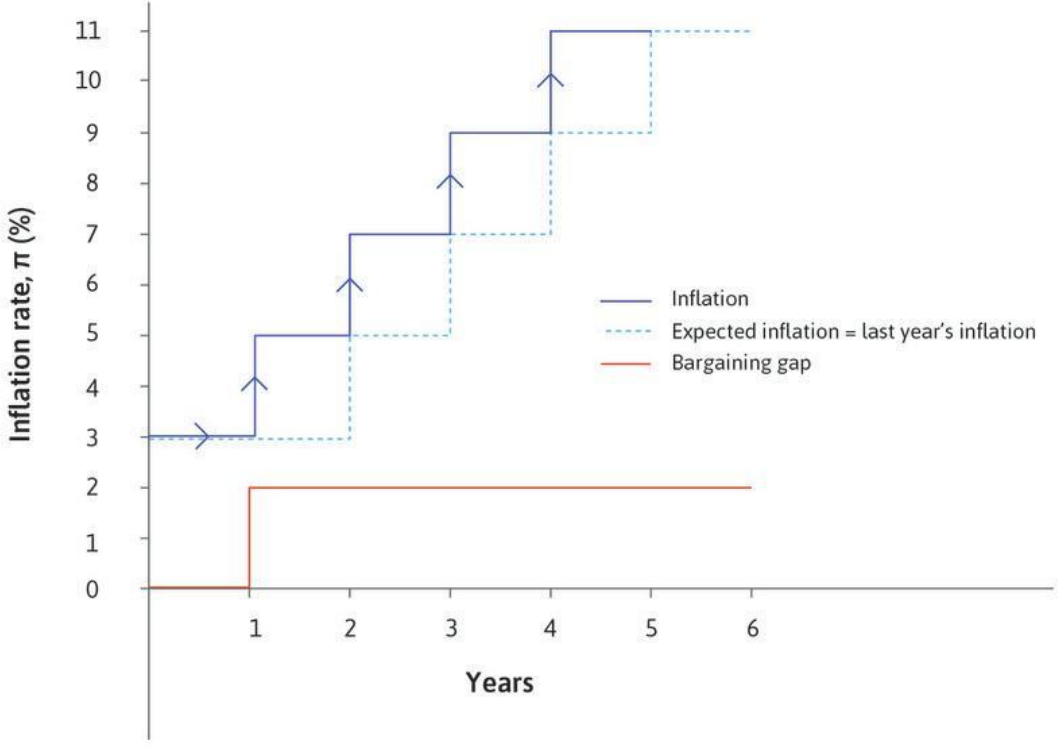


Inflation path

… and each year afterwards

As long as the bargaining gap remains unchanged, inflation rises each year

Note that the real wage does not change, but remains on the price-setting curve

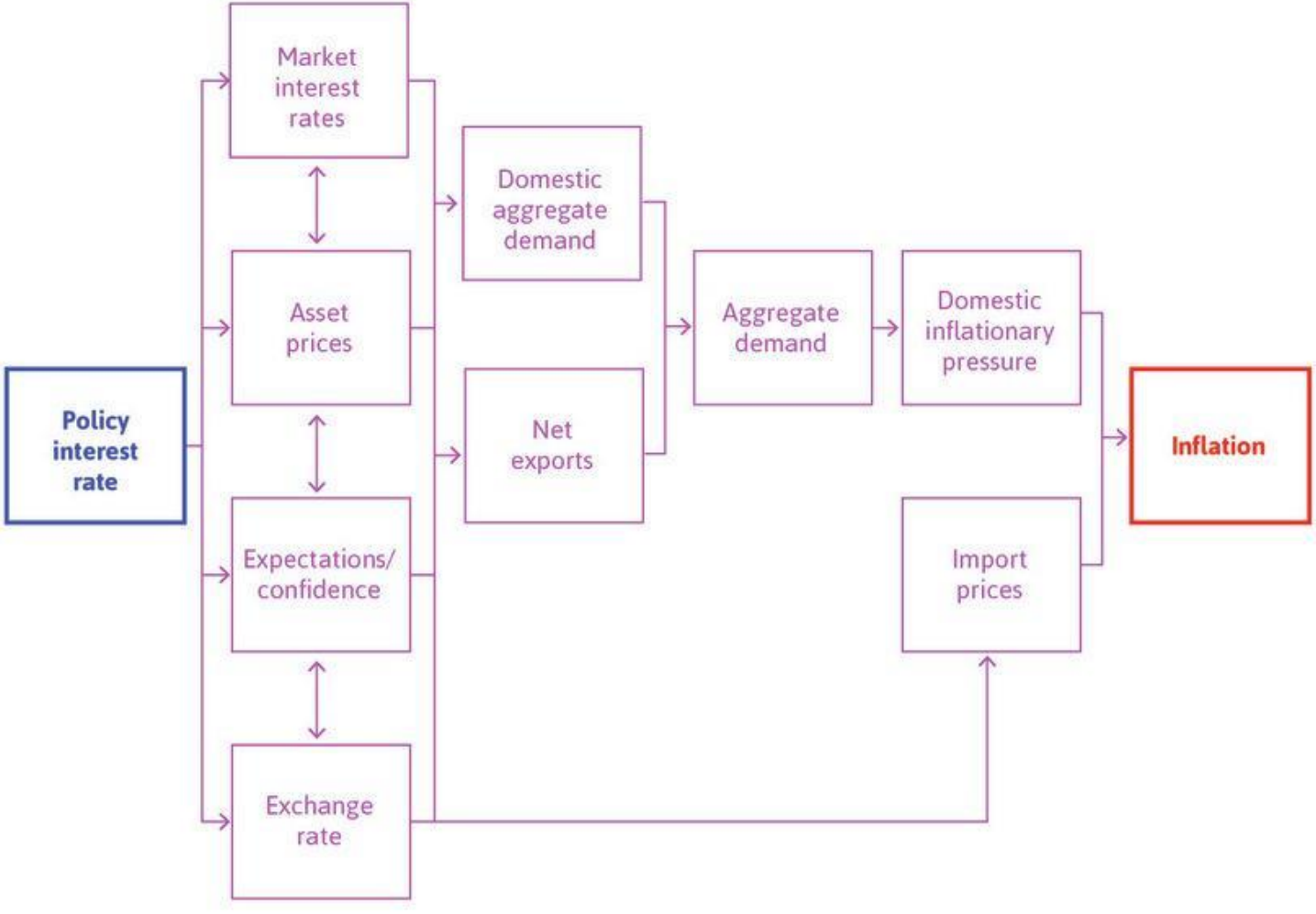


Monetary policy

Monetary policy

- **Many central banks around the world have policies to target an inflation rate of 2%**
  - They either set this objective for themselves, or the government sets the objective for them
- **When they can, central banks use changes in the policy interest rate as their monetary policy instrument to stabilize the economy**
  - Monetary policy relies on the central bank being able to control interest rates, and on changes in interest rates influencing aggregate demand
  - For example, higher (real) interest rates make it more expensive to borrow money to spend

The transmission of monetary policy



Policy interest rate

- **To set the policy rate, the central bank will work backwards:**

1. It will estimate a target for the total aggregate demand, Y, to stabilize the economy, based on the labour market equilibrium and the Phillips curve
2. It will then estimate the real interest rate, r, which will produce this level of aggregate demand, based on shifting the aggregate demand line into the desired position in the multiplier diagram
3. Finally it calculates the nominal policy rate, i, that will produce the appropriate market interest rate

Asset prices

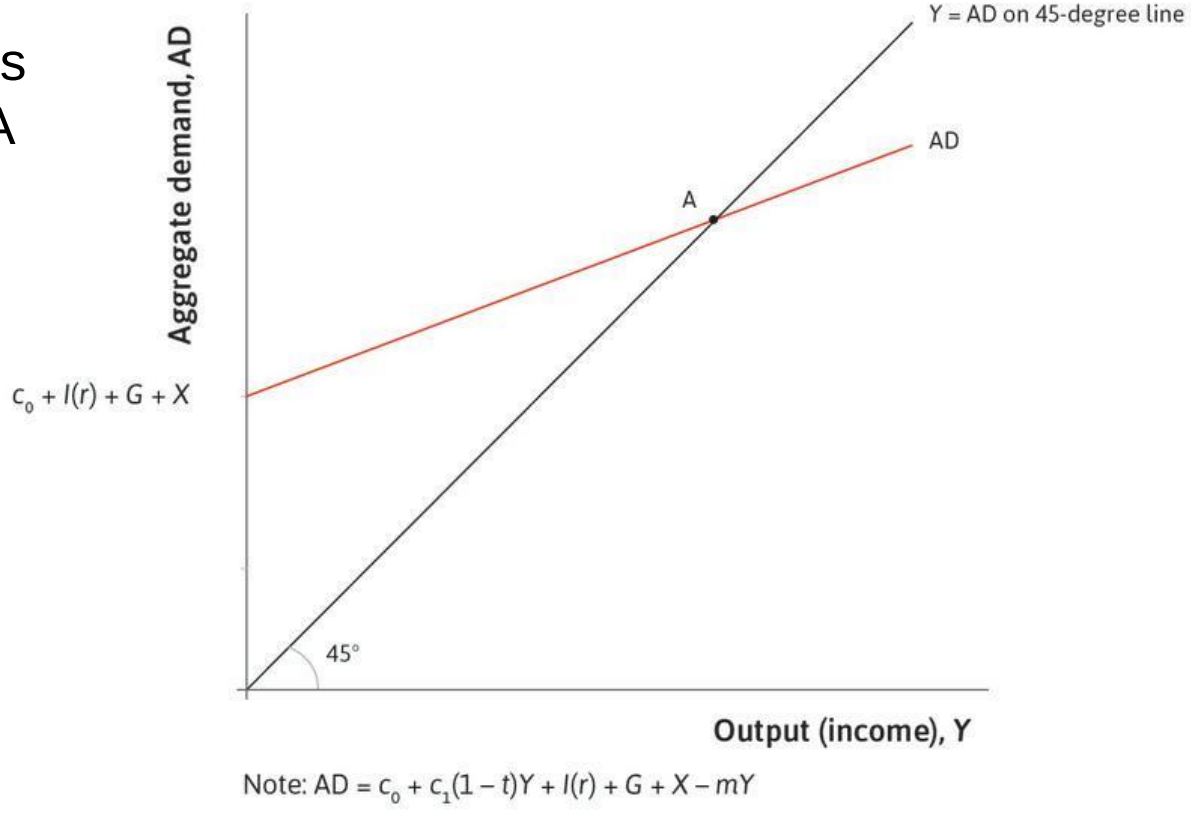
- **A change in the policy rate has a ripple effect through all the interest rates in the economy**
- **When the interest rate goes down, the price of assets goes up**
- **So a fall in interest rates will be expected to feed through to spending, because households who own the assets will feel wealthier**

Profit expectations and confidence

- **When setting the interest rate, the central bank tries to build confidence through consistent policymaking and good communication with the public**
- **If it lowers the policy rate and explains its reasoning, this can lead firms to expect higher demand, who will therefore increase investment**
- **Similarly, if it increases the confidence of households that they will not lose their jobs, then they may also increase their spending**

The use of monetary policy to stabilize the economy in a recession

The economy starts in goods market equilibrium at point A

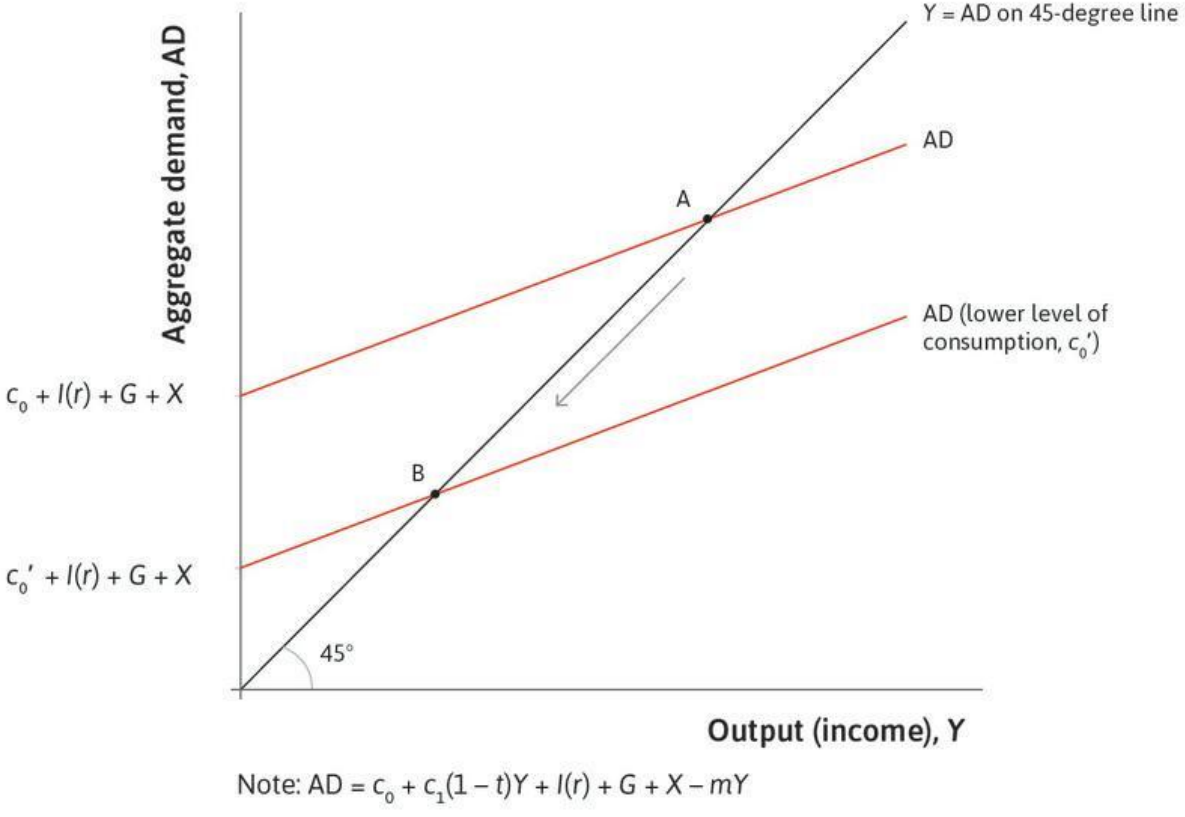


Note: AD = $c_0 + c_1(1 - t)Y + I(r) + G + X - mY$

The use of monetary policy to stabilize the economy in a recession

A recession:

Consumption then falls, which shifts the aggregate demand line down and the economy enters a recession, moving from point A to point B

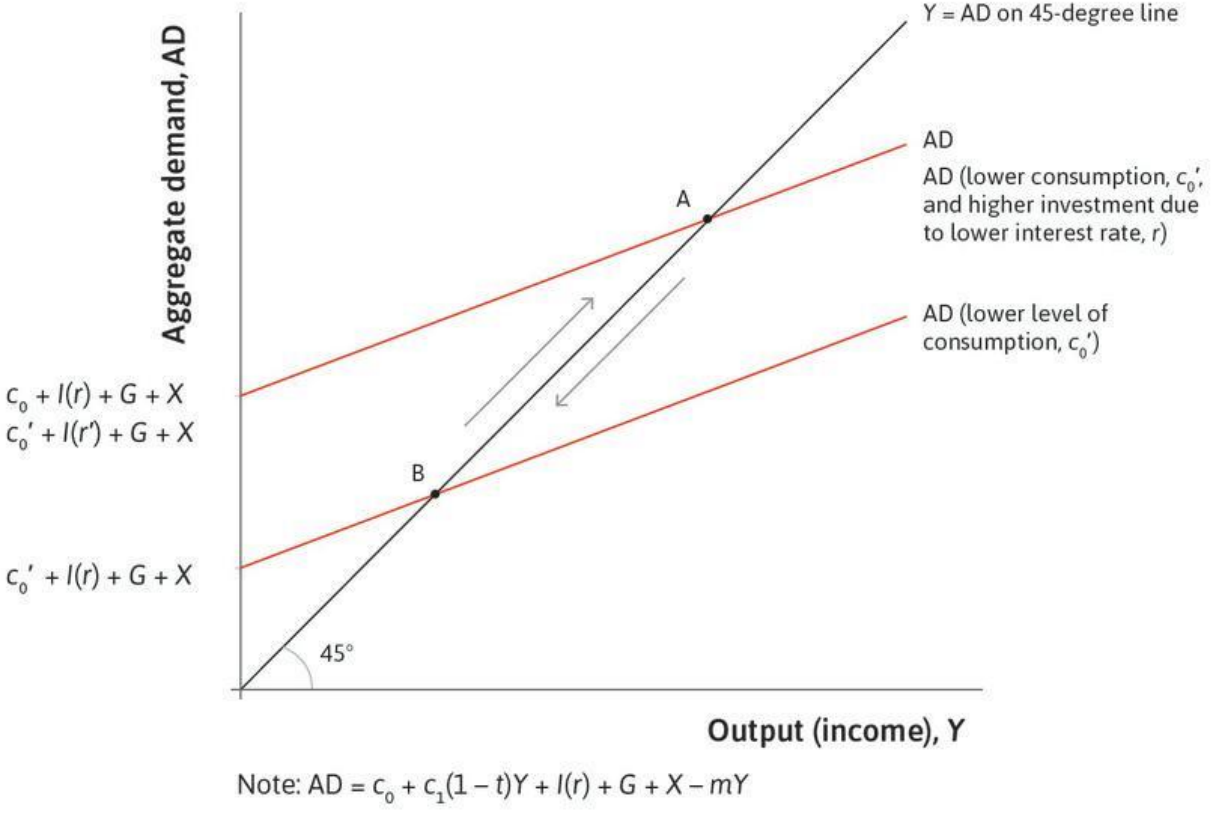


The use of monetary policy to stabilize the economy in a recession

Monetary policy:

To stabilize the economy, the central bank stimulates investment by lowering the real interest rate from *r* to *r′*

This policy shifts the aggregate demand curve up, pulling the economy out of recession and back to its starting point



A warning

- **The economy emits all kinds of noisy signals and it is difficult to decide, for example, whether a downturn is a temporary blip or signifies a long-term weakness**
- **The models we use help us to organize our thinking about the causal links in the economy and what policies might be warranted**
- **They do not give a complete recipe for effective stabilization!**

Monetary vs fiscal policy

- **Fiscal policy is complicated to adjust and inflexible**
- **Instead, to keep aggregate demand close to the level it desires, the central bank can adjust the interest rate up and down by small amounts month-by-month**
- **There are two important limitations, however, to the usefulness of monetary policy in stabilization:**
  - The short-term nominal interest rate cannot go below zero: But this is the central bank's policy instrument
  - A country without its own currency does not have its own monetary policy

The zero lower bound

- **The short-term nominal interest rate (policy rate) cannot go below zero ("zero lower bound")**
  - When the economy is in a slump, a nominal interest rate of zero may not be low enough to stabilize the economy
  - For this reason, some economists argue that countries with inflation targets of 2% should raise them to 4% in order to allow real interest rates to become more negative in a slump
- **This is also why economies that were badly hit by the global financial crisis introduced a new kind of monetary policy called quantitative easing**

Quantitative easing (QE)

- **How is QE supposed to work?**
  - The central bank buys bonds and other financial assets: It creates additional base money for this purpose
  - This raises demand for bonds and other financial assets: So the central bank shifts the demand curve for those assets to the right, which pushes up the price
  - This boosts spending: Particularly on housing and consumer durables, because both the cost of borrowing and return to holding financial assets has gone down

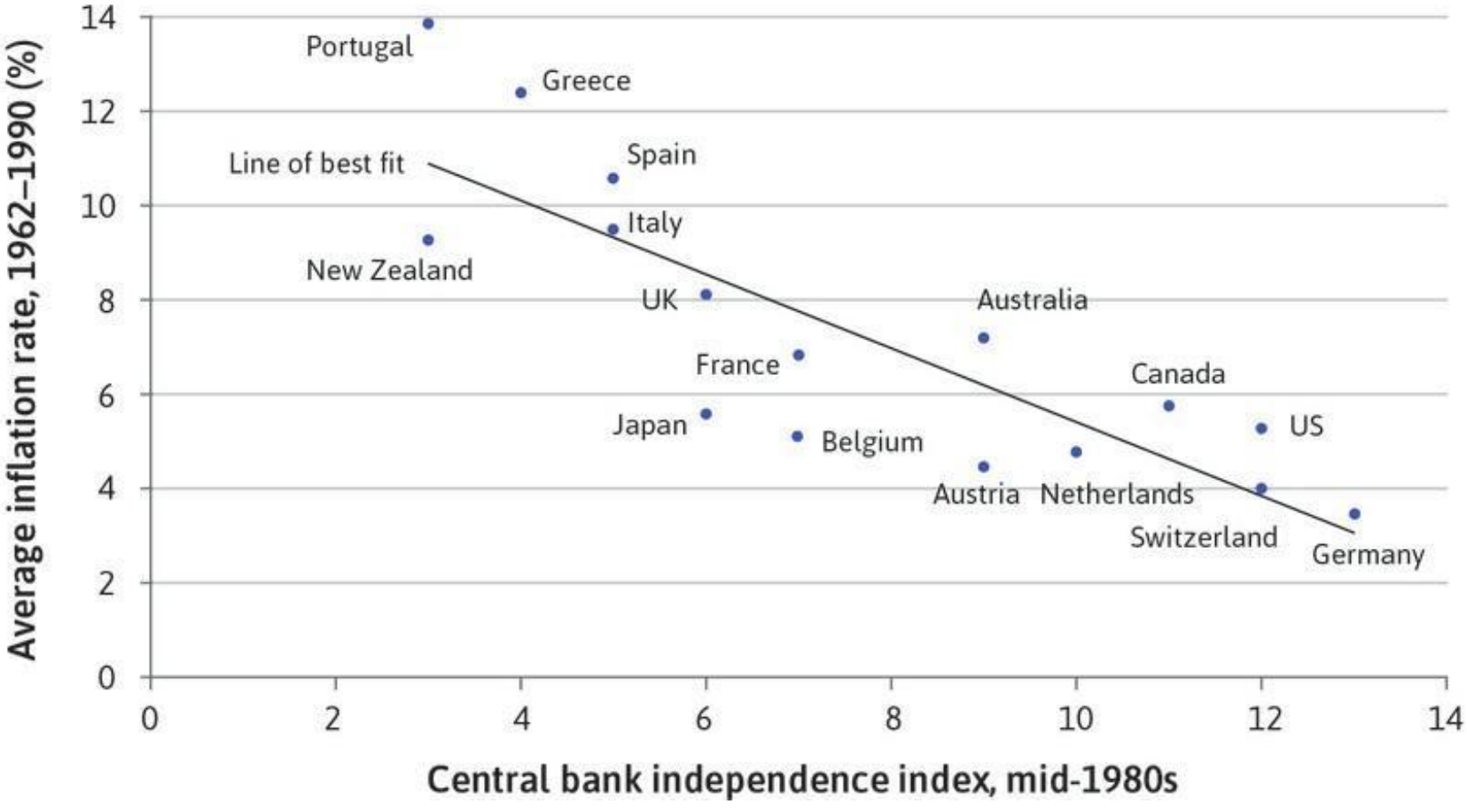
No national monetary policy

- **A country without its own currency does not have its own monetary policy (e.g. countries of the eurozone)**
- **The European Central Bank (ECB) in Frankfurt sets the policy interest rate, because it controls the base money used by all banks in the Eurozone**
  - This interest rate may be more appropriate for some members than for others
  - After the financial crisis, unemployment was low and falling in Germany but in the southern Eurozone countries such as Spain and Greece, it was high and rising fast
  - Many complaints that the ECB's monetary policy remained too restrictive for too long for the needs of the latter countries

Inflation targeting

- **There were two important features of the 1990s and 2000s prior to the crisis:**
  - Central banks were made independent of government control: Monetary policy was placed in the hands of these independent central banks in most advanced and many developing countries.
  - Inflation targeting: These banks used their policy instruments to keep the economy close to a target rate of inflation
- **Making the central bank independent from the government gives inflation targets credibility and prevents an inflation spiral by setting expectations**

Inflation targeting



Inflation targeting

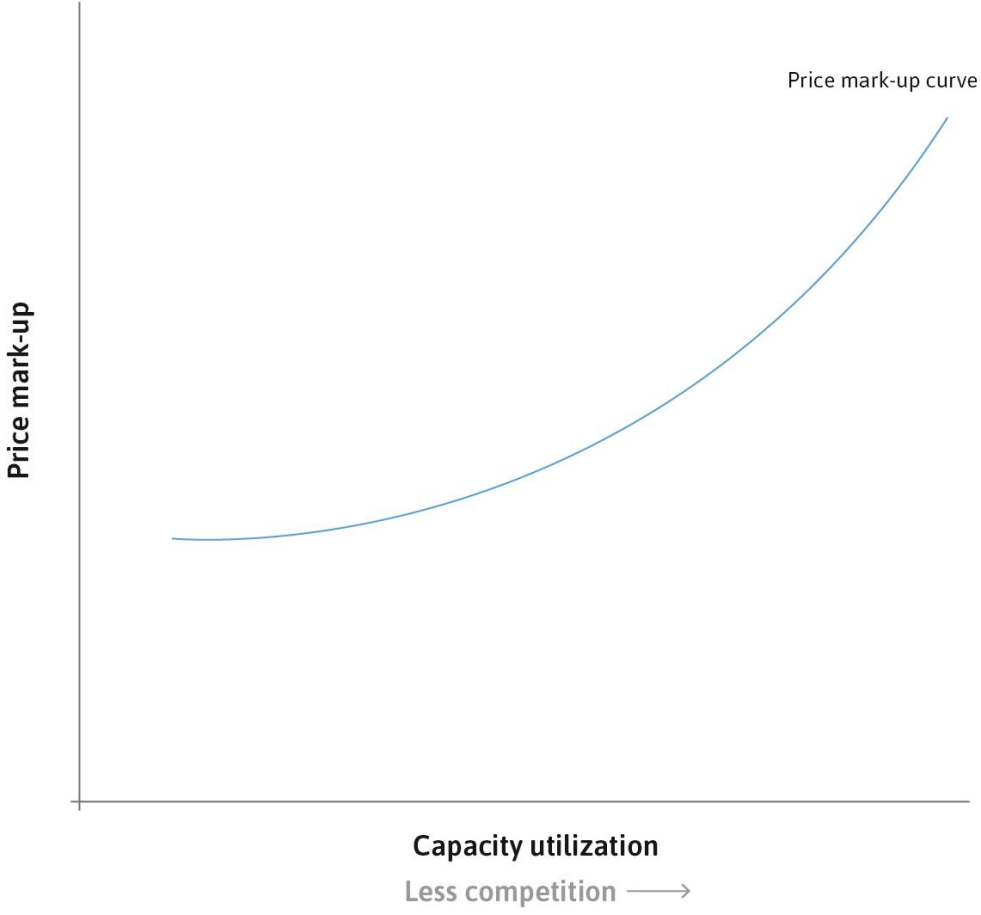
- **The hyperinflations in Venezuela or Zimbabwe were the result of printing money**
  - Zimbabwe: https://mru.org/courses/principles-economics-macroeconomics/zimbabwe-currency-inflation
  - The government was basically using the money printing press to make purchases instead of using taxes
- **These central banks are very different than the inflation targeting central banks that we are analysing**

Capacity constraints

Another reason for the inflation-unemployment trade-off are capacity constraints

Firms respond to rising capacity utilization by increasing investment. In the short run, firms are capacity constrained (unable to meet excess demand for output) so raise prices.

Wage-price spiral when other firms respond in the same way



Example: recession and policy response

Fiscal and monetary policy in the US following the collapse of the tech bubble

		2000	2001	2002	2003
Real gross gomestic product (annual % change)		4.1	0.9	1.8	2.8
Contribution to % change in GDP	Change in non-residential investment	1.15	−1.2	−0.66	0.69
	Change in residential investment	−0.07	0.09	0.39	0.66
	Change in government expenditure	0.10	0.88	0.74	0.36
	Change in other contributions	2.92	1.13	1.33	1.09
Federal Reserve nominal interest rate (annual average, %)		6.24	3.89	1.67	1.13
Unemployment rate (%)		4	4.47	5.8	6
Inflation rate (%)		3.4	2.8	1.6	2.3

Monetary policy

- **In 2001, the Federal Reserve started rapidly decreasing the nominal interest rate, from a high of 6.2% on average in 2000, to 3.9% in 2001, and a low of 1.1% in 2003**
  - This large drop in nominal interest rates helped boost residential investment in 2001 and 2002.
  - Its contribution to growth became much larger than before.
  - It also helped non-residential investment to recover, but the adjustment was slower: the contribution of non-residential investment to growth became positive only in 2003

Fiscal policy

- **To compensate for the stagnation in firms' private investment, the government used expansionary fiscal policy**
  - It introduced large tax cuts and increased spending in 2001 and 2002
  - The multiplier model helps explain the logic of the government's policy, and the large increase in the contribution of public expenditure to growth in 2001 and 2002

Summary

Summary

- **Inflation is caused by bargaining gaps and capacity constraints**
  - Phillips Curve: tradeoff between inflation and unemployment
  - Positive bargaining gap leads to persistently high inflation
  - The trade-off isn't stable: expectations matter
- **Central banks can stabilize the economy by changing the policy rate**
  - Four channels of monetary transmission mechanism: interest rate, asset prices, profit expectations, exchange rates
  - Zero lower bound puts a limitation on monetary policy

Additional reading (not to the exam!)

- **Eurozone crises:**
  - https://voxeu.org/sites/default/files/file/reboot_upload_0.pdf
  - http://personal.lse.ac.uk/reisr/papers/99-crashcourse.pdf
  - https://mru.org/eurozone-crisis
- **Journal of Economic Perspectives has a number "symposiums" on the financial crisis, fiscal policy, debt etc.**
  - https://www.aeaweb.org/journals/jep/issues?v=9