

# Inflation, unemployment, and monetary policy

## ECONOMICS

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UCL

Lecture 15

# CONTEXT

Wage-setting curve (Unit 9)

Price setting curve (Unit 9)

Governments can use fiscal policy to stabilise the economy during recessions. (Unit 14)

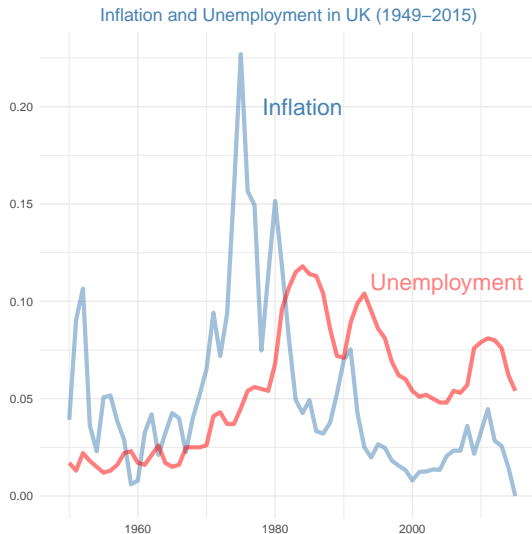
What factors affect the price level in an economy (Unit 14)

# 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

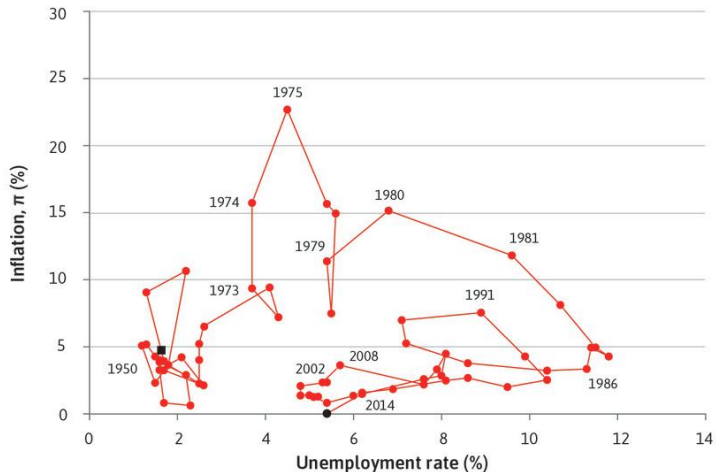
# INFLATION & UNEMPLOYMENT RATE



Just looking at this graph should give you a sense of the relationship between inflation and unemployment. Think about how persistent changes in inflation and unemployment are. Try also to think about whether you see a pattern. Recall that UK along with the rest of the world experienced a series of oil price shocks in the 1970s.

# INFLATION & UNEMPLOYMENT RATE

## UK's Inflation and unemployment rate (1950–2015)



Discernible patterns from the graphs in the previous slides:

- Inflation increased significantly in the 1970s.
- Unemployment increased significantly in the 1980s.
- Unemployment decrease over the 1990s and is not back to the level of the late 1970s.
- While both unemployment and inflation has decreased significantly in the last decade, the unemployment levels is much higher than they were in the 1950s and 1960s.)

- What we don't know is exactly what has led to this change. It could either be a something to do with the structural institutions of the economy or it could simply be the work-leisure choice of a generation that is on the average much richer than the generation in the 1950s and 1960s.
- Try to connect this back to the lecture we did on work-leisure choice and the income and substitution effects of higher wages.

# KEY CONCEPTS

*Inflation*    rate at which price increases

...    *role of expectations* in how we respond to price changes

*Zero inflation*    Constant price level year to year

*Deflation*    rate at which price decreases



# KEY CONCEPTS

*Nominal value*      pecuniary value

*Real value*      value in terms of real goods

*Real interest rate*      *Nominal interest rate – Inflation rate*

*The Fisher equation*

*Real wage*      Nominal wage divided by price level, i.e.,  $\frac{W}{P}$

represents the wage in terms of what a worker can buy with it

workers care about the *real wage* and not about the nominal wage they receive

# WHAT'S WRONG WITH INFLATION?

For people on *fixed nominal income* (e.g. pensioners) higher inflation means lower real value of income

Inflation *reduces the real value of debt*  
good for borrowers, bad for creditors

*High rate of inflation* makes the economy work less well:

- *menu costs* are the fixed cost of firms updating their prices, hence firms update infrequently, leading to uncertainty
- harder for producers to distinguish between changes in *relative prices* and *inflation*
- high inflation can be volatile *giving rise to* further *uncertainty*

# WHAT'S WRONG WITH DEFLATION?

Deflation could be worse 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.

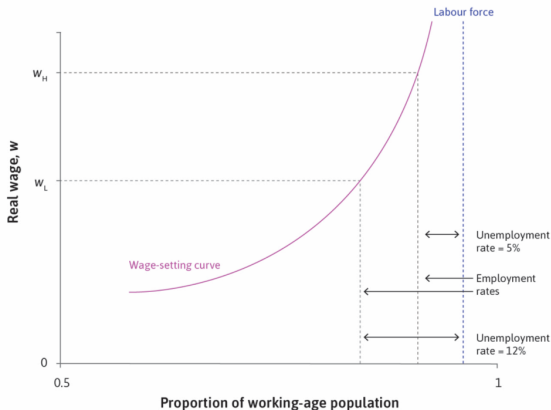
Deflation *increases* the *real debt burden*,

repay bank more in real terms

may lead households to cut consumption to return to their target wealth.

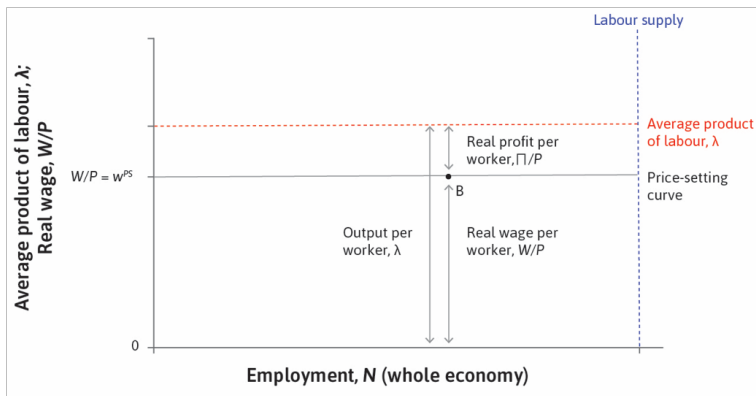
# WAGE-SETTING CURVE

*Wage-setting curve: incentive compatible wage* (for ensuring workers exert effort) for each level of *employment*



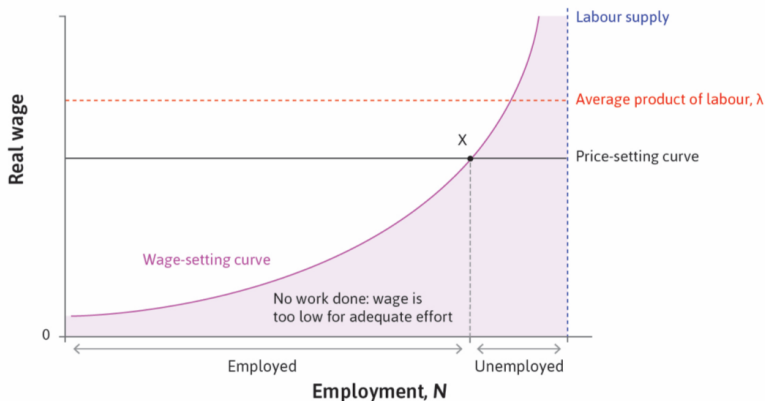
# PRICE-SETTING CURVE

*Price-setting curve: real wages* profit-maximising firms can *afford* for each level of *employment*



# LABOUR MARKET EQUILIBRIUM

The *labour market equilibrium* occurs where the *wage-setting* and *price setting curves* intersect. Why is there some unemployment in equilibrium?



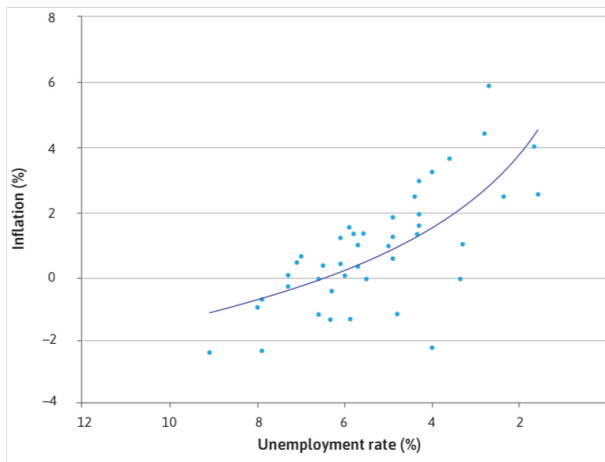
*Why is there some unemployment in equilibrium?*

Unemployment is a penalty for a worker if they lose their job. If there was no unemployment, the wages required to give workers' an incentive to exert effort would be very high and beyond the wages the firms can afford. Hence, it would not be a labour market equilibrium. In a labour market equilibrium, the wages required to incentivise workers would be equal the wages the firms can afford. Without some unemployment, the labour market would never be in equilibrium.

The key concepts to understand labour market equilibrium are what constitutes the wage-setting and price setting curves. The *wage-setting* curve gives the *incentive compatibility wage* for each level of employment (unemployment). Firms *affordability* is reflected in the *price-setting* curve.

# PHILLIPS'S CURVE

Original *Phillips's curve*: an empirical relationship between *inflation* & *unemployment* (1861–1913)





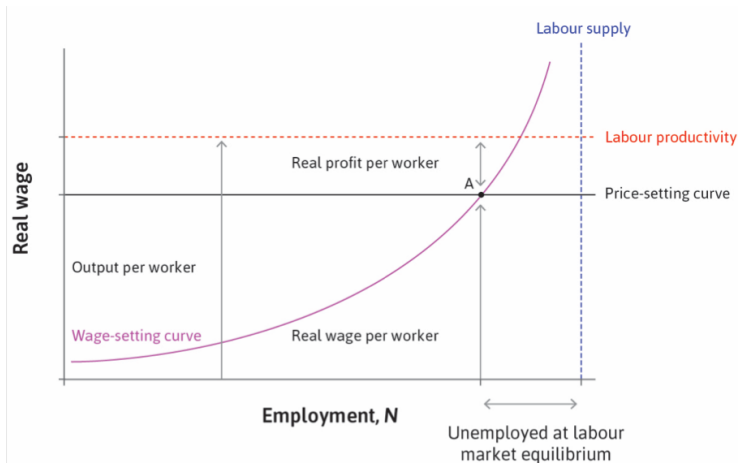
The original Phillips curve suggested that higher inflation occurred when there was high unemployment in the economy. This was based on historical economic data in Britain from 1861 to 1913.

The *conjecture* was that during a boom period firms need to expand their output. They do so by hiring more workers and paying them higher wages. Higher wages lead to higher cost of production, which needs to be recouped by firms by increasing the prices of the goods and services they produce. As we see below, the process does not end here.

The first round of changes create a new problem. The new problem is that when firms raise the prices, workers find their real wage has gone down. This is because if  $P \uparrow$  and  $W$  remains unchanged, it implies that  $\left(\frac{W}{P}\right) \downarrow$ , i.e., that is real wage has gone down. Hence, the workers do not have incentive to work hard and the process of renegotiating the wage between the workers and the firms starts again.

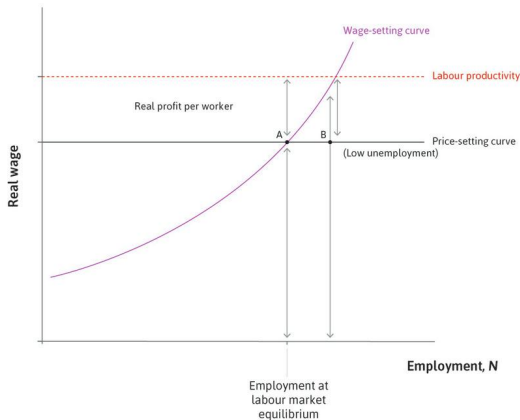
# STABLE PRICE LEVEL

*Labour market equilibrium at A* prices are stable, inflation is 0



# BOOM

*Boom:* employment is high (B) → upward pressure on *wages*  
 → upward pressure on *prices*

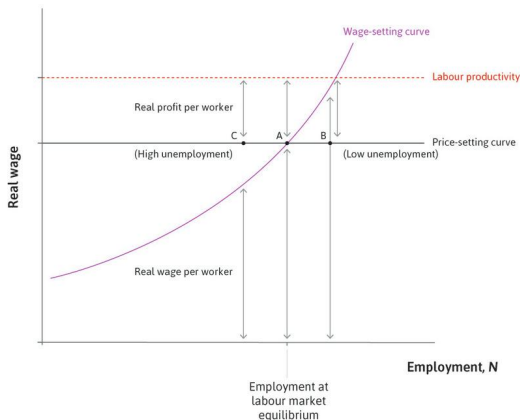


Aggregate demand is high during the boom. Firms try to produce more by hiring more workers. Hence, the labour employment level is above the labour market equilibrium. With high employment, workers don't fear losing their jobs. Hence the firms have to pay them more to incentivise them to work hard.

The key to understanding this process is realising that firms cannot increase the wages and keep the prices of their output constant. To pay the workers a higher wage, they have to raise their prices too. Upward pressure on wages during a boom also means upward pressure on prices.

# RECESSION

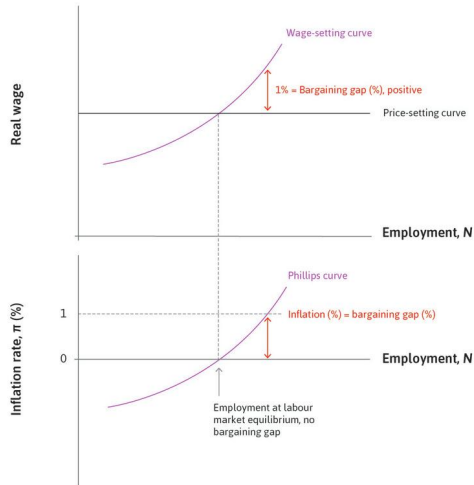
*Recession:* employment is low (C) → downward pressure on *wages*  
 → downward pressure on *prices*



In recession, the employment level is lower at C than it when the labour market is in equilibrium (A). There is not enough demand and firms hire less workers. With low employment (high unemployment), workers fear losing their jobs. Workers thus require less compensation to exert effort. Hence, firms pay workers less. With lower wages, firms make higher profits. Competition ensures that all firms reduce their prices so no firm's is making a profit higher than the markup. Downward pressure on wages during the recession also means downward pressure on prices.

## Bargaining gap

Difference between *incentive compatible real wage* (wage-setting curve) and *real wage that firms can afford* (price-setting curve)



# WAGE-PRICE SPIRAL

*Boom*    ↑ Aggregate demand → low unemployment

*wage-inflation*    ↑  $\frac{W}{P}$  required to *incentivise workers* to exert effort because of low unemployment

↑  $W$  increases cost of production

*price-inflation*    Firms ↑  $P$  to cover the cost of ↑  $W$

Once all firms in the economy have ↑  $P$ , the economy experiences *wage-inflation* and *price-inflation*

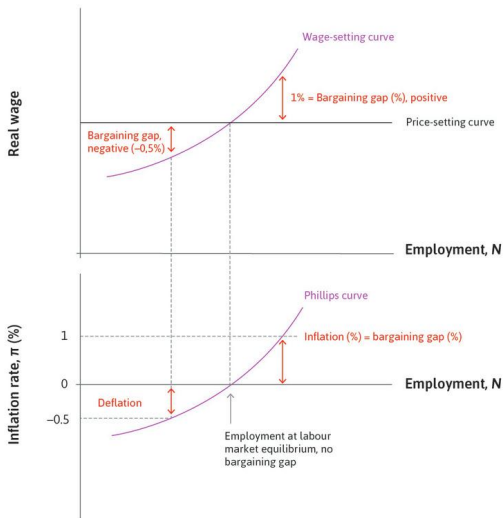
Real wage remains unchanged because  $\frac{\uparrow W}{\uparrow P}$  and remains too low to incentivise workers given the low unemployment

*Wage-price spiral*    Next round of wage and price changes start leading to a *perpetual wage-price inflation*

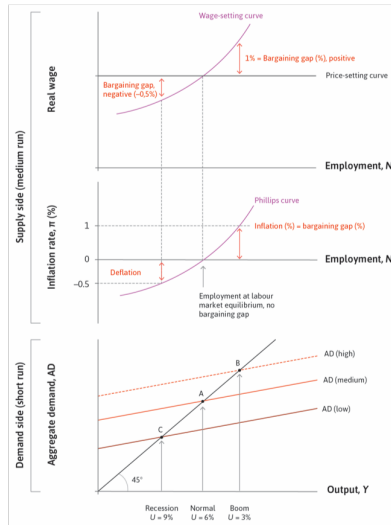


A *positive bargaining gap* during boom leads to inflation

A *negative bargaining gap* during recession leads to deflation



# THE PHILLIPS CURVE AND THE BUSINESS CYCLE



# THE BARGAINING GAP

**Bargaining gap** Difference between *incentive compatible real wage* (wage-setting curve) and *real wage that firms can afford* (price-setting curve)

	Employment	Bargaining gap	inflation
<i>Boom</i>	<i>above equilibrium</i>	a positive	<i>inflation</i>
<i>Recession</i>	<i>below equilibrium</i>	a negative	<i>deflation</i>
	<i>at labour market equilibrium</i>	zero	<i>inflation 0</i>

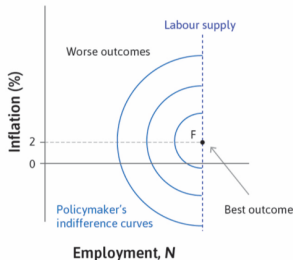
# CHOOSING INFLATION RATES

*Phillips Curve* feasible trade-offs between inflation and unemployment. (red)

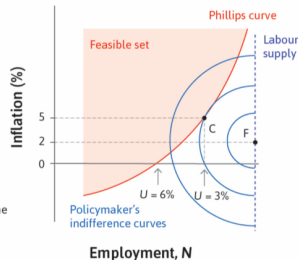
*indifference curves* policymaker's preferred tradeoffs between inflation and unemployment (blue)

*Optimal inflation rate* where the two are tangent

The policymakers' preferences

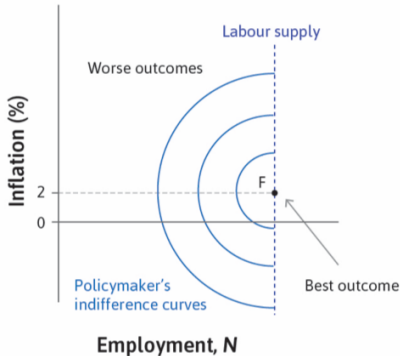


The policymakers' preferences and the Phillips curve trade-off

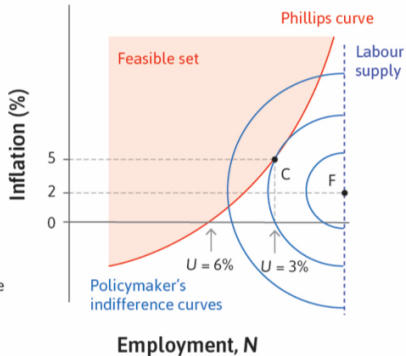


# CHOOSING INFLATION RATES

The policymakers' preferences

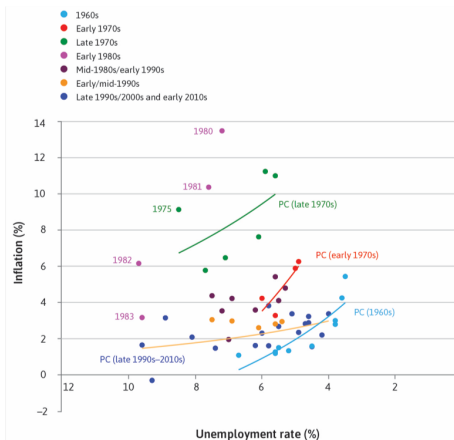


The policymakers' preferences and the Phillips curve trade-off



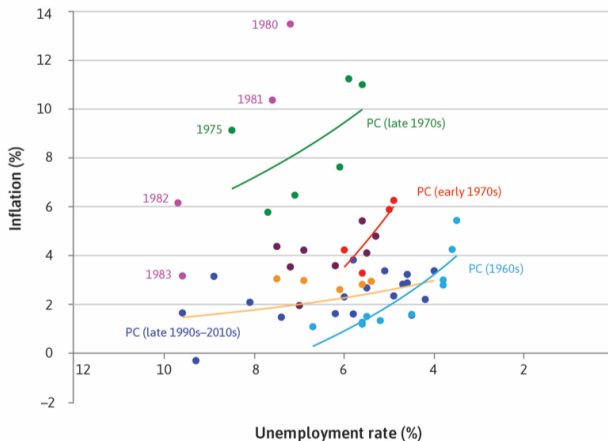
# UNITED STATES PHILLIPS CURVE

*Phillips Curve shifts over time*      trade-off between inflation and unemployment is not stable



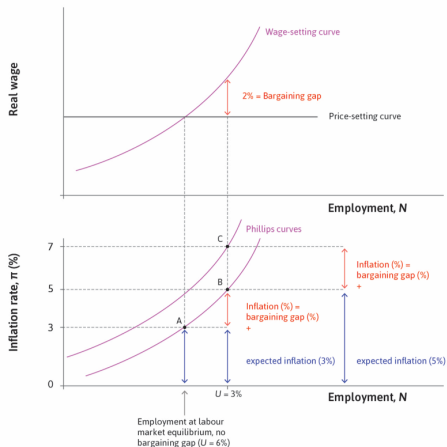
Keeping unemployment “too low” *leads to* higher prices and rising inflation

*Inflation is stable* at only one unemployment rate



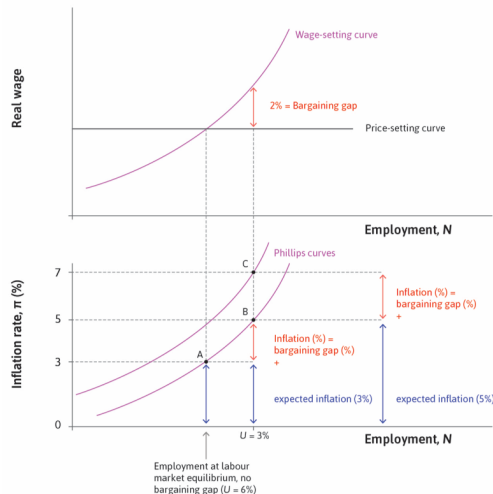
# THE ROLE OF EXPECTATIONS

*Inflation*    expected inflation + bargaining gap





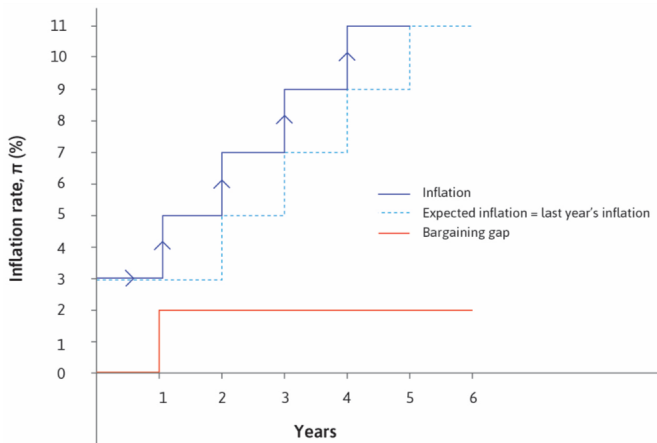
Expectations of future prices can cause the *Phillips curve* to shift up  
 Unemployment rate which keeps inflation constant is called the  
*inflation-stabilising unemployment rate*



Recall the earlier discussion of why there is always some unemployment associated with the labour market equilibrium. This is an analogous argument. Every economy has an unemployment level that keeps the inflation stable. This is the unemployment level where the labour market is in equilibrium and there is no bargaining gap. That is the incentive compatible real wage that ensure that the workers exert effort *equals* the real wage the firms can afford.

# WAGE PRICE SPIRAL

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



# MONETARY POLICY

*Interest rates*    market interest rates are set by Central Banks

*Monetary Policy*    Central Bank's use of interest rates to increase or decrease aggregate demand

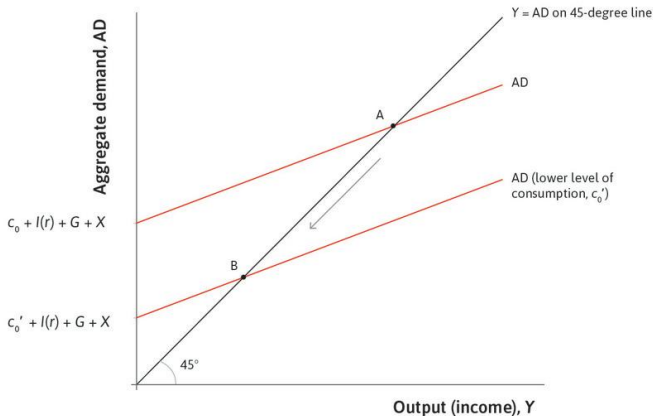
potentially works by influencing the investment and consumption (through debt)

$$Y \equiv C(r) + I(r) + G + (X - M)$$

*Stabilisation policy*    Monetary policy can be used to counteract shocks to the aggregate demand

# MONETARY POLICY IN THE MULTIPLIER MODEL

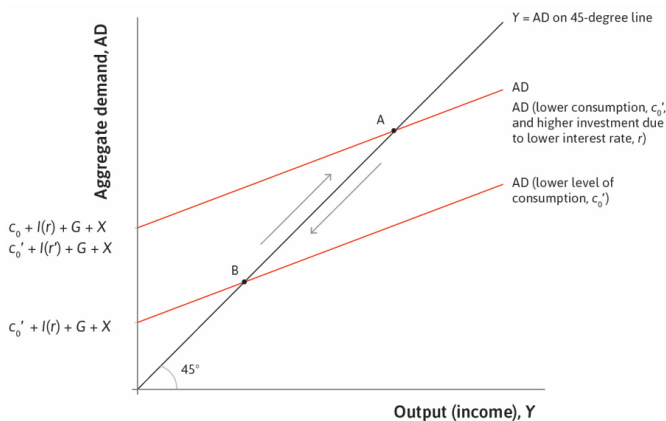
*Shock:* Consumption falls, which shifts the aggregate demand line down and the economy enters a recession ( $A \rightarrow B$ )



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

# MONETARY POLICY IN THE MULTIPLIER MODEL

To stabilise economy *Central bank* stimulates investment by *lowering real interest rate*, which shifts aggregate demand curve upward



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

$A \longrightarrow B$ : negative demand shock. Leads to decreasing aggregate demand.

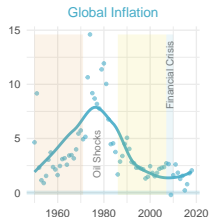
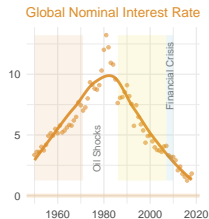
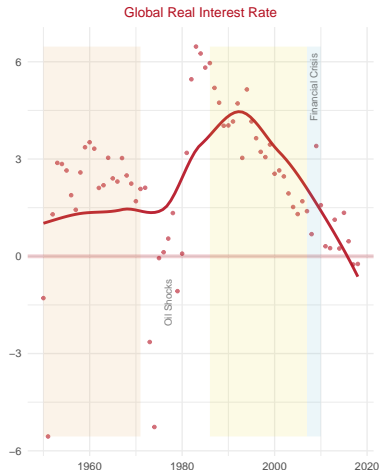
$B \longrightarrow A$ : Monetary policy in form of  $\downarrow r$  can counter-act the negative demand shock.  $\downarrow r$  leads to increase in investment and consumption that leads to increase in aggregate demand through the multiplier process.

# MONETARY POLICY: LIMITATIONS

- *Zero lower bound* The short-term nominal interest rate cannot go below zero
  - *a very large negative shock* i.e., global financial crisis or the Covid-19 pandemic
  - a nominal interest rate of zero may not be low enough to counteract the shock



There was significant decline in nominal and real interest rate during the *Great Moderation* (mid 1980s to 2007) leading to monetary policy hitting the zero lower bound.



After the inflationary period of 1970s, the consensus had emerged that monetary policy alone can be used to counter-act any demand shock and stabilise the economy. We see a significant decline in interest rate after the upheaval of the oil shocks and during the phase that has been named the *Great Moderation*. During the *Great Moderation*, there was an almost 30 year period where the global economy did not experience a significantly large negative shock. The consensus during this period was that monetary policy alone can counter-act the negative demand shocks. Looking back, we now know that the lack of shocks during this period was an exception, not the rule. By the end of the *Great Moderation*, the interest rates were low and quite close to zero.

When the *Global Financial Crisis* hit, the Central Banks did not have much room for manoeuvre. To counter-act a large shock like the *Global Financial Crisis*, the Central Banks needed to cut the interest rates significantly. The Central Banks reduced the interest rate, but given how close the nominal interest rates were to zero, the drop in the interest rates was not significant. The impotence of monetary policy in counter-acting the *Global Financial Crisis* has led to renewed interest in fiscal policy since the crisis. The new consensus emerging is that a combination of monetary and fiscal policy should lead counter-act the shock and stabilize.

# SHOCKS & STABILISATION

*Demand shock* an unexpected negative shock

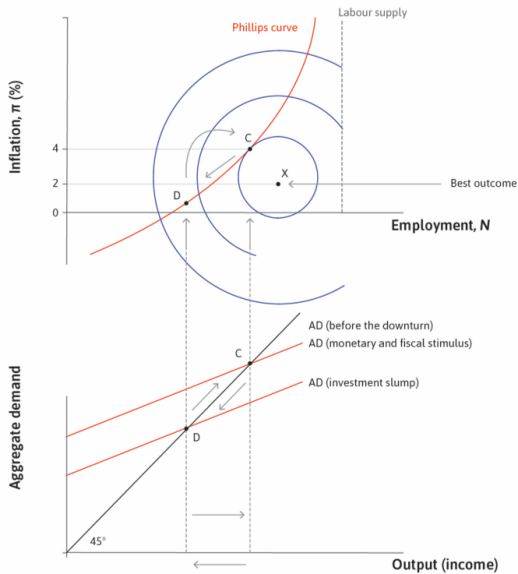
↓ aggregate demand

*Stabilise economy* Governments can use *fiscal* & *monetary policy* to counter-act the shock

*Monetary policy* ↓  $r$  to stimulate investment and consumption, which in turn

*Fiscal policy* ↑  $G$  and/or ↓  $T$

Analogously, after an unexpected positive shock leading to ↑ aggregate demand, the economy can be stabilised by using appropriate *monetary policy*, i.e., ↑  $r$  and appropriate *fiscal policy*, i.e., ↓  $G$  and/or ↑  $T$ .



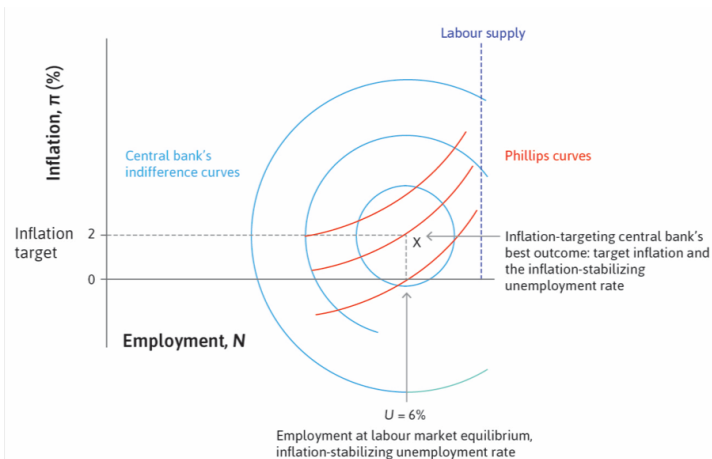
Top panel in the graph shows you what happens on the Phillips curve when the economy is hit by a negative demand shock.

$C \rightarrow D$ : the aggregate demand curve shifts down as the economy moves from  $C$  to  $D$ .

$D \rightarrow C$ : Monetary policy ( $\downarrow r$ ) and fiscal policy  $\uparrow G$  and/or  $\downarrow T$  can counter-act the demand shock and stabilise the economy. This would move the economy back to the place it was at before the negative shock.

# INFLATION TARGETING

*Independent Central Bank's* indifference curve allows it to effectively target inflation



Notice the difference between the indifference curves of the policymakers/politicians who want to win elections and the indifference curve of the Independent Central Banker who has been given a clear incentive to hit the inflation target. The Central Banker knows that the best way to hit the target is to keep the unemployment rate at the *inflation-stablising unemployment rate*. This is the rate where the labour market is in equilibrium and there is not bargaining gap.

Since there is not bargaining gap, it would not leave to any wage-price spiral and the inflation can be stabilised at the target level. The target level in the graph above is 2%. 2% is usually the inflation target given to most Central Banks in the developed countries. The Central bank this aims for its bliss point (the point where maximum utility can be attained) at X and achieves it.

It is useful to contrast this with the indifference curves of the policymaker. The policymakers bliss point was to the right of the independent Central Banker's bliss point. The policymaker's bliss point was a 2% inflation rate and zero unemployment. This gave the policymaker the incentive to exploit the trade-off between inflation and unemployment.

The policymaker was thus ready to tolerate a higher inflation rate in order to reduce the unemployment rate to zero. This meant that the unemployment rate was always lower than the inflation stabilising inflation rate. This means if the policymaker calls the shot, there was always a positive bargaining gap, leading to wage-price spiral and an accelerating inflation rate. Please make sure you understand the role expectations plays in accelerating the inflation rate when unemployment is below the inflation stabilising unemployment rate.



# INFLATION TARGETING

*Inflation targeting* Central Bank tries its best to keep the inflation near its target

*Central Bank independence* there is no inflation-unemployment trade-off for an independent *Central Bank*

*Central Bank's* has more credibility, i.e., people believe that it wants to target inflation

*Central Bank* is able to *prevents inflation spiral* using its credibility to settle expectations

*Central Bank* more effective at *inflation targeting*

# SUMMARY

1. 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

2. Economic can be stabilised by can stabilise the economy by changing the interest rate

*Monetary policy*: changing the interest rate to stimulate the investment

*Fiscal policy*: increasing government expenditure or cutting tax to affect the aggregate demand