Monetary policy

What is monetary policy?

The term *monetary policy* has roots in the word *money*, and refers to the way that the central bank actively manages money in the economy. Monetary policy refers to the central bank using the money supply and interest rates to manage the economy.

What is the role of the central bank?

The central bank is an independent authority which is responsible for the monetary system in a nation (such as the US) or a region (such as the Eurozone). The central bank determines monetary policy by controlling the money supply and setting the interest rate. The interest rate refers to the cost of borrowing money.

Source: " People's Bank of China Headquarter, Beijing (https://en.wikipedia.org/wiki/File:People%27s_Bank_of_China_Headquarter,_Beijing.jpg) " by Max12Max is licensed under CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0/deed.en)

Credit: Getty Images Georg Stelzner

Source: " Marriner S. Eccles Federal Reserve Board Building (https://commons.wikimedia.org/wiki/File:Marriner_S._Eccles_Federal_Reserve_Board_Building.jpg) " by AgnosticPreachersKid is

Figure 1. Central banks from around the world: the People's Bank of China, the European Central Bank and the Federal Reserve.

What is the money supply?

The money supply refers to the total amount of money in circulation; it consists of all of the coins, notes and bank balances.

Figure 2. The money supply refers to the stock of money available in an economy at a particular point in time.

Credit: Getty Images Plan Shoot / Multi-bits

The functions of a central bank

- Determines the money supply and interest rate
- Prints physical money and mints coins
- Lender of 'last resort'
- Issues bonds and other financial instruments
- Regulates the banking system

Read more about each function below:

a. Determines the money supply and interest rate

The central bank has a range of tools to adjust the money supply and determine the interest rate.

At any particular point in time, the supply of money is **fixed**; we have a defined amount of money in our pockets and our bank balances. Hence, the supply of money is considered to be perfectly inelastic. This point in time is illustrated in **Figure 3** at S_{m1}. Suppose that the central bank now chooses to intervene in the market to increase the money supply from S_{m1} to S_{m2}. This will result in an increase in the quantity of money circulating throughout the economy from Q_1 to Q_2. All else being equal, this will drive down the interest rate from $i_1$to i_2.

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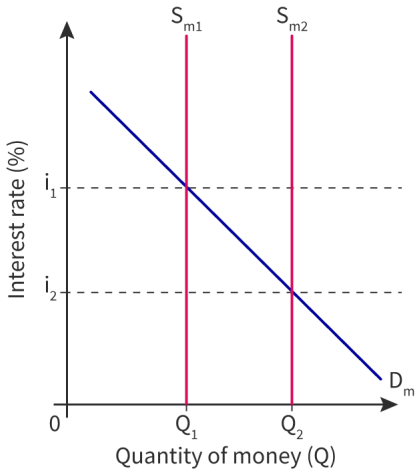

Figure 3. The demand and supply for money. Note that the money supply is fixed.

More information for figure 3

The graph illustrates the demand and supply for money. The X-axis represents the quantity of money (Q) and the Y-axis represents the interest rate (%). There are two vertical lines labeled S_m1 and S_m2, indicating fixed points of money supply. The line S_m1 indicates the original supply, while S_m2 represents an increased supply due to central bank intervention. These lines show the supply's inelasticity.

A downward sloping line labeled D_m represents the money demand curve. At the original supply level S_m1, the intersection with the demand curve is at Q1, the original quantity of money, and i1, the initial interest rate. When the supply shifts to S_m2, the intersection moves to Q2, a higher quantity of money, lowering the interest rate to i2. The graph visually represents how increasing the money supply lowers interest rates, aligning with economic principles.

[Generated by AI]

Student view

If the economy functions at a level lower than the full employment level the economy experiences a recessionary gap. In **Figure 4,** Y_1 is lower than the full employment level, which is illustrated at point Y_{fe}. In such a situation central banks may choose to lower interest rates. Lower interest rates will induce firms to borrow money to invest (I) in new machinery. At the same time, lower interest rates will encourage consumers to make more purchases on credit cards, which will increase consumption (C). This will help to grow the economy because, as we learnt in subtopic 3.2.3 (/study/app/pp/sid-186-cid-754025/book/aggregate-supply-id-30342/), aggregate demand = $C\uparrow + I\uparrow + G + (X–M)$. Therefore an increase in consumption (C) and investment (I) will increase aggregate demand. In **Figure 4** aggregate demand shifts outward from AD_1 to AD_2. This shift will cause the price level to rise from P_1 to P_2 and real GDP to increase from Y_1 to Y_{fe}.

Overview (/study/ap 186- cid- 754025/

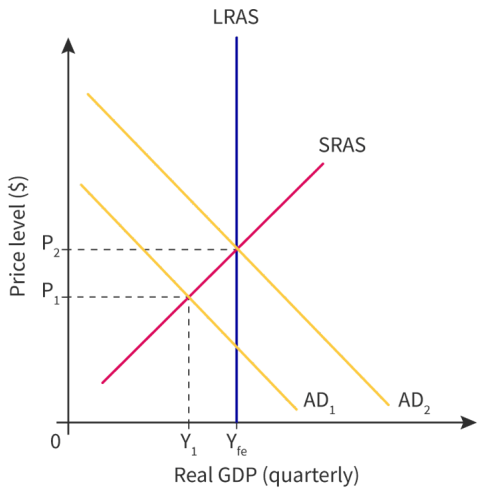

Figure 4. Lower interest rates can stimulate both investment (I) and consumption (C) and therefore aggregate demand.

More information for figure 4

The graph illustrates the relationship between price level and real GDP on a demand and supply model. The X-axis represents Real GDP (quarterly), ranging from 0 to an unspecified maximum, with key points labeled Y1 and Yfe. The Y-axis represents Price level (in $), marked at P1 and P2.\n\nThe graph includes several intersecting lines:\n\n- The downward sloping yellow lines represent aggregate demand, labeled as AD1 and AD2. AD1 is situated to the left, and after a shift, AD2 is to the right.\n- The upward sloping magenta line is the short-run aggregate supply (SRAS).\n- The vertical blue line indicates long-run aggregate supply (LRAS) positioned at Yfe.\n\nThe shift from AD1 to AD2 signifies an increase in aggregate demand, leading to a rise in price from P1 to P2 and real GDP from Y1 to Yfe, illustrating the economy moving towards full employment output.

[Generated by AI]

By adjusting the money supply and lowering interest rates, the central bank uses monetary policy to help grow the economy or to close a recessionary gap.

Student view

Figure 5. Low interest rates encourage firms to purchase more capital machinery, which helps to grow the economy.

Credit: Getty Images Brownie Harris

b. Prints physical money and mints coins

The central bank prints notes and mints coins to:

- enable increases in the money supply to align with increases in GDP

- replace old and torn bank notes

Central banks take care to include security features to ensure the integrity of the currency and to make counterfeit bank notes less likely.

Figure 6. A secure currency is important. Here are some of the security features which are used to prevent counterfeits.

Credit: Mark Tantrum / Stringer Getty Images

Activity

Research the currency of your country. What security features are used to keep your currency safe from counterfeit?

c. Lender of 'last resort'

The central bank acts as a lender of last resort for commercial banks. In a financial crisis, consumers may lose faith in their bank and rush to withdraw their money. This is known as a run on the bank. If all depositors start to suddenly withdraw their money, banks will not have the funds on hand, and will become insolvent very quickly. **Figure 7** shows a notice on an ATM in Greece during the financial crisis in 2015. To control the run on Greek banks, the European Central Bank (ECB) closed commercial banks and reduced cash withdrawals to a minimum.

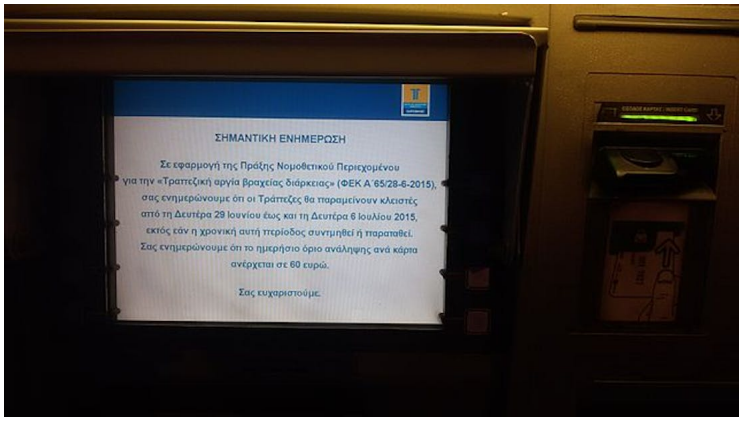

Figure 7. A notice on an ATM in Greece in July 2015.

Source: "Message on Greek ATM on 29 June 2015 (https://commons.wikimedia.org/wiki/File:Message_on_Greek_ATM_on_29_June_2015.jpg)" by SucreRouge is licensed under CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0/deed.en)

Overview (/study/ap 186- cid- 754025/c

Case study

Central banks as the lender of last resort

Traditionally, central banks act as a lender of last resort to **save depositors**. If a bank fails, central banks will guarantee customers the value of their deposits. However, in Cyprus the European Central Bank (ECB) undertook a new strategy. As banks in Spain and Italy now look increasingly vulnerable, will the ECB save depositors or will it plunder them?

In 2013, Cyprus faced a bank crisis; banks were close to bankruptcy in a banking sector which was equal to 700% of GDP. The Cypriot government was unable to bail out the banks, as debt was equal to 104% of GDP. In desperation, Cyprus requested a bailout from the ECB. But the conditions were extremely controversial. One third of the bailout was funded from money held in savings accounts — paid by the depositors who are meant to be the very people protected in a bank crisis. Deposits exceeding EUR 100 000 were confiscated to recapitalise the banks.

Figure 8. Citizens of Cyprus protest the bail-in.
Credit: Getty Images Milos Bicanski / Stringer

That policy still has an impact today, as many fear that the confiscation set a terrible precedent. As banks in Spain and Italy look increasingly vulnerable, depositors may fear a similar confiscation may occur and those fears could create a run on the bank. Banks in Lebanon may also face a similar crisis, thereby creating the very situation that the central banks' function as the **lender of last resort** was designed to avoid.

Source: Adapted from 'Bail-in': A questionable instrument (https://www.telegraphindia.com/opinion/bail-in-a-questionable-instrument/cid/1709501), The Telegraph India, Bail-in or bail-out? Lebanese banks in need of rescue as crisis bites (https://www.reuters.com/article/us-lebanon-crisis-banks/bail-in-or-bail-out-lebanese-banks-in-need-of-rescue-as-crisis-bites-idUSKBN2050LH), Reuters and Moral hazards in banking (https://www.dnaindia.com/analysis/column-moral-hazards-in-banking-2567142), DNA India.

1. What was the role of the central bank as a lender of last resort before the 2008 financial crisis? How has it changed?
2. What is the difference between a bailout and a bail-in?
3. Who bears the cost of a bailout versus a bail-in?
4. How can the bail-in create moral hazard?

Student view

d. Issues bonds and other financial instruments

The Central Bank may issue bonds to raise funds to finance a range of projects from building infrastructure to funding a war. During World War I and World War II, governments badly needed funds to finance weaponry required for war. Patriotic citizens would buy a *war bond*, and in doing so would lend money to the government. After a

Overview (/study/ap 186- cid- 754025/

predetermined period, the government would repay the loan, including interest.

Figure 9. A poster to encourage people to buy war bonds during World War II.

Source: "If you Can't Go Across...Come Across^ Buy War Bonds" - NARA - 514003 (https://commons.wikimedia.org/wiki/File:%22If_you_Can%27t_Go_Across...Come_Across%5E_Buy_War_Bonds%22_-_NARA_-_514003.jpg) by U.S. National Archives and Records Administration is in public domain.

Today, the government still issues bonds; for example, to fund important infrastructure projects.

e. Regulates the banking system

An important role of the central bank is to regulate commercial banks to ensure they do not take too much risk. The most important regulatory power of a central bank is to set reserve requirements. The reserve requirement is the proportion of deposits that a commercial bank must keep in its vaults in reserve. It is the duty of central banks to ensure commercial banks hold adequate reserves to counter risky lending.

Student view

Complete section with 3 questions

Start questions

Previous section(/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30340/)

Next section (/study/app/pp/sid-186-cid-754025/book/goa

Goals of monetary policy

The central bank operates monetary policy to influence aggregate demand (AD) to help achieve macroeconomic objectives. We will now look at how specific goals of monetary policy ensure that the government maintains economic stability in the short term.

Low and stable rate of inflation

Monetary policy aims to maintain a low and stable rate of inflation. Rising prices reduce the purchasing power of individuals, and create uncertainty for firms. You can read more about the effects of inflation on the economy in subtopic 3.3 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30344/).

Figure 1. Inflation decreases purchasing power. Money lost so much value in Germany 1923 that it was used as wallpaper!

Inflation targeting

Inflation targeting means central banks are responsible for using monetary policy to maintain inflation close to an agreed target (usually around 2%). Inflation targeting creates greater certainty and ensures that monetary policy is constantly adjusted to maintain a stable rate of inflation. This is preferable to waiting until inflation is out of control before the central bank acts.

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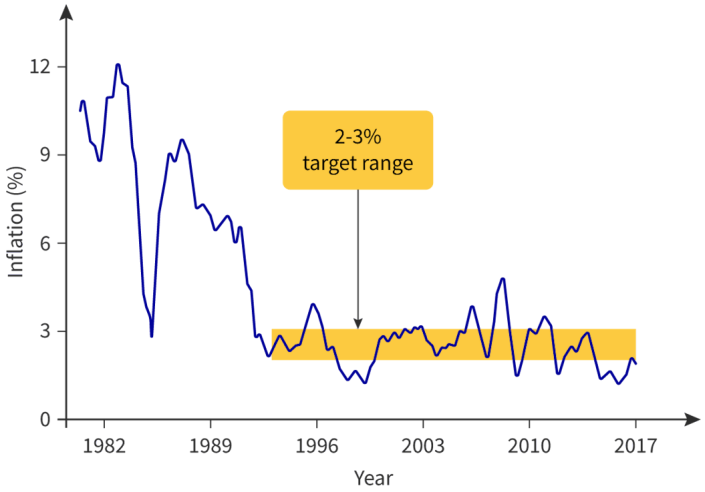

Figure 2. The central bank may target a certain level of inflation to smooth out fluctuations in the business cycle.

More information for figure 2

The image is a line graph depicting inflation rates from 1980 to 2018. The x-axis represents years, from 1980 to 2018, while the y-axis depicts inflation percentages ranging from 0% to 14%. The graph shows a steep decline in inflation from about 12% in the early 1980s to under 3% by the mid-1990s. From the late 1990s onwards, the inflation rate fluctuates between 2% and 4%. A yellow box highlights the 2-3% target range, indicating the central bank's intended range for inflation stabilization.

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Low unemployment

Monetary policy aims to keep unemployment low. Economically unproductive individuals will not contribute to a nation's GDP and will not earn a salary or wage with which to contribute to consumption. As consumption tends to make up between half and two-thirds of aggregate demand, unemployment can lead to slower economic growth.

Student view

Figure 3. Unemployment decreases the productive capacity of the economy, and may lead to slower economic growth.

Credit: Getty Images vadimguzhva

Overview (/study/ap 186- cid- 754025/c

Reducing business cycle fluctuations

Economies are often subject to booms and busts as part of the business cycle. The last worldwide bust was the financial crisis of 2008. Some families lost their homes and their life savings.

The business cycle is characterised by four phases: an expansionary phase, a boom phase, a contractionary phase and a bust.

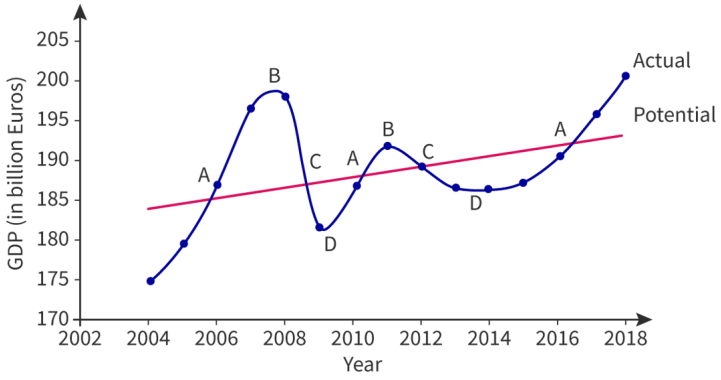


Figure 4. The booms and busts of the business cycle in Finland.

More information for figure 4

The graph illustrates the business cycle phases of Finland's GDP from 2002 to 2018. The X-axis represents the years, spanning from 2002 to 2018, while the Y-axis indicates GDP in billion Euros, ranging from 170 to 205. The graph shows two curves: the blue line represents the actual GDP and the pink line indicates the potential GDP.

The actual GDP goes through various phases symbolized by letters: A (expansionary), B (boom), C (contractionary), and D (bust).

- From 2002 to 2008 (Phase A to B), the GDP increases, peaking in 2007.
- 2008 marks the beginning of a decline (Phase C and D), showing a contraction until 2009 when it starts to recover again until 2011 (Phase A).
- Another contraction follows from 2011 to 2013 (Phase C and D).
- From 2014 onwards, the graph indicates recovery and growth (Phase A and B), with GDP reaching higher levels by 2018.

[Generated by AI]

Student view

Look at the business cycle for Finland in **Figure 4**. The phases are labelled A (expansionary), B (boom), C (contractionary) and D (bust). **Economic growth** took place from 2004 to 2008, reaching its peak during 2007. With the onset of the global financial crisis in 2008, GDP started to fall and economic growth turned negative until 2009. The economy recovered until 2011, when it began to contract as a result of falling competitiveness and declining industrial sectors. From 2015 to 2018, the Finnish economy recovered, and started to grow again.

One goal of monetary policy is to smooth out fluctuations in the business cycle. The bust can be incredibly destructive, but governments can use monetary policy to encourage firms to expand, buy more machinery and rehire unemployed workers. This will create an uptick in demand for goods and services and an economic recovery.

International Mindedness

Overview (/study/ap 186- cid- 754025/c

Some countries have economies that are so large that they can affect others. For example, China is the biggest trading partner for many countries including Indonesia, Australia, Germany, Japan and South Korea. If Chinese economic growth slows, or if China has a bust, the effect on its trading partners will be significant. To what extent do large economies such as China have a responsibility to the rest of the world to smooth out the fluctuations in their business cycles?

Promoting a stable economic environment for long-term growth

The central bank can operate monetary policy to encourage long-term growth. Through careful management of the money supply and interest rates, inflation can be controlled, and real GDP has a stable environment to grow.

External balance

External balance is achieved when a country's exports equal its imports. It is possible for the government to use monetary policy to move towards external balance. Imagine a country has a trade deficit. By raising interest rates, the government discourages both firms and consumers from spending on investment goods and consumer goods. If the reduction on spending includes imports, this will help move the economy to external balance. External balance will be discussed further in subtopic 4.6 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30345/).

Case study

Australia using interest rates to achieve external balance

In the 1990s, the Australian Prime Minister, Paul Keating, came under great criticism for using monetary policy with the intention of causing a recession. Keating is famously quoted as saying 'This is the recession we had to have.' Why would the Australian government intentionally create a recession? To achieve external balance.

In 2019, the official central bank cash rate was at a record low of 2%. In contrast, under the Keating government, interest rates were driven up to 17.5% in January 1990.

By the end of the 1980s Australia was experiencing a significant trade deficit, and the government was desperate to reduce the country's reliance on imports. Keating believed that high interest rates would discourage spending and lead to a decrease in imports.

Student view

The interest rate hike did cause a decrease in spending and it did cause a recession. However, it did not cause a significant recovery in the trade balance. Consumers continued to buy imports, many of which were essentials such as pharmaceuticals.

Apart from being completely ineffective, this policy had further unintended consequences. The high interest rate discouraged investment. Firms did not buy new capital machinery, retool, or adapt to changing technologies. Manufacturing industries reliant on technology closed, and many industries never recovered. Australia narrowed its industrial base to mining and agriculture.

We can still see the effects of this policy today. The high interest rates in the 1990s discouraged consumers from taking out mortgages and buying houses. By the time interest rates fell, there was intense pent-up demand for housing. This created an unprecedented boom for housing in Australia. The boom drove up housing prices so much that by 2014, Australia had the most unaffordable housing in the world. Today, Australia is suffering from a downturn in housing. These sharp turns in the price of housing have created much hardship for Australians — and can all be traced back to 'the recession we had to have.'

Source: Adapted from Remembering the recession: 'The 1990s experience changed my view of the world' (https://www.theguardian.com/business/2019/nov/17/remembering-the-recession-the-1990s-experience-changed-my-view-of-the-world), The Guardian.

Overview (/study/ap 186- cid- 754025/

Figure 5. Australia's housing crisis today can be traced back to high interest rate policies of the past.
Credit: Getty Images alexsl

1. Research the relationship between interest rates and housing prices in the country where you live. What do you notice?
2. Evaluate the effects of a housing boom. Consider a range of stakeholders; who wins and who loses from a housing boom?
3. Should governments actively encourage a boom in housing?

Complete section with 2 questions

Start questions

Previous section(/study/app/pp/sid-186-cid-754025/book/monetary-policy-id-30341/)

Next section (/study/app/pp/sid-186-cid-754025/book/mo

Student view

Money creation (HL only)

The creation of money by commercial banks

Commercial banks have the power to create money through credit (credit creation) . When individuals deposit money into a bank account, the bank is only required to keep a small percentage of the deposit as cash. This is referred to as the reserve requirement.

Figure 1. Banks can create money.

Credit: Getty Images Artifacts Images

Let's assume that the central bank determines a reserve requirement of 10%. This means that for every $100 deposited, the bank must hold $10. What does the bank do with the remaining $90? They lend it! It is this process that creates credit. If banks kept 100% of deposits in reserve, there would be no lending and no credit creation. The central banks require commercial banks to hold back some deposits in reserve to ensure that banks do not take too much risk by lending out too much money.

Look at the example below:

Round 1: Bill

Imagine Bill deposits $1000 in his local bank. The bank is required to hold 10% of that deposit as part of its reserve requirements. This leaves $900 for the bank to lend out (and make profit on). The bank lends this money to a local jeweller, who buys $900 of gold from Jilly.

Round 2: Jilly

Jilly is incredibly pleased with her jewellery supply business. She just earned $900 from selling gold and has deposited it directly into the bank. The bank holds 10% of that deposit ($90) as part of their reserve requirements. The bank now has $810 to lend. The bank lends this money to an Uber driver to put new tyres on his car. Ramu, his local tyre distributor, is very pleased with the sale.

Overview (/study/ap 186- cid- 754025/c

Round 3: Ramu

Ramu happily deposits $810 in the bank. The bank holds 10% of the deposit ($81) and lends out $729, and so it continues.

Rounds	Deposit	Reserve requirement (10%)	Credit creation
1. Bill	$1000	$100	$900
2. Jilly	$900	$90	$810
3. Ramu	$810	$81	$729
...	...	...	...
...	...	...	...
Total	$10000	$1000	$9000

We can calculate the **total deposits** and **total credit creation** through the **credit multiplier.**

The credit multiplier = the reciprocal of the **reserve requirement** where the **RR** = 10%

$$= \text{the reciprocal of} \frac{10}{100} = \frac{100}{10} = 10$$

Total deposits = initial deposit × credit multiplier

$$= \$1000 \times 10 = \$10000$$

Total credit creation = initial credit creation $\times$credit multiplier

Student view

= ($1000 is deposited and the bank can lend out 90%) $\times$credit multiplier

= $\$900 \times 10$

= $9000

Worked example 1

If the reserve requirement is 5%, and the initial deposit was $1000, calculate

- Credit multiplier
- Total deposits
- Total credit creation

If the reserve requirement is 5%, and the initial deposit was $1000

Calculate

Overview (/study/ap 186- cid- 754025/c

Credit multiplier

The credit multiplier = reciprocal of the reserve requirement where the $\mathrm{RR} = 5$

$= \text{reciprocal of } \frac{5}{100}$

$= \frac{100}{5}$

$= 20$

Total deposits

Total deposits = initial deposit × credit multiplier

$= \$1000 \times 20$

$= \$20\ 000$

Total credit creation

Total credit creation = initial credit creation × credit multiplier

Total credit creation = initial credit creation ($1000 is deposited, and bank can lend out 95%) × credit multiplier

$= (\$1000 \times (0.95)) \times 20$

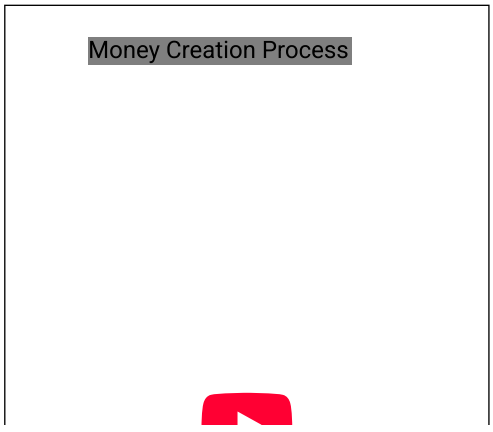
$= (\$950) \times 20$

$= \$19\ 000$

Student view

Be aware

Make sure you understand the relationship between the reserve requirement and the money supply. If the central bank wishes to increase the money supply, should it increase or decrease the reserve requirement?



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Student view

Complete section with 3 questions

Start questions

Previous section(/study/app/pp/sid-186-cid-754025/book/goals-of-monetary-policy-id-30343/)

Next section (/study/app/pp/sid-186-cid-754025/

Tools of monetary policy (HL only)

The central bank helps manage the economy by managing inflation and growth. But how? What are the tools of monetary policy?

Open market operations

Open market operations refers to the central bank buying and selling bonds to regulate the money supply.

A bond is like an IOU *(I Owe You)* between the government and an investor. Bonds are used by governments to finance infrastructure projects such as bridges, ports or highway systems. Look at the bond below. The US government issued a USD 500 Treasury Bond in 1969 that paid 2½% every year until the principal was repaid in 1999. This is a 30-year bond.

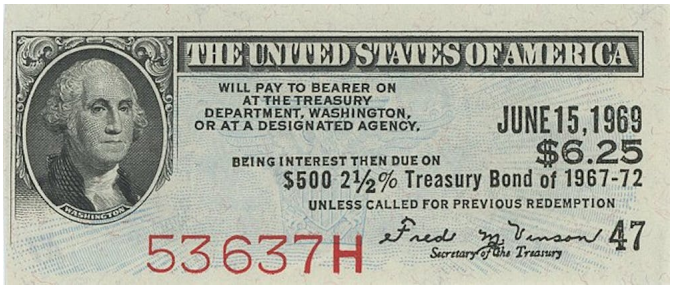
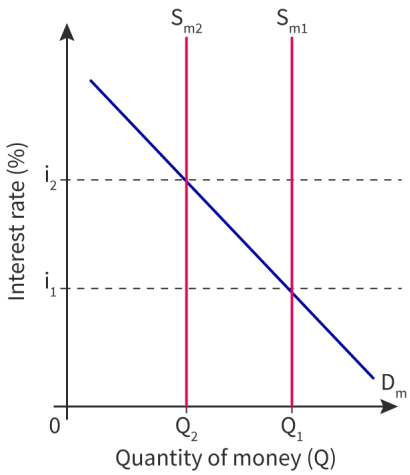


Figure 1. A 30-year USD 500 bond earning 2½% each year.

Source: "1969 2.5% $500 Treasury Bond coupon (https://commons.wikimedia.org/wiki/File:1945_2.5%25_$500_Treasury_Bond_coupon.jpg)" by JHerbstman is licensed under CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0/deed.en)

The central bank buys and sells bonds on the open market in order to regulate the money supply. When the central bank sells a bond for $500, the money supply is reduced by $500. **Figure 2** illustrates this: when a central bank sells a bond, it moves the supply from S_{m1} to S_{m2}. The quantity of money falling from Q_1 to Q_2 can drive the interest rate up from i_1 to i_2. In this way, the government can buy and sell bonds (open market operations) to influence the interest rate.



Overview (/study/ap 186- cid- 754025/c

Figure 2. Open market operations can determine the interest rate.

More information for figure 2

This graph illustrates the effect of open market operations on interest rates. The x-axis represents the quantity of money (Q) and ranges from 0 to greater quantities, while the y-axis shows the interest rate in percentage (%). Two vertical supply curves, labeled as S_m1 and S_m2, demonstrate a shift in the supply of money. Initially, the supply curve is at S_m1 with a corresponding quantity of money at Q1, resulting in an interest rate of i1. When the central bank sells bonds, the supply curve shifts left to S_m2, decreasing the quantity of money to Q2, which results in an increased interest rate of i2. The downward-sloping demand curve, labeled D_m, intersects with both supply curves at different points, showing the change in interest rate as the quantity of money decreases.

[Generated by AI]

Exam tip

Always try to use diagrams to help you explain economic theory. It will give greater precision and clarity to your answers. Don't forget to write your labels clearly.

Minimum reserve requirements

The reserve requirement is the proportion of bank deposits that a bank must hold in cash, either in their vaults or on deposit at the central bank.

As you will recall, Bill from section 3.5.3 (/study/app/pp/sid-186-cid-754025/book/money-creation-hl-only-id-30346/) deposited $1000 in the bank. The reserve requirement for the bank was 10%, so the bank now had $900 to lend out.

Student view

Figure 3. Bill depositing money in the bank.

Credit: Getty Images Patrick Foto

Rounds	Deposit	Reserve requirement (10%)	Credit creation
Bill	$1000	$100	$900
...	...	...	...
Total	$10000	$1000	$9000

Overview (/study/ap 186- cid- 754025/c

Activity

Imagine the central bank would like to increase borrowing and hence stimulate investment. Should the central bank increase or decrease the reserve requirement? If the reserve requirement was increased to 20% would borrowing increase or decrease?

A fall in reserve requirements is expansionary because it increases the money supply. A greater proportion of bank deposits can now be lent to consumers and businesses. If the central bank wanted to stimulate the economy, it could lower the reserve requirement from 10% to 5% so that the bank could lend out a greater proportion of Bill's initial deposit.

An increase in reserve requirements is contractionary because it decreases the money supply and reduces the funds available for lending.

Changes in the central bank minimum lending rate

The central bank is able to determine the interest rates offered by commercial banks through the minimum lending rate. The minimum lending rate is the rate at which the central bank charges commercial banks to borrow money. We would expect the minimum lending base rate to influence all the interest rates set by commercial banks and other financial institutions.

If the central bank cuts the minimum lending rate, it decreases the cost of borrowing money for commercial banks. Competition between commercial banks would also drive them to cut their mortgage and lending rates. Lower interest rates encourage borrowing and spending by firms and consumers.

Student view

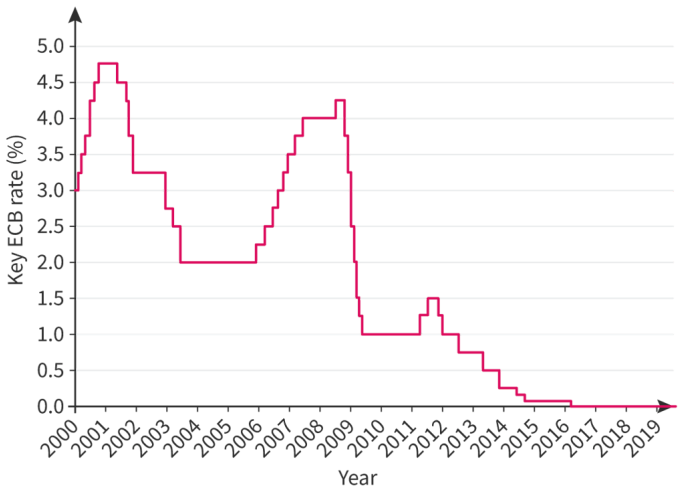


Figure 4. The European Central Bank (ECB) has lowered the minimum lending rate to 0% to encourage investment and spending.

Source: ECB (https://www.ecb.europa.eu/stats/policy_and_exchange_rates/key_ecb_interest_rates/html/index.en.html)

More information for figure 4

The graph depicts the changes in the European Central Bank's (ECB) key rate from the year 2000 to 2019. The X-axis represents the year, ranging from 2000 to 2019, while the Y-axis represents the key ECB rate in percentage, ranging from 0% to 5%.

Initially, in 2000, the rate was at 4.5%. It briefly peaked at 5% in 2001 before gradually declining to 2% by 2003. Around 2006, it began to rise again, reaching another peak of about 4.5% in 2008. Following the 2008 financial crisis, the rate dropped sharply, reaching approximately 1% by 2010.

Overview (/study/ap 186- cid- 754025/c

From 2011, the rate started to climb slightly before continuing a downward trend, eventually reaching 0% by 2016 and maintaining that rate up until 2019.

Throughout the graph, sudden declines and rises mark key economic events affecting ECB policies.

[Generated by AI]

International Mindedness

Central banks around the world have different vocabulary for the minimum lending rate. In some countries it is referred to as the base rate, or the discount rate or even the repo (refinancing) rate.

Quantitative easing

Quantitative easing is a way for the central bank to inject money directly into the economy.

Student view

Money not only exists in physical form (as in notes and coins) but also digitally as money in bank accounts. Quantitative easing is where the central bank creates more digital money. The central bank then uses this newly created digital money to buy bonds.

The goal of quantitative easing is to create 'new' money to boost spending and investment in the economy.

How does it work?

Let's assume the central bank buys $1000 000 of government bonds from a pension fund. Instead of bonds, the pension fund now has $1000 000 in money. Rather than hold the money, the pension fund might choose to invest it in shares on the stock market to earn higher returns. As more and more pension funds and other institutions invest, the value of shares on the stock market will be driven upwards. Those individuals holding shares will become wealthier, which will make them more likely to spend more, boosting economic activity.

Quantitative tightening is the opposite. The central bank attempts to roll back the expansion in the money supply.

Case study

How did the US Federal Reserve use the tools of monetary policy during the financial crisis?

Overview (/study/ap 186- cid- 754025/c

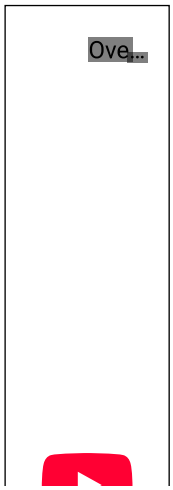
What did the US Federal Reserve do in the early stages of the crisis?

Starting in late 2007, the US Federal Reserve, also known as the Fed, began responding to rising unemployment with the main tool of traditional monetary policy: interest rate cuts. By mid-December 2008 the interest rate reached nearly 0 percent and could go no lower.

What then?

With rates at zero, the Fed experimented with some unconventional monetary policy measures. The Fed used quantitative easing: created digital money (with a click of a computer keyboard) and used that money to purchase bonds, mortgage-backed securities and other financial instruments. The Fed was able to inject money into the banking system to grow the money supply.

Watch the documentary below to find out more about the role of the Fed in the financial crisis.



What are the consequences today?

Central banks significantly increased their balance sheets through quantitative easing to fight the crisis. Read some of the links below to explore the long-term consequences.

- Fed's first hurdle in 2020: Dispensing with 'QE Lite' (https://www.reuters.com/article/us-usa-fed-portfolio/feds-first-hurdle-in-2020-dispensing-with-qe-lite-idUSKBN1ZQ19E)
- Centre stage: political disputes have thrown central bank policy into the limelight (https://www.worldfinance.com/special-reports/centre-stage-political-disputes-have-thrown-central-bank-policy-into-the-limelight)

Student view

Evaluate the consequences of using different monetary policy tools to address the financial crisis of 2008. With the benefit of hindsight, what do you think central banks should have done differently?

Theory of Knowledge

The Global Financial Crisis of 2008 was earth shattering. Unemployment skyrocketed and the stock market crashed. Bankruptcies and foreclosures were widespread.

Yet not a single economist in the Federal Reserve saw it coming. “It’s not just that they missed it, they positively denied that it would happen,” says Finance Professor Franklin Allen (https://fnce.wharton.upenn.edu/profile/allenf/#overview). He argues that economists use mathematical models based on ceteris paribus. These models assume that many variables do not change. Therefore the models economists use to understand economic behavior cannot take into account the complicated behaviour of the banking system.

Franklin Allen is not a lone voice on this. The research paper titled, “The Financial Crisis and the Systemic Failure of Academic Economists (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1355882),” argued that academic economists are too focused on mathematical models, and too disconnected from the real world. They had no tools to see the financial crisis coming.

Overview (/study/ap 186- cid- 754025/

Knowledge question: What are the limitations of knowledge of the study of Economics, that mean that economists cannot predict serious economic downturns such as the Financial Crisis?

Complete section with 5 questions

Start questions

Previous section(/study/app/pp/sid-186-cid-754025/book/money-creation-hl-only-id-30346/)

Next section (/study/app/pp/sid-186-cid-754025/b

Student view

Demand and supply of money (HL only)

How does the interaction of money demand and money supply determine the interest rate?

The interest rate

The interest rate refers to the price/cost of borrowing money. Just like all prices, the nominal interest rate is determined by the forces of supply and demand for money without any intervention by the central bank in the money market .

The demand and supply of money

The diagram to represent supply and demand of money is drawn with the price of money on the *y*-axis and the quantity of money (https://www.thoughtco.com/the-quantity-theory-of-money-1147767) on the *x*-axis. As the interest rate is the 'price' of money we label the *y*- axis as 'interest rate'.

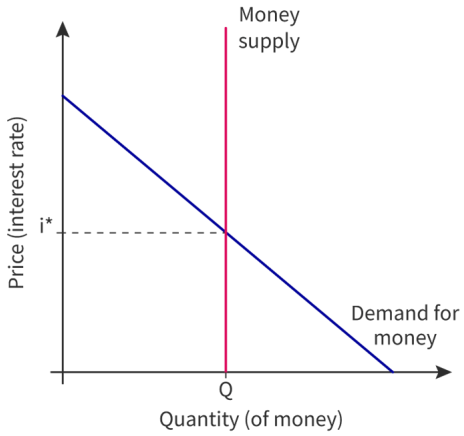


Figure 1. The supply and demand for money.

More information for figure 1

The image is a graph depicting the supply and demand for money. The X-axis is labeled "Quantity (of money)," representing the different quantities of money, and it ranges from left to right with an unspecified scale. The Y-axis is labeled "Price (interest rate)," indicating the interest rate associated with different levels of money supply and demand, again with an unspecified scale.

The graph includes two main lines: 1. A vertical line labeled "Money supply," indicating a fixed supply of money. 2. A downward-sloping line labeled "Demand for money," showing that as the interest rate decreases, the quantity of money demanded increases.

The intersection of these two lines is marked with a point labeled "Q" on the X-axis and "i*" on the Y-axis, indicating the equilibrium interest rate and quantity of money where supply equals demand.

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Overview (/study/ap 186- cid- 754025/c

The demand for money

The demand for money refers to the willingness and the ability of economic agents (such as consumers, firms, etc.) to use money at a given interest rate and at a specific point in time.

Figure 2. Individuals demand money to shop, to save or to avoid risk.

Credit: Getty Images Thomas Ruecker

So what influences the demand for money? Economic agents use money for three reasons:

- *Transactions motive:* Individuals demand money to physically buy goods.
- *Precautionary motive:* Individuals demand money as a *precaution* against unexpected events such as urgent medical or car repair bills .
- *Speculative motive:* Individuals who hold money receive *no* rate of return and often lose purchasing power due to inflation. The opportunity cost of holding money is the interest that can otherwise be earned in a savings account, or the returns from investing the money in the stock market. So why would an individual hold money? In the very rare circumstances where holding money is perceived to be *less risky* than the alternative of investing it in some other asset. This may occur during a stock market crash.

Student view

The demand for money is drawn as downward sloping. The higher the interest rate, the less likely it is that individuals will hold money. Imagine the interest rate rises to 1000%. Consumers would probably not want to take out large amounts of cash – they would keep as much as possible in bank accounts, which would mean that the demand for money would be very low!

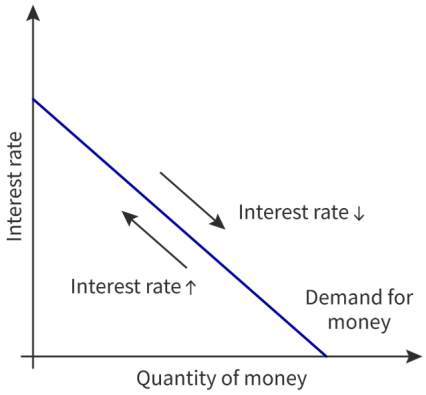

Figure 3. The demand for money is downward sloping. As interest rates rise, the demand for money falls.

More information for figure 3

Overview (/study/ap 186- cid- 754025/

The graph illustrates the demand for money as a downward sloping curve. The X-axis represents the quantity of money, while the Y-axis represents the interest rate. The graph reveals an inverse relationship between interest rates and the quantity of money demanded. As interest rates increase, the demand for money decreases, depicted by a line sloping downwards from left to right. Arrows indicate the effects of rising and falling interest rates on the demand for money. There are no specific data points or units displayed, emphasizing the general trend rather than precise numeric values.

[Generated by AI]

The supply of money

The **money supply** refers to the total amount of money in circulation. It consists of all of the coins, notes and bank balances circulating in an economy.

As a reminder from section 3.5.4 (/study/app/pp/sid-186-cid-754025/book/tools-of-monetary-policy-hl-only-id-30347/), the central bank is able to adjust the money supply in a number of ways. The central bank can use monetary policy through open market operations (buying or selling bonds), adjusting the reserve requirements for commercial banks, setting the minimum lending rate, or undertaking quantitative easing.

Changes in the money supply

If the central bank wishes to operate an expansionary monetary policy and drive down interest rates, it must increase the money supply, through buying bonds (open market operations).

If the central bank buys bonds, it pays investors in cash. It is this payment in cash that increases the money supply. In **Figure 4**, you can see the increase in the money supply from S_1 to S_2. This creates a surplus of money. It will induce individuals to hold less interest-bearing instruments and more money, which increases the quantity of money from Q_1 to Q_2. The interest rate must now decrease from i_1* to i_2*.

Student view

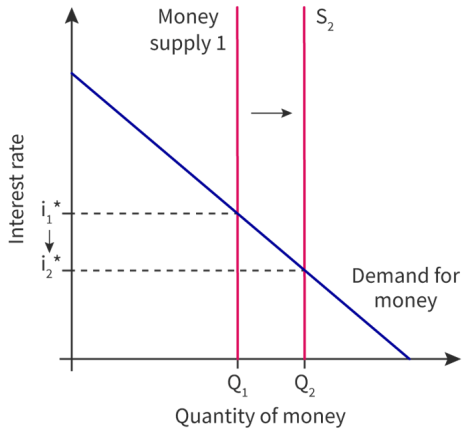

Figure 4. The central bank can adjust the money supply in order to determine the interest rate.

More information for figure 4

The image is a graph that shows the relationship between the money supply and the interest rate, against the quantity of money. The X-axis represents the quantity of money with notable points Q1 and Q2. The Y-axis represents the interest rate with levels i1 *and i2*. The graph includes a demand curve for money, depicted with a downward-sloping blue line. Money supply lines, indicated as 'Money supply 1' and S2, are vertical pink lines shifting from Q1 to Q2. The demand curve intersects the initial money supply at point i1 *and adjusts as the money supply shifts to intersect at i2*. An arrow indicates the shift from the initial supply to the new supply.

[Generated by AI]

Overview (/study/ap 186- cid- 754025/c

Using changes in the money supply to stabilise the economy

Over time, as the economy grows, individuals will require more and more money for day-to-day transactions. Hence we would expect to see that, over time, the demand for money will grow from D_1 to D_2. If the central bank can increase the supply of money at the same rate as the increase in the demand for money, the central bank can maintain interest rates at i* to create greater stability in the economy.

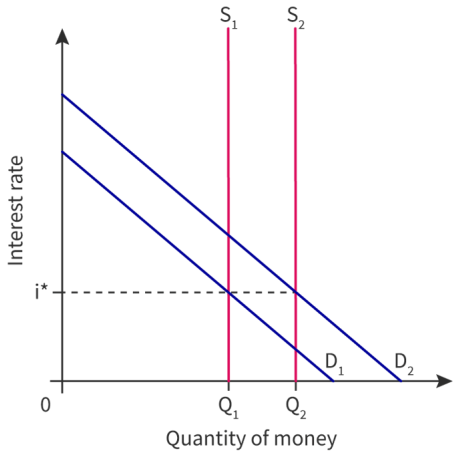

Figure 5. The central bank can create stability in the economy over time by growing the money supply at the same rate as the increase in the demand for money.

More information for figure 5

The graph illustrates the relationship between interest rate and quantity of money. The X-axis, labeled as "Quantity of money," ranges from 0 to Q2, with points Q1 and Q2 marked. The Y-axis is labeled "Interest rate," with a dashed horizontal line indicating a specific interest rate labeled i*. Two downward-sloping lines are labeled D1 and D2, representing demand curves for money. Two vertical lines, labeled S1 and S2, represent shifts in supply curves. The intersection points of these lines highlight changes in economic equilibrium based on different supply and demand scenarios.

[Generated by AI]

Student view

Making connections

In section 3.3 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30344/) we explained how an increase in the money supply can lead to inflation. In this section we explain how an increase in the money supply can stabilise the economy. Under what circumstances does growth in the money supply lead to inflation or stability?

Complete section with 3 questions

Start questions

Overview (/study/ap 186- cid- 754025/

Previous section(/study/app/pp/sid-186-cid-754025/book/tools-of-monetary-policy-hl-only-id-30347/)

Next section (/study/app/pp/sid-186-cid-75

Student view

Nominal versus real interest rates

The nominal interest rate

The nominal interest rate is the interest rate quoted by commercial banks. If you borrow $100 at a 9% interest rate, you will pay $9 in interest. However, the nominal interest rate is not adjusted for inflation. If the inflation rate is 5%, what is the real interest rate?

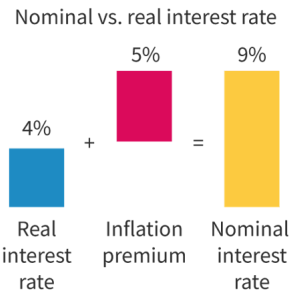

Figure 1. The Real Interest Rate takes into account inflation.

More information for figure 1

The image is a bar chart titled 'Nominal vs. real interest rate.' It displays three vertical bars, each labeled with text and numerical values. The first bar is labeled 'Real interest rate' and is marked at 4%. The second is labeled 'Inflation premium' at 5%. The third bar is labeled 'Nominal interest rate' and shows 9%. The chart visually demonstrates the relationship that the nominal interest rate is the sum of the real interest rate and the inflation premium. Each bar has different colors to distinguish them visually.

[Generated by AI]

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A real interest rate is the interest rate with inflation taken into account. It indicates the true cost of borrowing money. Imagine a bank lends someone $100 at a nominal interest rate of 3%. Let's assume that the inflation rate is 2%. The real interest rate the borrower is paying is only 1%. The real interest rate is lower because inflation devalues the money used to pay back the loan. Consider a 30-year loan for a house. Over time, as you continue to make payments, your wages will rise along with inflation. It will become easier and easier to pay back the set loan amount each month.

How can we calculate the real interest rate?

In most cases the calculation for real interest rate can be simplified to an approximation of:

$$\text{Real interest rate} \approx \text{nominal interest rate} - \text{inflation rate}$$

Overview (/study/ap 186- cid- 754025/

This approximation works well with small numbers, such as in the example above.

When dealing with larger numbers, though, it is more appropriate to use the formula:

$$\frac{(1 + \text{nominal interest rate})}{(1 + \text{inflation rate})} = 1 + \text{real interest rate}$$

For example, using the figures for Argentina from the activity box below:

$$\frac{(1 + 0.83)}{(1 + 0.53)} = 1.196078431, \text{so real interest rate} = 1.1961 - 1 = 19.61\%$$

The approximate formula will usually be accurate enough for IBDP Economics.

Worked example 1

What is the real interest rate if the nominal interest rate is 20% and the inflation rate is 10%? You can use the approximate formula.

Real interest rate ≈ nominal interest rate – inflation rate

$= 20\%–10\%$

Real interest rate = 10%

Worked example 2

Using the approximation method, what is the real interest rate if the nominal interest rate is 30% and the inflation rate is 5%? You can use the approximate formula.

Student view

Real interest rate ≈ nominal interest rate – inflation rate

$= 30\%–5\%$

Real interest rate = 25%

Worked example 3:

What is the **nominal** interest rate if the **real** interest rate is 10% and the inflation rate is 10%? You can use the approximate formula.

Nominal interest rate ≈ real interest rate + inflation rate

$= 10\% + 10\%$

Nominal interest rate = 20%

Overview (/study/ap 186-cid-754025/c

Worked example 4:

What is the **nominal** interest rate if the **real** interest rate is 20% and the inflation rate is 5%? You can use the approximate formula.

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$= 20\% + 5\%$

Nominal interest rate = 25%

Activity

In January 2020, Argentina had the highest nominal interest rate in the world: 83%! It was also facing an inflation rate of 53% in December of 2019, so the real interest rate was only 19.6%. Research the nominal interest rate and the inflation rate for your country. Calculate the real interest rate. Does your country have an expansionary or contractionary monetary environment?

The inflation rate in Zimbabwe for the month of December 2019 was 521.2%. The nominal interest rate was 70%, which means the real interest rate was –72.63 ! The real interest rate was negative! When real interest rates are negative it means that savers lose and borrowers benefit from borrowing money. In real terms, borrowers will benefit because they will pay back the debt with increasingly worthless money, whilst savers will lose out because the money they have saved is also increasingly worthless.

Case study

Student view

The long-term effects of negative real interest rates

In 2012, Denmark's National Bank was the first central bank to use negative real interest rates. Sadly, Denmark suffered unintended consequences of the negative interest rate regime. Danish mortgage borrowers were able to finance their houses at negative rates. This created a sharp housing boom, driving up prices. By 2019, Danish house prices peaked and a 2-bedroom home in Copenhagen cost on average USD 745 000.

Figure 2. Danish house prices experienced a boom when the central bank introduced a negative real interest rate.
Credit: Getty Images Witthaya Prasongsin

Overview (/study/ap 186- cid- 754025/

Housing booms can be very destructive because investment is channelled into non-productive assets. This misallocation of investment funds may have starved strategic industries of potential investment.

Read this (http://theconversation.com/negative-interest-rates-will-not-fix-the-global-economy-just-ask-switzerland-130718) article to find out more about the effects of negative interest rates in Europe.

Evaluate the costs and benefits of a negative interest rate policy.

Complete section with 3 questions

Start questions

Previous section(/study/app/pp/sid-186-cid-754025/book/demand-and-supply-of-money-hl-only-id-30348/)

Next section (/study/app/pp/sid-186

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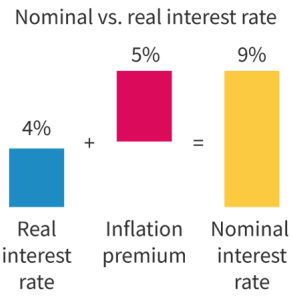

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Overview (/study/ap 186-cid-754025/c

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Complete section with 3 questions

Start questions

Previous section(/study/app/pp/sid-186-cid-754025/book/demand-and-supply-of-money-hl-only-id-30348/)

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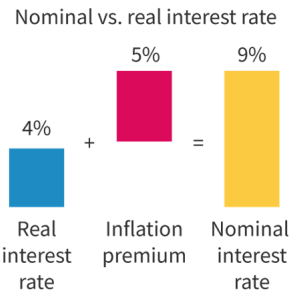

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Student view

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Overview (/study/ap 186-cid-754025/c

Worked example 4:

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Activity

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The inflation rate in Zimbabwe for the month of December 2019 was 521.2%. The nominal interest rate was 70%, which means the real interest rate was –72.63 ! The real interest rate was negative! When real interest rates are negative it means that savers lose and borrowers benefit from borrowing money. In real terms, borrowers will benefit because they will pay back the debt with increasingly worthless money, whilst savers will lose out because the money they have saved is also increasingly worthless.

Case study

Student view

The long-term effects of negative real interest rates

In 2012, Denmark's National Bank was the first central bank to use negative real interest rates. Sadly, Denmark suffered unintended consequences of the negative interest rate regime. Danish mortgage borrowers were able to finance their houses at negative rates. This created a sharp housing boom, driving up prices. By 2019, Danish house prices peaked and a 2-bedroom home in Copenhagen cost on average USD 745 000.

Figure 2. Danish house prices experienced a boom when the central bank introduced a negative real interest rate.
Credit: Getty Images Witthaya Prasongsin

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Housing booms can be very destructive because investment is channelled into non-productive assets. This misallocation of investment funds may have starved strategic industries of potential investment.

Read this (http://theconversation.com/negative-interest-rates-will-not-fix-the-global-economy-just-ask-switzerland-130718) article to find out more about the effects of negative interest rates in Europe.

Evaluate the costs and benefits of a negative interest rate policy.

Complete section with 3 questions

Start questions

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Student view

Nominal versus real interest rates

The nominal interest rate

The nominal interest rate is the interest rate quoted by commercial banks. If you borrow $100 at a 9% interest rate, you will pay $9 in interest. However, the nominal interest rate is not adjusted for inflation. If the inflation rate is 5%, what is the real interest rate?

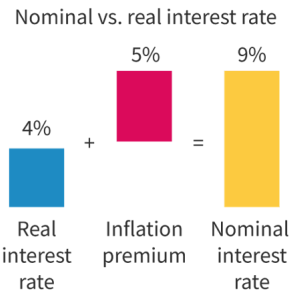

Figure 1. The Real Interest Rate takes into account inflation.

More information for figure 1

The image is a bar chart titled 'Nominal vs. real interest rate.' It displays three vertical bars, each labeled with text and numerical values. The first bar is labeled 'Real interest rate' and is marked at 4%. The second is labeled 'Inflation premium' at 5%. The third bar is labeled 'Nominal interest rate' and shows 9%. The chart visually demonstrates the relationship that the nominal interest rate is the sum of the real interest rate and the inflation premium. Each bar has different colors to distinguish them visually.

[Generated by AI]

The real interest rate

A real interest rate is the interest rate with inflation taken into account. It indicates the true cost of borrowing money. Imagine a bank lends someone $100 at a nominal interest rate of 3%. Let's assume that the inflation rate is 2%. The real interest rate the borrower is paying is only 1%. The real interest rate is lower because inflation devalues the money used to pay back the loan. Consider a 30-year loan for a house. Over time, as you continue to make payments, your wages will rise along with inflation. It will become easier and easier to pay back the set loan amount each month.

How can we calculate the real interest rate?

In most cases the calculation for real interest rate can be simplified to an approximation of:

$$\text{Real interest rate} \approx \text{nominal interest rate} - \text{inflation rate}$$

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This approximation works well with small numbers, such as in the example above.

When dealing with larger numbers, though, it is more appropriate to use the formula:

$$\frac{(1 + \text{nominal interest rate})}{(1 + \text{inflation rate})} = 1 + \text{real interest rate}$$

For example, using the figures for Argentina from the activity box below:

$$\frac{(1 + 0.83)}{(1 + 0.53)} = 1.196078431, \text{so real interest rate} = 1.1961 - 1 = 19.61\%$$

The approximate formula will usually be accurate enough for IBDP Economics.

Worked example 1

What is the real interest rate if the nominal interest rate is 20% and the inflation rate is 10%? You can use the approximate formula.

Real interest rate ≈ nominal interest rate – inflation rate

$= 20\%–10\%$

Real interest rate = 10%

Worked example 2

Using the approximation method, what is the real interest rate if the nominal interest rate is 30% and the inflation rate is 5%? You can use the approximate formula.

Student view

Real interest rate ≈ nominal interest rate – inflation rate

$= 30\%–5\%$

Real interest rate = 25%

Worked example 3:

What is the **nominal** interest rate if the **real** interest rate is 10% and the inflation rate is 10%? You can use the approximate formula.

Nominal interest rate ≈ real interest rate + inflation rate

$= 10\% + 10\%$

Nominal interest rate = 20%

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Worked example 4:

What is the **nominal** interest rate if the **real** interest rate is 20% and the inflation rate is 5%? You can use the approximate formula.

Nominal interest rate ≈ real interest rate + inflation rate

$= 20\% + 5\%$

Nominal interest rate = 25%

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Complete section with 3 questions

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Next section (/study/app/pp/sid-186

Student view

Expansionary and contractionary monetary policies

The central bank can operate monetary policy to close a recessionary or inflationary gap that arises as a result of changes in aggregate demand.

Expansionary monetary policy: closing a recessionary gap

Assume the economy has moved into a recession. A recession is two consecutive quarters of negative growth. This point can be illustrated in **Figure 1c**, which shows the economy operating at Y_1 and P_1. The central bank may choose to intervene in the market and increase the money supply (**Diagram A**) from S_{m1} to S_{m2}. This will increase the amount of money in circulation from Q_1 to Q_2, and in turn drive down the price of money (the interest rate) from i_1 to i_2. The US has operated an expansionary monetary policy between 2018 and 2020 and has lowered interest rates three times. Lower interest rates induce firms to invest (I) more, increasing investment from I_1 to I_2 (**Diagram B**), which means firms will purchase more machinery and capital goods. An increase in investment ($I\uparrow$) will increase aggregate demand $(AD = C + I\uparrow + G + (X - M))$from AD_1 to AD_2 (**Diagram C**), raise the price level from P_1 to P_2 and close the recessionary gap by increasing real GDP from Y_1 to Y_{fe}. By the start of 2020, the US was operating at close to full employment.

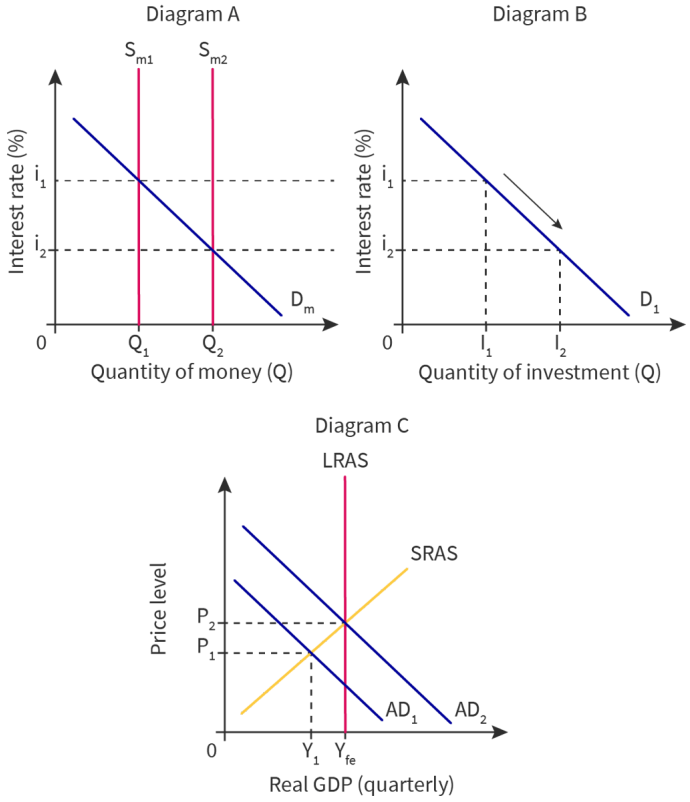

Figure 1. Expansionary monetary policy can close a recessionary gap.

More information for figure 1

The image consists of three labeled diagrams demonstrating the concept of expansionary monetary policy and its effects on interest rates, investment, and GDP.

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Diagram A: This graph illustrates the relationship between the interest rate and the quantity of money. The vertical axis represents the interest rate (i) in percentage, while the horizontal axis shows the quantity of money (Q). Initially, there is a money supply curve labeled Sm1. When the money supply increases, the curve shifts to Sm2. The demand for money is represented by the line labeled Dm. As the money supply increases from Sm1 to Sm2, the quantity of money in the market grows from Q1 to Q2, causing a reduction in the interest rate from i1 to i2.

Diagram B: This graph depicts the relationship between the interest rate and the quantity of investment. The vertical axis shows the interest rate (i), and the horizontal axis represents the quantity of investment (Q). Initially, a demand curve for investment is present, labeled D1. As the interest rate decreases from i1 to i2, the quantity of investment increases from I1 to I2, shown by a downward arrow.

Diagram C: This graph demonstrates the effect on real GDP and price level. The vertical axis measures price level, and the horizontal axis measures Real GDP quarterly. The initial aggregate demand curve is labeled AD1, which shifts to AD2 when investment increases. The short-run aggregate supply (SRAS) and long-run aggregate supply (LRAS) are also labeled. As aggregate demand shifts from AD1 to AD2, the price level rises from P1 to P2, and the real GDP increases from Y1 to Yfe, closing the recessionary gap.

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We can evaluate the effectiveness of expansionary monetary policies by considering different viewpoints of the aggregate supply curve. Assume the economy is operating at Y_1 in **Figure 2**. At Y_1, the economy is producing at a level of output which is far short of full capacity (at Y_{fe}), which means many factors of production are unemployed. Any stimulus to increase aggregate demand from AD_1 to AD_2 will increase real GDP significantly from Y_1 to Y_2 without any pressure on the price level (at P). Denmark has been operating an expansionary monetary policy since 2012 and yet has only experienced a 1% inflation rate. This demonstrates how it is possible to operate expansionary monetary policy without putting any pressure on prices.

Now assume that the economy is operating at Y_2, in the upward sloping section of the aggregate supply curve, where many factors of production are already employed, and supply-side bottlenecks may occur. Expansionary monetary policy will shift out the aggregate demand from AD_2 to AD_3, increasing real GDP from Y_2 to Y_{fe}. At Y_{fe} the economy is operating at full capacity, and all factors of production are fully employed. As firms attempt to increase output they must compete with other firms to hire more factors of production. In this scenario expansionary monetary policy *will* drive up the price level from P_2 to P_3.

Student view

So if the economy is operating close to full employment, expansionary monetary policy will lead to an increase in the price level.

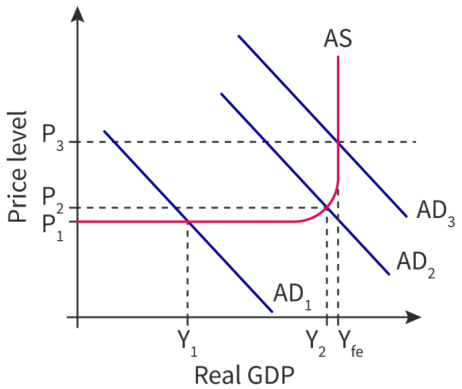

Figure 2. The effects of expansionary monetary policy on the price level.

More information for figure 2

Overview (/study/ap 186-cid-754025/c

The graph illustrates the effects of expansionary monetary policy on the price level and real GDP. The X-axis represents Real GDP with labels Y1, Y2, and Yfe. The Y-axis represents the Price level with labels P1, P2, and P3. Three downward-sloping lines, labeled AD1, AD2, and AD3, represent different aggregate demand levels. The upward-sloping curve labeled AS represents aggregate supply. As the aggregate demand shifts from AD1 to AD2 to AD3, the real GDP increases from Y1 to Y2, eventually reaching Yfe (full employment level), while the price level rises from P1 to P2 and then to P3, showing inflationary pressure due to higher demand when the economy is at or near full employment.

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Contractionary monetary policy: closing an inflationary gap

Now suppose the economy is facing an inflationary gap. An inflationary gap is where the economy overheats, and creates upward pressure on the price level. Rising price levels make it difficult to plan for the future and create uncertainty in the economy. In addition, there will be problems for individuals paying for essentials such as food and rent if incomes do not rise at the same rate.

In **Figure 3c** below the economy faces an inflationary gap at Y_1 and P_1. To close an inflationary gap the central bank will choose to undertake contractionary monetary policy. They will decrease the money supply (**Figure 3a**) from S_{m1} to S_{m2}. This will reduce the quantity of money in circulation from Q_1 to Q_2 and will drive up the interest rate from i_1 to i_2. Higher interest rates will discourage firms from investment (I), reducing it from I_1 to I_2 (**Figure 3b**), which means firms will postpone purchases of more machinery and capital goods. A fall in investment ($I\downarrow$) will decrease aggregate demand $(AD = C + I\downarrow + G + (X - M))$from AD_1 to AD_2 (**Figure 3c**), decrease the price level from P_1 to P_2 and close the inflationary gap by decreasing real GDP from Y_1 to Y_{fe}.

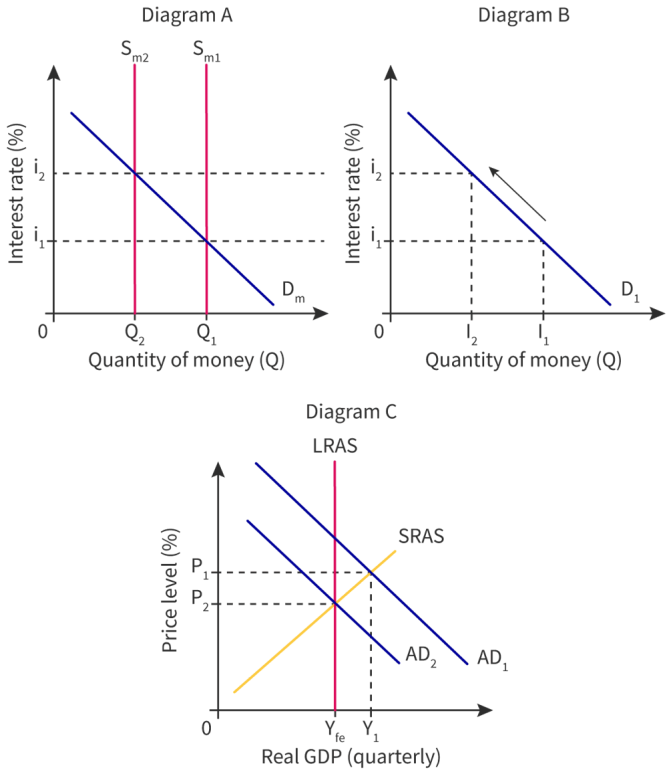

Figure 3. Contractionary monetary policy can close an inflationary gap.

More information for figure 3

The image contains three diagrams labeled A, B, and C, representing different aspects of contractionary monetary policy.

Diagram A: It is a graph with the Y-axis labeled "Interest rate (%)" and the X-axis labeled "Quantity of money (Q)." Two vertical lines labeled S_m1 and S_m2 indicate changes in the money supply, with S_m2 to the left of S_m1, indicating a decrease in money supply. The demand curve, D_m, slopes downward from left to right. The initial equilibrium is at interest rate i1 and quantity Q1, outlined by a horizontal dashed line, and shifts to a new equilibrium at a higher interest rate i2 and a lower quantity Q2.

Diagram B: It shows a similar graph with the Y-axis labeled "Interest rate (%)" and the X-axis labeled "Quantity of money (Q)." A downward-sloping demand line labeled D_1 indicates how higher interest rates reduce interest, shifting demand from i1 to i2 and subsequently from quantity level Q1 to Q2, shown by horizontal lines indicating points of intersection.

Diagram C: This graph has a Y-axis labeled "Price level (%)" and an X-axis labeled "Real GDP (quarterly)." A vertical line represents long-run aggregate supply (LRAS). Two downward-sloping lines represent aggregate demand: AD1 initially and AD2 after contractionary policy is applied. The intersection points show initial and new equilibriums at Y1 (initial) to Y_fe (full employment), and price level from P1 to P2.

These diagrams collectively illustrate how contractionary monetary policy aims to reduce the money supply, increase interest rates, decrease aggregate investment, and shift aggregate demand leftwards, thereby closing an inflationary gap by reducing price levels and real GDP.

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Exam tip

In the exam, make sure you explain your diagrams in full. Include the effects on every variable such the price level (P_1 to P_2) and real GDP (Y_1 to Y_{fe}) for full marks.

Complete section with 3 questions

Start questions

Student view

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Effectiveness of monetary policy

What constrains monetary policy from being effective?

Limited scope for reducing interest rates, when they are close to zero

Expansionary monetary policy is dependent on lower interest rates to stimulate investment to help grow the economy. But what if interest rates are close to 0% already? How can the government lower them further? Essentially, expansionary monetary policy can only be effective if there is room for the central bank to reduce interest rates enough to kick-start a recovery.

Case study

New Zealand's international trade

New Zealand has an open economy, and is very dependent on international trade — especially with Australia. Hence, New Zealand is very vulnerable to the booms and busts of the world economy. The diagram below shows the annualised growth in GDP per quarter. New Zealand experienced a sudden shock in growth in quarter 3 (July) of 2019, down to 2.1%.

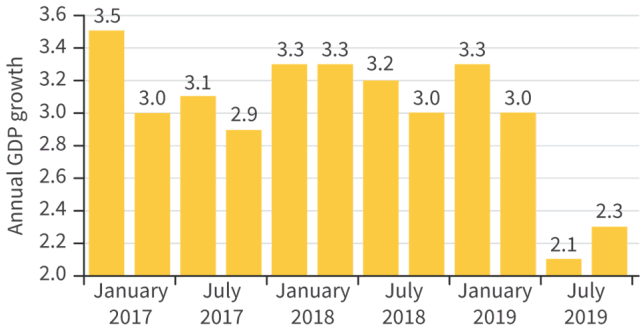

Figure 1. Changes in annualised Growth in GDP for New Zealand.
Source: tradingeconomics.com (https://tradingeconomics.com/new-zealand/gdp-growth-annual)

More information for figure 1

The New Zealand central bank responded to this on 7 August 2019 by lowering interest rates to 1%. This created a small stimulus to the economy, and GDP growth rebounded slightly to 2.3%. But what will the New Zealand central bank do if Australia falls into recession, and the growth in GDP continues to fall, or if growth becomes negative?

If the New Zealand central bank utilises expansionary policy in times of economic growth, what tools will be left in times of recession or even depression?

Read about the quandary the NZ central bank finds itself in because of the coronavirus of 2020.

- Orr May Signal Readiness to Cut Rates as Virus Hits New Zealand's Economy (https://www.bloomberg.com/news/articles/2020-02-10/orr-may-signal-readiness-to-cut-rates-as-virus-hits-n-z-economy)
- Reserve Bank is indicating that it has now done with any further interest rate cuts unless the impacts of coronavirus prove more long lasting than it currently anticipates; dollar and swap rates up

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(https://www.interest.co.nz/bonds/103579/reserve-bank-says-monetary-policy-has-time-adjust-if-impact-coronavirus-proves-be)

Low consumer and business confidence

Expansionary monetary policy may ***not*** be effective to stimulate the economy during times of low consumer and business confidence, recession and depression. During a recession, firms are not responsive to changes in the interest rate. In a recession firms will cut back output, fire workers and leave capital machinery lying idle. Under these circumstances it is unlikely that firms will borrow money to buy *additional* capital equipment just so it too can lay idle.

This is a very significant disadvantage. The time when an expansionary policy is needed most – during a recession – is the time when it is ineffective.

In addition, expansionary monetary policy is more effective in some countries than others.

Case study

Monetary policy is more effective in some countries than others

Some economies are more responsive to changes in the interest rate than others.

The Chinese central bank lowered the interest rate to 4.2% on 20 September 2019. This is not as low as other countries; will it be enough to stimulate the economy?

Historically, China has enjoyed rapid dynamic growth; firms are keen to expand and need new machinery in order to do so. China is also starting to challenge the world in AI, computer, hardware and mobile phones. These industries require new machinery utilising the latest technology, and require constant retooling. Therefore, firms in China will be very sensitive to the interest rate. Even a small decrease in the interest rate may lead to a significant increase in economic activity.

Have a look at China's interest rate regime here (https://tradingeconomics.com/china/interest-rate).

On 1 October 2019, the Australian Central Bank decreased the interest rate to 0.75%. To what extent will Australian firms be responsive to lower interest rates, and increase investment?

The Australian economy is dependent on farming and mining. It matters little if the trucks carrying minerals are decades old, or if a combine harvester is not this year's model. Neither mining nor farming is dependent on constant retooling to remain at the cutting edge in the industry. Hence Australian farmers and miners will be less sensitive to the interest rate and decreases in the interest rate are less likely to lead to any significant change in economic activity.

Student view

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Figure 2. Since its invention, the essential functions of the combine harvester have remained unchanged.
Credit: Getty Images Westend61

Consider the structure of the economy in the country in which you live. In what ways are important industries sensitive to the interest rate? Do you think monetary policy would be effective in your country?

What are the strengths of monetary policy?

Incremental, flexible and easily reversible

Interest rates are easy to adjust, and can be lowered or raised by a small amount to fine-tune the economy. This allows central banks to adjust to sudden demand-side or supply-side shocks in the economy. Central banks can be very flexible to respond to financial crises, as can be seen in **Figure 3**, when many countries quickly dropped their interest rates during 2015-2016.

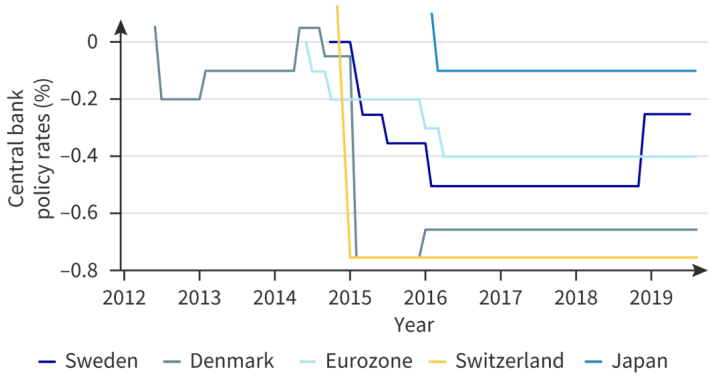

Figure 3. Interest rates adjust to changing economic conditions. Interest rates between 2012 and 2019 for selected countries and the Eurozone.

More information for figure 3

Student view

The graph shows central bank policy rates (%) from 2012 to 2019 for Sweden, Denmark, the Eurozone, Switzerland, and Japan. The X-axis represents the year, ranging from 2012 to 2019, while the Y-axis represents the central bank policy rates in percentage, ranging from -0.8 to 0.

- Sweden's rate starts near 0% in 2012, declines to around -0.4% by 2015, and fluctuates through 2019, showing a notable dip between 2016 and 2017.
- Denmark's rate is constant at nearly -0.75%, except for a brief decrease around 2013.
- The Eurozone shows consistent rates at approximately -0.2% from 2013 onwards, with some fluctuations in between.
- Switzerland's line remains flat at around -0.8% after an initial drop in 2015.
- Japan maintains a relatively consistent rate of around -0.1%, with slight variations.

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Exam tip

In the exam you should always use real-life examples. Use examples from the place you know the most about: your home country.

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Student view

Short time lags

Central banks can act very quickly to adjust monetary policy tools such as the interest rate. Most central bank monetary policy committees meet monthly to determine interest rates. This means that interest rates can respond to changes in the economic climate almost right away.

Strengths and limitations in promoting growth, low unemployment, and low and stable rate of inflation

Conflict amongst government economic objectives

It is very challenging for the government to meet the goals of economic growth, low unemployment and low inflation all at the same time.

If the government wishes to stimulate growth and employment, the central bank may employ expansionary monetary policy (see **Figure 4**). If the central bank lowers interest rates, it will encourage consumers to spend ($C\uparrow$) and firms to invest ($I\uparrow$). This will shift out aggregate demand $(AD\uparrow = C\uparrow + I\uparrow + G + (X - M)$ from AD_1 to AD_2. In doing so, real GDP will grow from Y_1 to Y_{fe}. However, this policy will place upward pressure on the price level, and it will rise from P_1 to P_2.

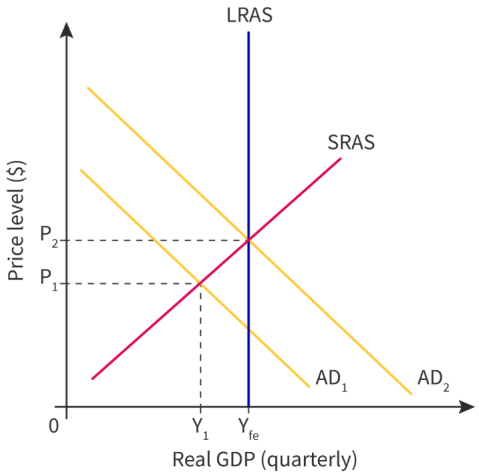

Figure 4. Expansionary monetary policy creates growth and lowers unemployment.

More information for figure 4

The graph illustrates the impact of an expansionary monetary policy on economic variables. The X-axis represents Real GDP (quarterly), starting from 0 and marked with points Y1 and Yfe. The Y-axis represents the price level in dollars. Three key curves are depicted: LRAS (Long-Run Aggregate Supply) is a vertical blue line at Yfe indicating full employment output. SRAS (Short-Run Aggregate Supply) is a positively sloped line intersecting LRAS.

Two aggregate demand (AD) curves, AD1 and AD2, are negatively sloped, showing an increase from AD1 to AD2. This shift demonstrates a movement from a lower equilibrium point (P1, Y1) to a higher one (P2, Yfe), indicating growth in real GDP and a change in price levels due to increased aggregate demand.

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Although the government objectives of growth and low unemployment are met, the goal of low inflation is not.

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However, it is possible for the government to create growth, low unemployment and low inflation in the long run.

If the government uses expansionary monetary policy in such a way that it encourages firms to invest in new machinery, adopt new technologies and explore more research and development, then in the long run the supply side of the economy will also increase. More machinery and technology will allow firms to become more efficient, and therefore to produce more. In **Figure 5** you can see that this will shift out aggregate supply from $LRAS_1$ to $LRAS_2$, real GDP will increase from Y_1 to Y_2, and the price level will fall from P_2 to P_1.

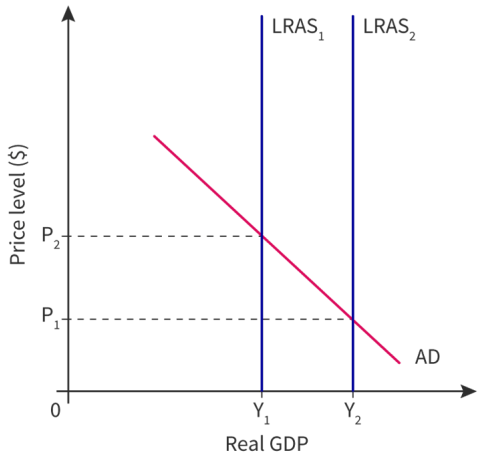

Figure 5. It is possible for monetary policy to meet all government objectives in the long run.

More information for figure 5

The image is a graph representing economic concepts with a downward-sloping line labeled AD (Aggregate Demand) and two vertical lines labeled LRAS1 and LRAS2, emphasizing Long-run Aggregate Supply. The X-axis represents Real GDP, denoted with tick marks at Y1 and Y2, while the Y-axis represents Price Level ($) with points denoted as P1 and P2. The AD curve indicates a decrease in quantity demanded as price level rises. LRAS1 and LRAS2 suggest shifts in long-run aggregate supply, demonstrating the economy's potential output levels at different stages of economic capacity or policy adjustments.

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Student view

In the long run, if expansionary monetary policy increases the productive capacity of the economy, then all macroeconomic objectives can be met.

Activity

Identify three countries that have met all macroeconomic objectives. Research the monetary policy undertaken in the previous decade by those countries. What do you notice?

Complete section with 3 questions

Start questions

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