Lecture 11: Monetary policy

ECON-C3100 Intermediate Macroeconomics I

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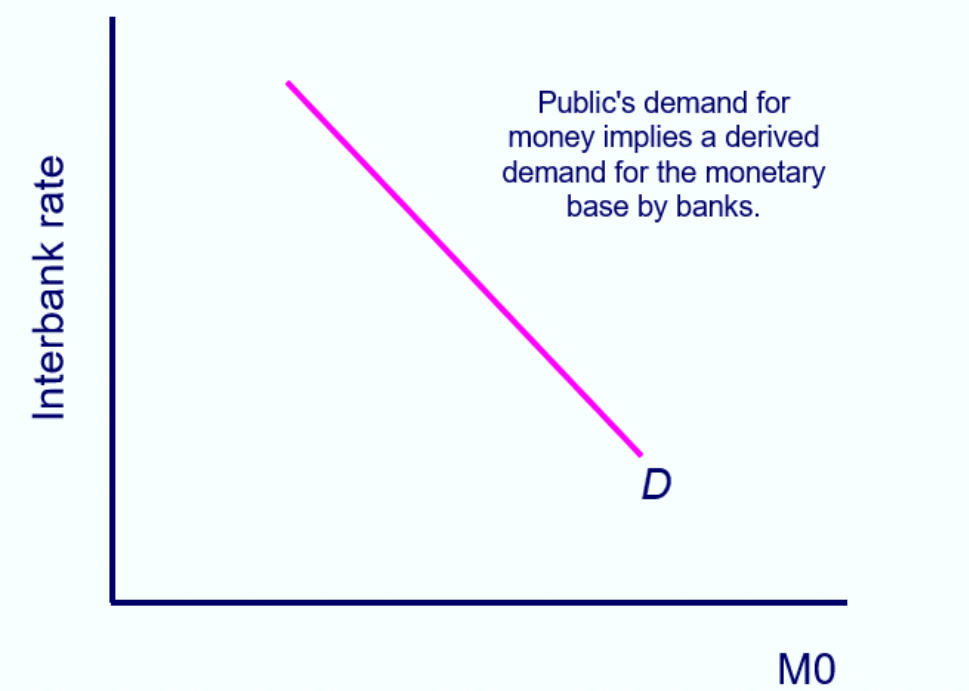
Monetary policy

- The central bank sets monetary policy
- It controls interest rates, exchange rates or financial conditions in general
- By doing so, it indirectly regulates the supply of money
- Monetary policy affects our economic life in many ways

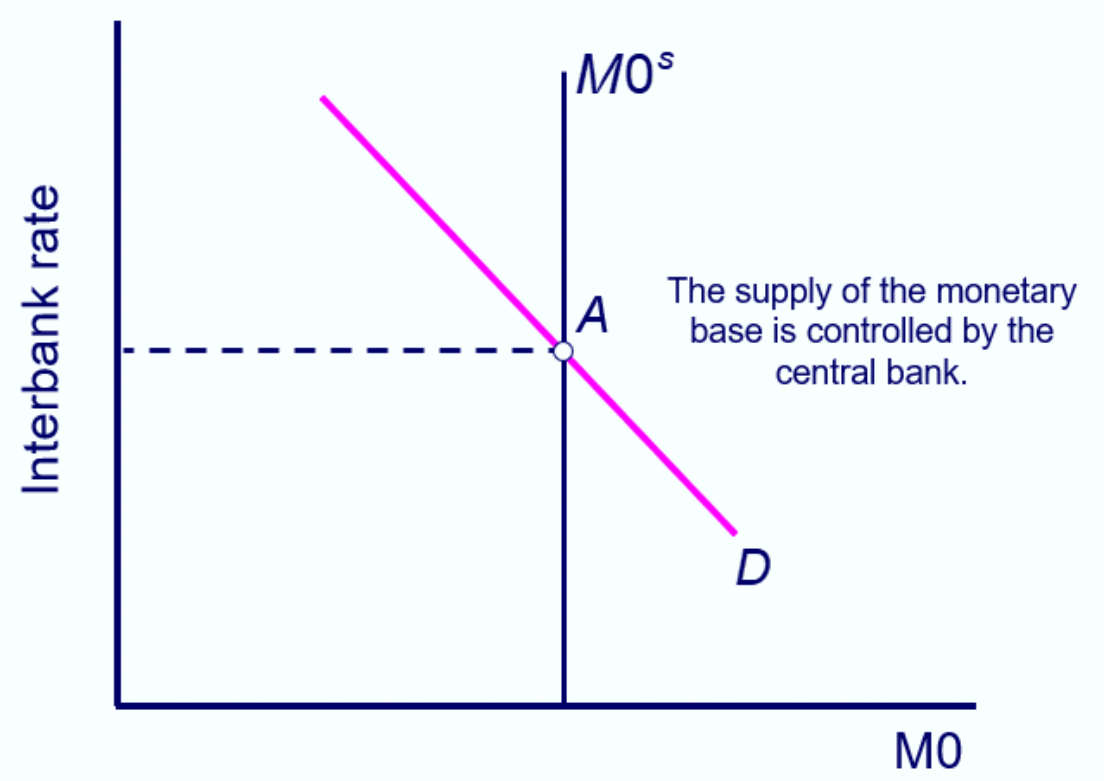
The Money Market: Demand for Monetary Base

- The demand for money declines when the interest rate increases (the interest rate is the price of money).
- The public's money demand is a proportion k of GDP, but this proportion is not constant $M^d = k\,(i)\,PY$
- The **derived demand** for $M0$ by commercial banks is a fraction of the public demand for M



The Money Market: Supply of Monetary Base

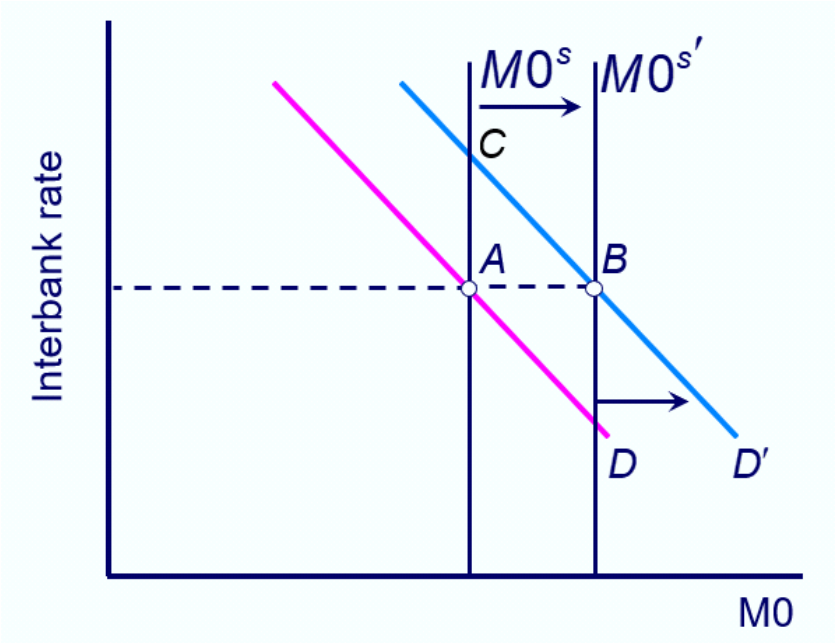
Money Market Equilibrium



The Money Market

Increase in money demand and response by the central bank

- Demand increases and the central bank does not respond: $A \longrightarrow C$
- Demand increases and the central bank wishes to hold interest rates constant: $A \longrightarrow B$



- Where the central bank decides to go, is the central question of monetary policy

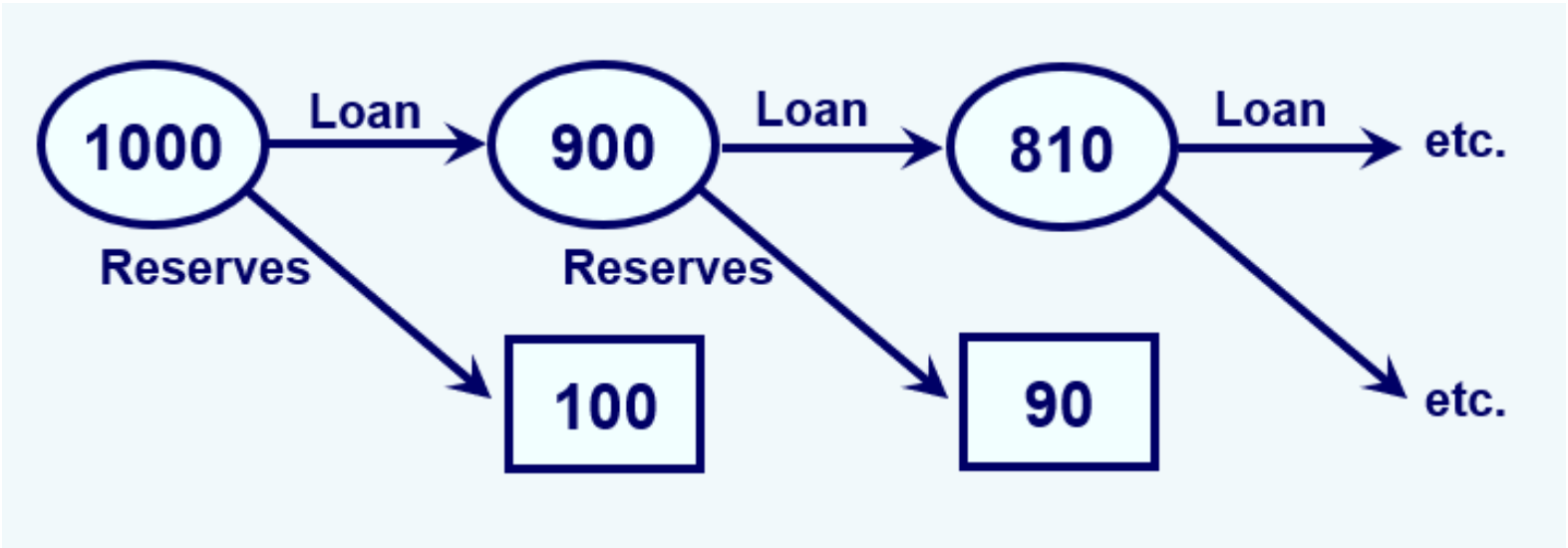
The influence of the central bank on money creation

- If a bank is convinced of a client's creditworthiness, it is good business and standard practice to lend the money - even if the bank doesn't have it!
- The bank simply credits a bank account that the customer opens - assuming that the customer commits to service the loan
- When the loan is granted, the bank creates an asset for itself (the loan) and a liability that it owes the customer (the deposit)
- The bank needs $x\%$ in reserves. If the reserves are not available, the bank can either borrow from another bank or from the central bank
- In the latter case, the bank **creates money** by crediting the customer's bank account with the amount of the loan, and the central bank creates reserves by depositing a proportion rr of the loan into the bank's account

The money creation process

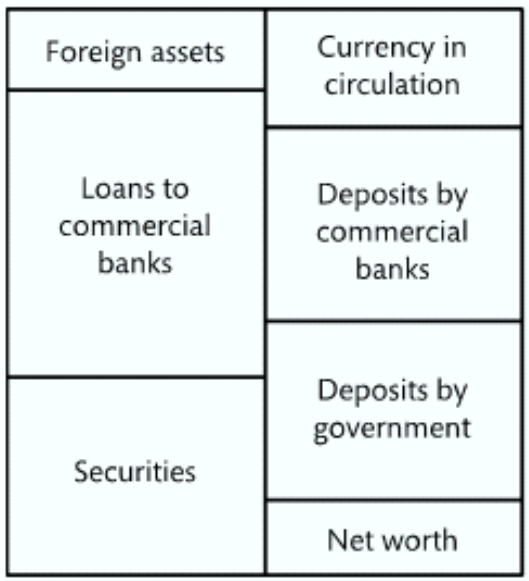
The money multiplier

An initial deposit triggers a succession of loans, paid in the form of deposits. When the bank keeps 10% of any deposit as reserves, each new loan is 90% of the previous one



Deposits $\leq \frac{1}{rr}$ x reserves

Balance sheet of typical central banks - abstract and concrete



ECB Balance Sheet (€ millions)

Assets		*Liabilities*	
Foreign assets	697000	Currency in circulation	1084000
Loans to commercial banks	667000	Deposits by commercial banks	1084000
Securities	1161000	Deposits by government	60000
		Other liabilities	342000
Other assets	256000	Net worth	444000
Total Assets	2781000	Total Liabilities + Net worth	2781000

Bank of England Balance Sheet (£ millions)

Assets		*Liabilities*	
Foreign assets	4000	Currency in circulation	69000
Loans to commercial banks including asset purchase facility	390000	Deposits by commercial banks	307000
		Deposits by government	4000
		Other liabilities	4000
Securities	10000	Net worth	20000
Total Assets	404000	Total Liabilities + Net worth	404000

Central banks on the money market

Open market operations

- As monopolist producers of the monetary base, central banks exercise a decisive influence on the money market
- When the central bank i) purchases assets or ii) lends to banks, it injects **reserves** into the banking system
- In either case, the central bank's assets on its balance sheet increase and, in return, the commercial bank receives cash or an increased account balance with the central bank
- The total volume of assets owned by the central bank is an important indicator of the high-powered money supply $M0$
- The central bank monitors the money market closely and ensures that either the interest rate of the quantity of money is in line with its intentions

Balance Sheet of a Central Bank Before and After an Open Market Purchase

(a) ECB balance sheet before the repurchase agreement

Assets		Liabilities	
Foreign assets	697	Currency	1084
Loans to banks	667	Bank reserves	851
Securities	1161	Gov't deposits	60
Other assets	256	Bank reserves	342
		Net worth	444
Total assets	2781	Total liabilities and net worth	2781

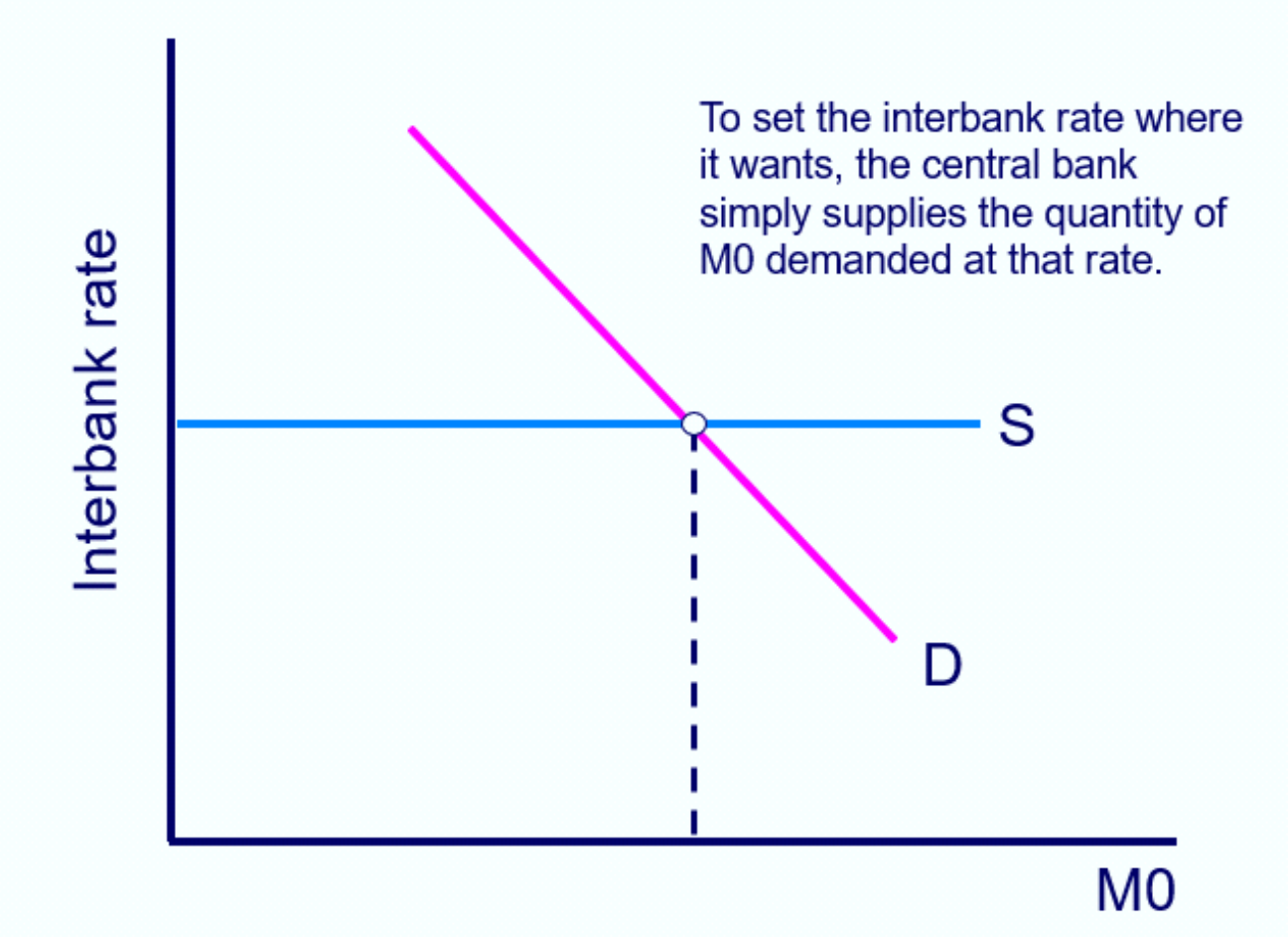
(b) ECB balance sheet after the repurchase agreement

Assets		Liabilities	
Foreign assets	697	Currency	1084
Loans to banks	767	Bank reserves	951
Securities	1161	Gov't deposits	60
Other assets	256	Bank reserves	342
		Net worth	444
Total assets	2881	Total liabilities and net worth	2881

- 100 billion euros in repurchase operations increase 'loans to banks'. As a result, bank reserves increase by 100 bn euros
- (A repurchase agreement is similar to a collateralized loan to a financial institution: the process of borrowing money by combining the sale of an asset with the subsequent repurchase of that same asset for a slightly higher price)

Setting the interest rate

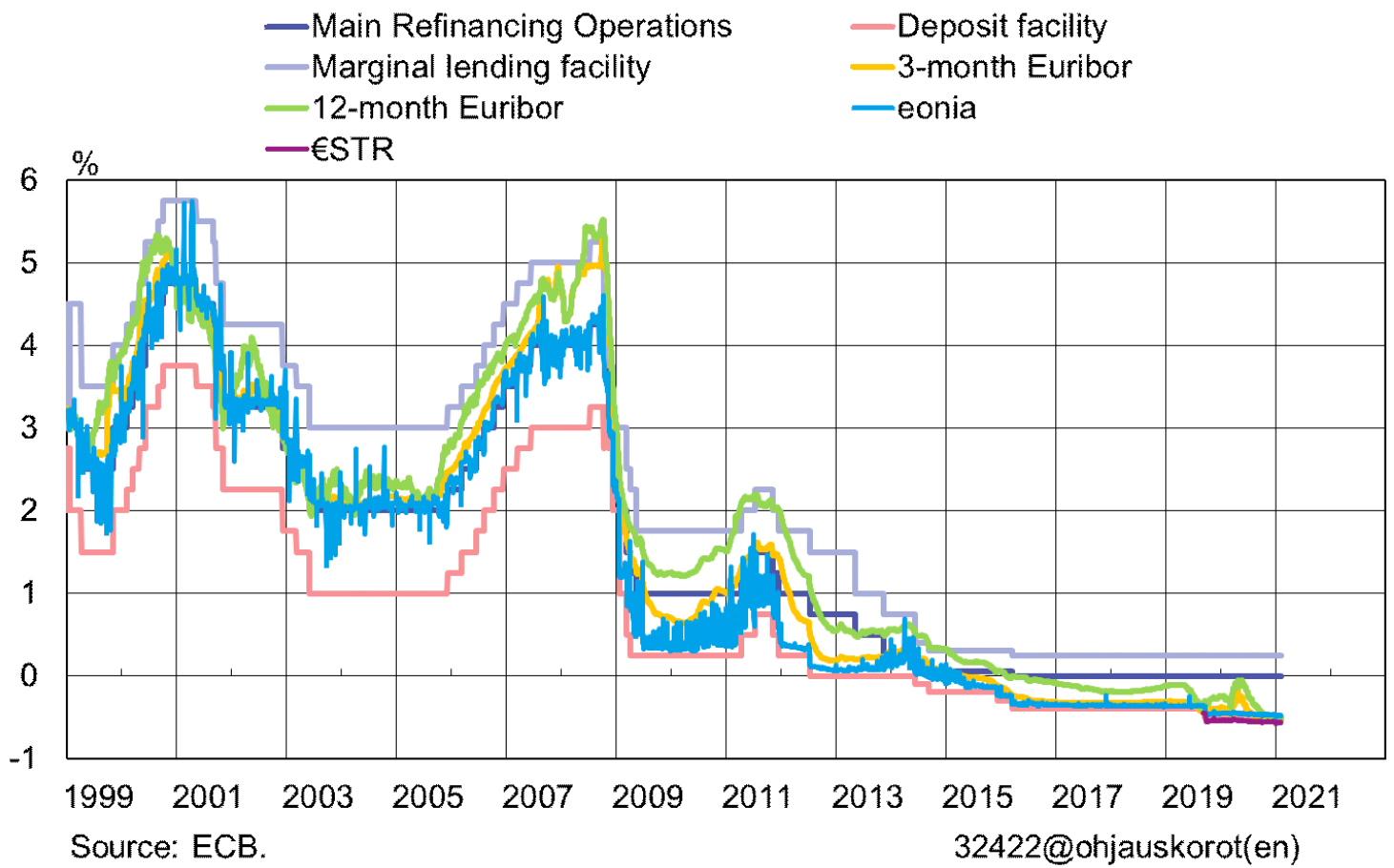
- Most central banks fix the interest rate. This is represented by a horizontal money supply schedule
- Central banks typically announce the rate they intend to set



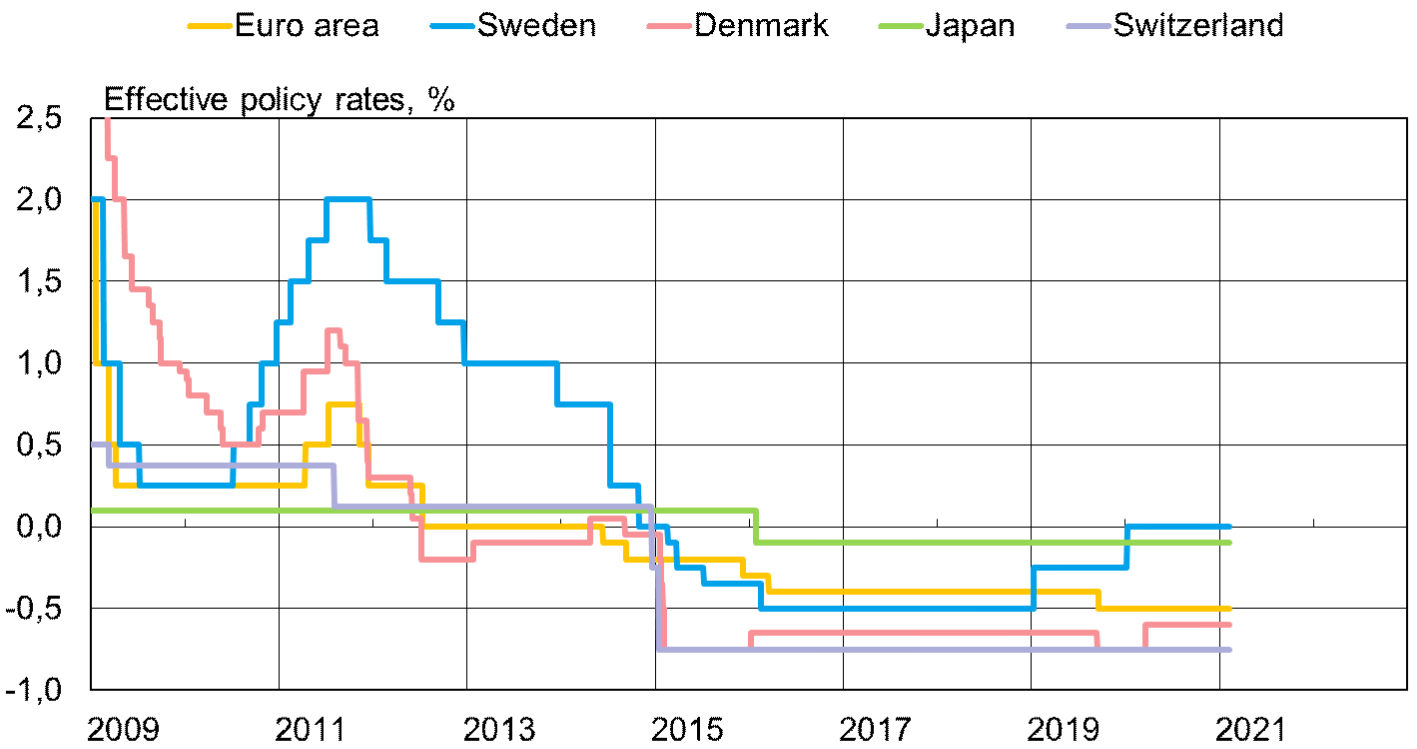
Setting the interest rate

- In order to enforce its key interest rate, each central bank provides its interbank market with whatever volume of reserves are demanded
- Open market operations mean that the central bank purchases and sells assets using reserves, which are its own liabilities
- How the ECB does it?
  - The Eurosystem's regular open market operations consist of one-week liquidity-providing operations in euro (main refinancing operations, or MROs) as well as three-month liquidity-providing operations in euro (longer-term refinancing operations, or LTROs).
  - MROs serve to steer short-term interest rates, to manage the liquidity situation and to signal the monetary policy stance in the euro area, while LTROs provide additional, longer-term refinancing to the financial sector.

Key interest rates of the ECB, interbank interest rate and Euribor



Effective policy rates in different currency areas



Effective policy rates: Euro area: deposit rate, Sweden: repo rate, Denmark: certificates of deposit rate, Japan: deposit rate, Switzerland: 3-month libor target.

Source: Macrobond. 32422@efokorot(ET)en

Lending to commercial banks

- Lending is always a risky business. If a commercial bank's customers do not pay back their loans (non-performing loans, NPLs), the bank will suffer losses and may not be able to repay its own debts, including those to the central bank
- Central banks take precautions i) by asking borrowing commercial banks to provide collateral and ii) by lending only for a short time period
- The quality of assets behind the loans could also be a concern

Legal minimum reserve requirements

- Legal minimum reserve requirements can also be used to affect the money supply
- Reserve ratios normally changed only in small increments, and only in emergency situations
- More frequently used in countries with less developed money markets
- In the euro area
  - Banks are required to hold minimum reserves in their current accounts at their national central bank.
  - A bank's minimum reserve requirement is set for six-week maintenance periods.
  - The level of reserves is calculated on the basis of the bank's balance sheet before the start of the maintenance period.

Objectives, targets and instruments of monetary policy

- So far: **How** a central bank can influence monetary conditions
- Now: **Why** would it want to do so?
- The four following facts guide our thinking:
  - The CB can affect interest rates by making reserves more or less abundant
  - The CB can affect the attractiveness to commercial banks of increasing their lending activities by setting the cost of bank refinancing
  - Monetary policy determines inflation *in the long run*, because it influences the growth of the money supply
  - Monetary policy can affect the level of economic activity (GDP, employment) in the short to medium run by influencing the level of interest rates

The objectives of monetary policy

- Inflation can create much trouble to an economy. The faster inflation is the more volatile it is, inflation erodes purchasing power and the revenue from savings
- For these reasons, **price stability**, which means a low rate of inflation, is socially desirable. A well-functioning and stable price system promotes economic growth and employment
- When prices change slowly it is easy for companies to plan their investments and the purchasing power of household savings is maintained
- Alan Greenspan: "Price stability exists when companies and individuals do not have to take the general rise in prices into account in their decision-making."
- ECB
  - The primary objective of the ECB is **price stability**
  - The ECB may also support other EU economic policy objectives (e.g. employment and sustainable growth), provided that this is done without jeopardizing price stability.

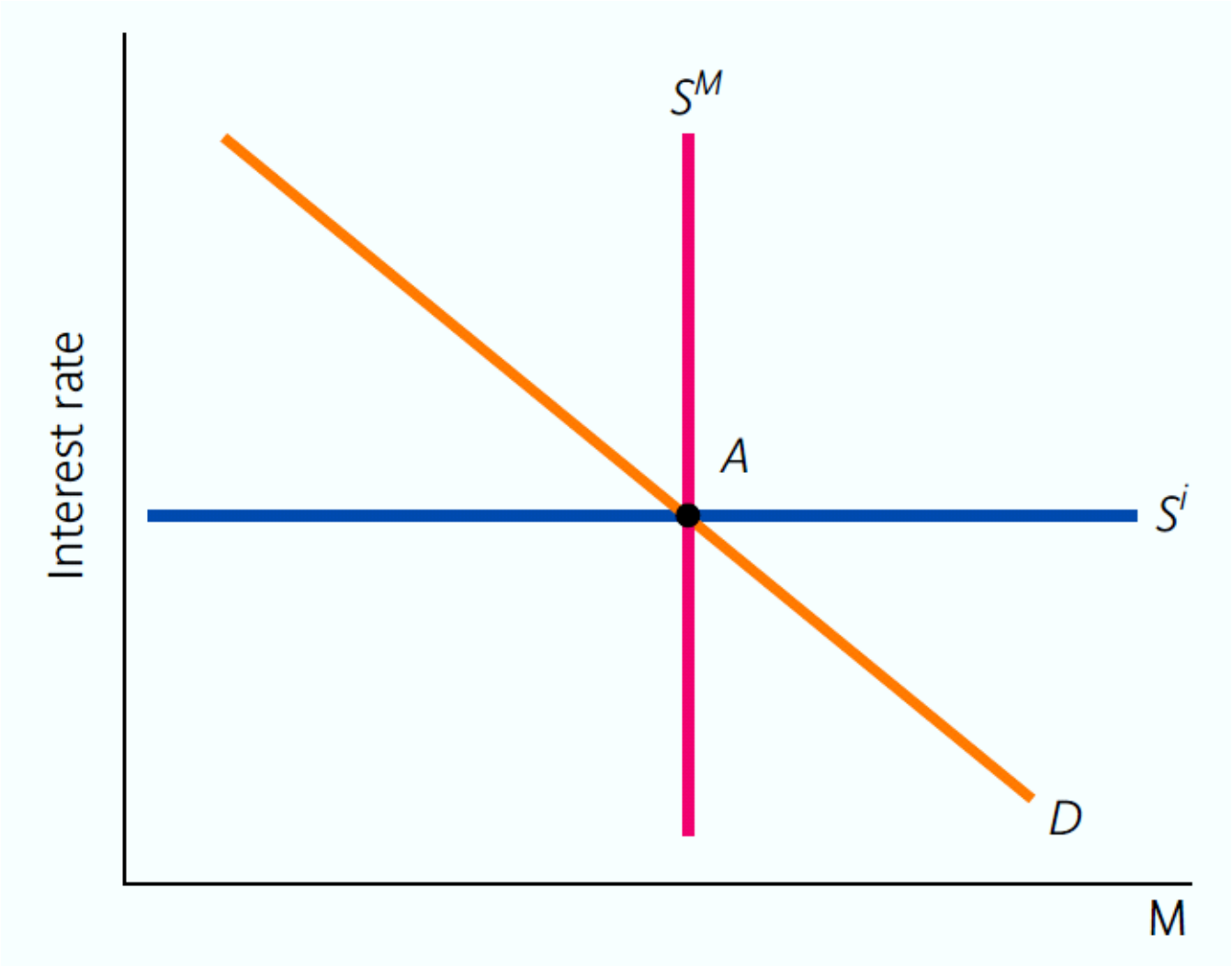
The objectives of monetary policy

- Monetary policy should first and foremost be dedicated to achieving price stability
- On the other hand, money is not neutral *in the short run* - over the horizon of two to three years, monetary policy actions affect output and employment
- This implies that central banks need to concerned also with the level of economic activity
- There are times when central banks confront conflicting demands between keeping inflation low and keeping the economy growing
- Short term stimulus to the economy politically more appealing than commitment to long run price stability
- To deal with this conflict, many countries have made their central banks *formally independent* of ruling governments and given precise tasks

Instruments and targets of monetary policy

- Low and stable inflation, GDP growth and employment are the most cited **objectives** of monetary policy
- Central banks around the world attach different weights to these goals, but none of these goals is directly under the control of the central bank
- The challenge is to use available **instruments** to affect these variables, possibly by identifying and focusing on intermediate **targets**
- Recall already discussed monetary policy instruments
  - the interbank or money market interest rate
  - the supply of bank reserves
  - the reserve ratio requirement

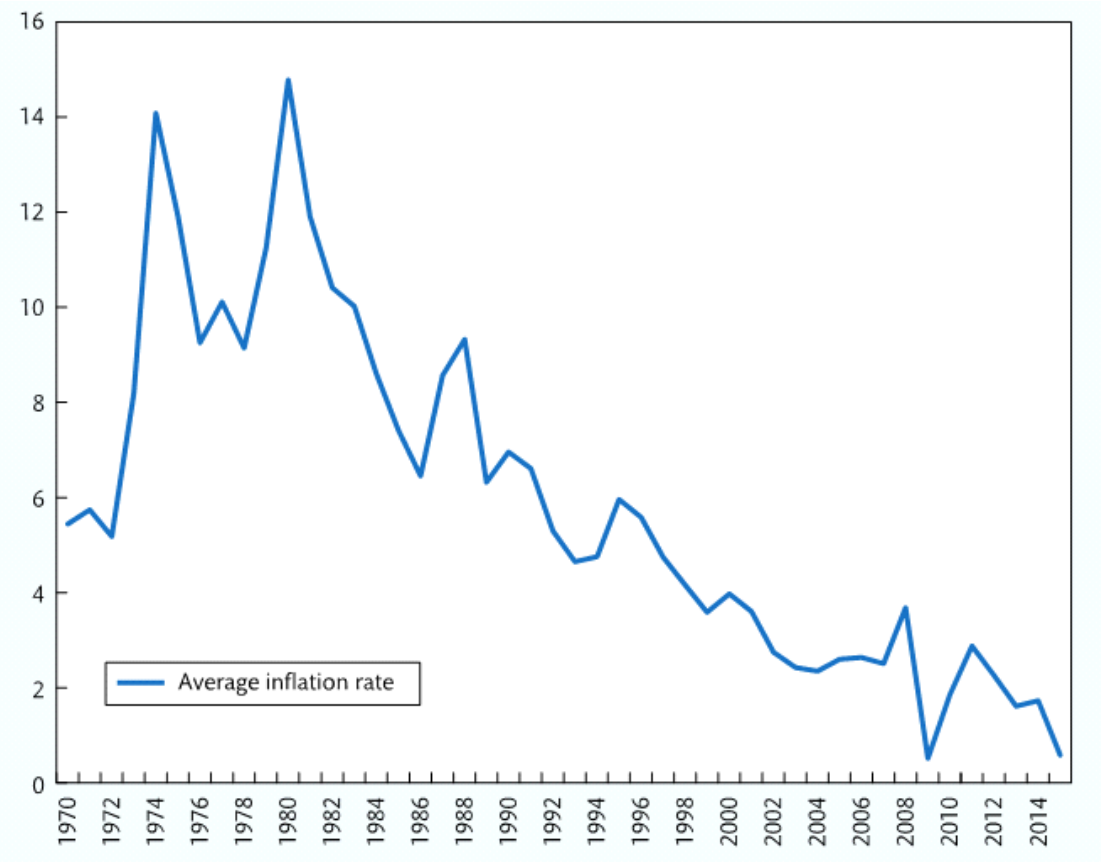
A central bank cannot control both the money stock and the interest rate



Money growth targeting

- That money growth drives inflation, is the reason why central banks around the world are nowadays tasked with the price stability objective
- Achieving a suitably chosen rate of money growth should be the way to achieve low inflation
- That has not always been the case however. 1950's and 1960's: focus on low and stable interest rates with little regard for inflation
- With the interest rate set too low, money grew rapidly, and led to high inflation rates in the 1970's

Inflation in OECD countries, 1970-2015



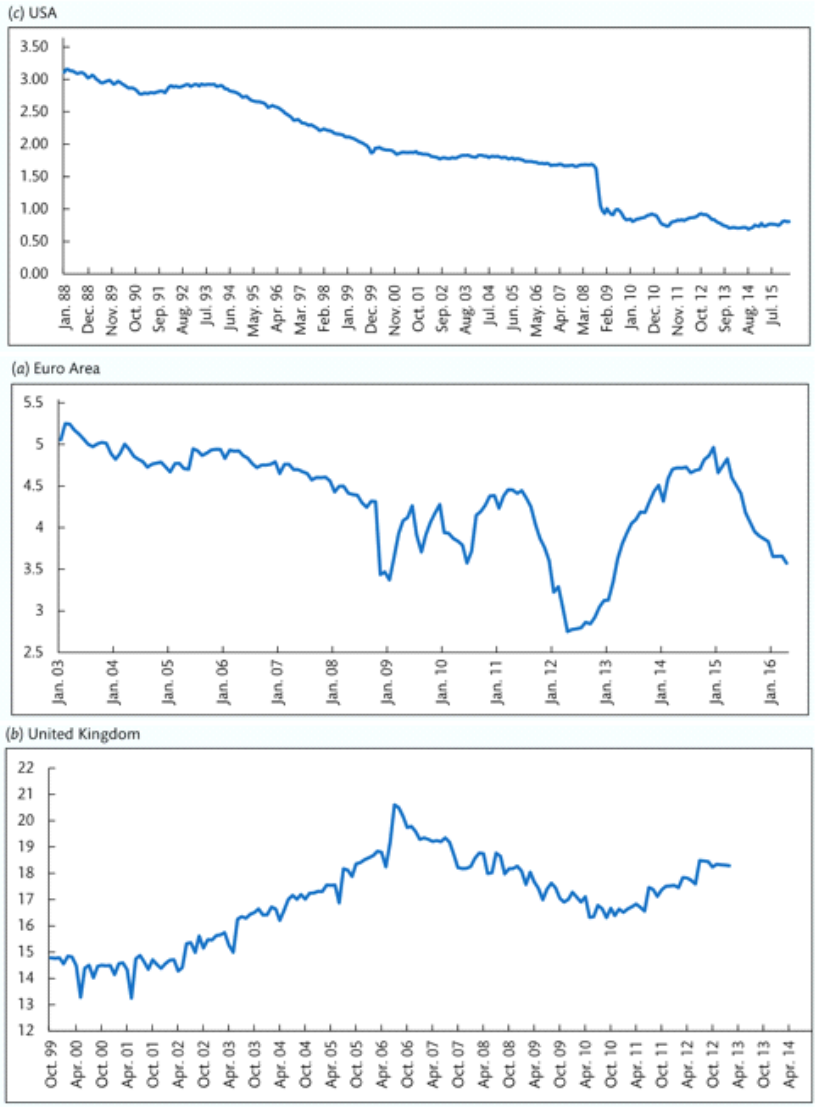
Money growth targeting

- As an immediate reaction to the damaging inflation of the 1970's, many central banks began to target the rate of money growth
- Rationale: if the money multiplier is stable, a choice of monetary base implies a choice of money supply.
- Also, in the long run, inflation π is equal to the difference between the rate of money growth μ and the real GDP growth rate g

$$\pi = \mu - g$$

- Money growth targeting implies forecasting GDP growth g and allowing money to grow at rate μ that delivers low inflation
- But i) it was never clear which monetary stock (M0, M1, M2, M3) should be targeted, and ii) the money multiplier became highly variable

Money multipliers (M1/M0) before and after the Global Financial Crisis

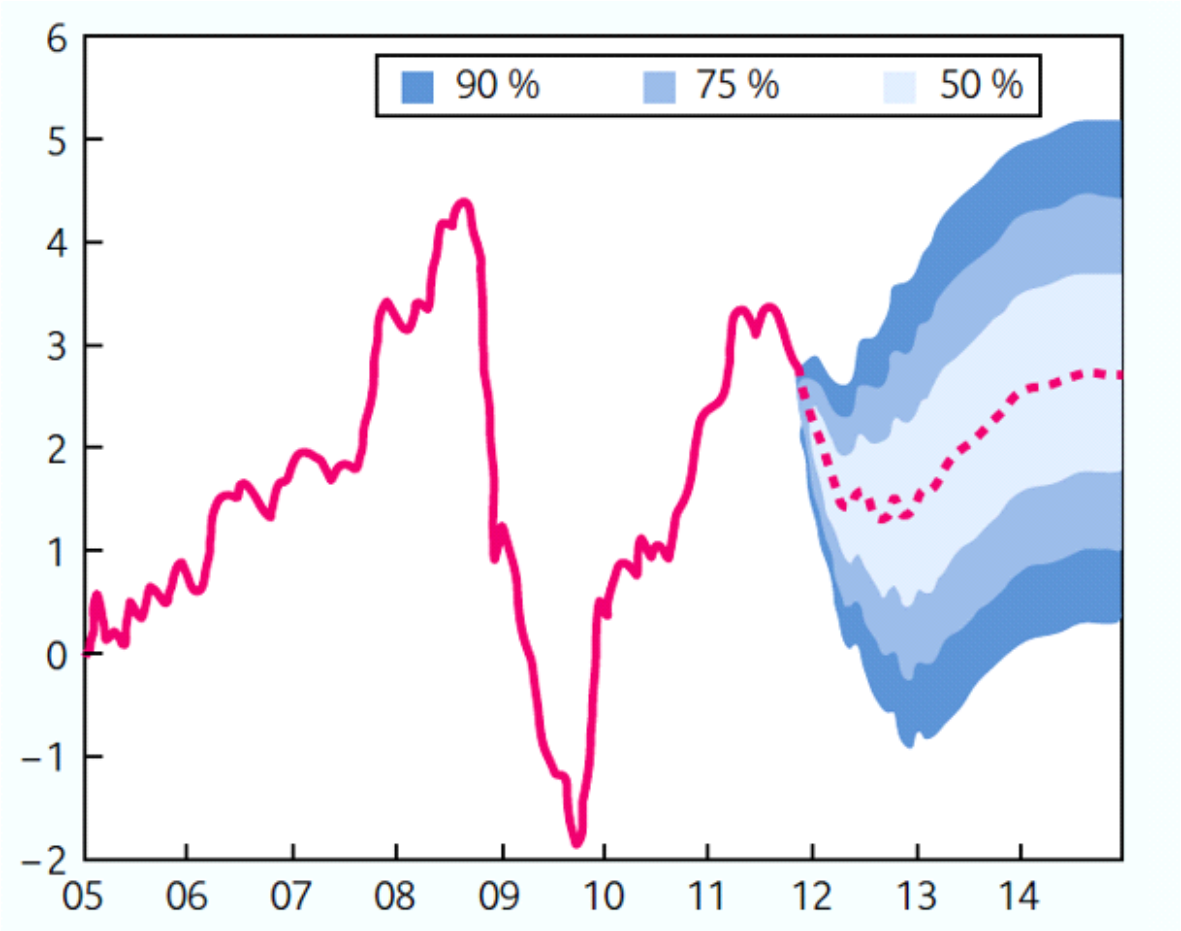


Inflation targeting

- (Expected) **inflation targeting** puts forecasts of future inflation at the centre of monetary policy
- If the forecast inflation rate is too high with respect to the central bank's objective, it will raise the interest rate, which will reduce the inflation rate. If future inflation is below target, the central bank will cut interest rates
- Given the uncertainty of future outcomes, why is the strategy described as *expected* inflation targeting?
- It is easier to target interest rates than the volume of reserves
- The natural appeal of inflation targeting is that it is closest to the central bank's responsibility to maintain price stability
- The ECB: price stability is achieved when the inflation rate is 'close to, but below 2%'

Inflation targeting

How do central banks know how to move the interest rate instrument to achieve the target? By adjusting gradually and observing the outcome



The Taylor rule

- A simple way of summarizing the way central banks deal with the two objectives of inflation and output stabilization is the **Taylor rule**
- The rule states that the central bank raises the interest rate i when the inflation rate π exceeds its **target inflation rate** $\overline{\pi}$, and when real GDP Y exceeds its current equilibrium or sustainable trend level $\overline{Y}$

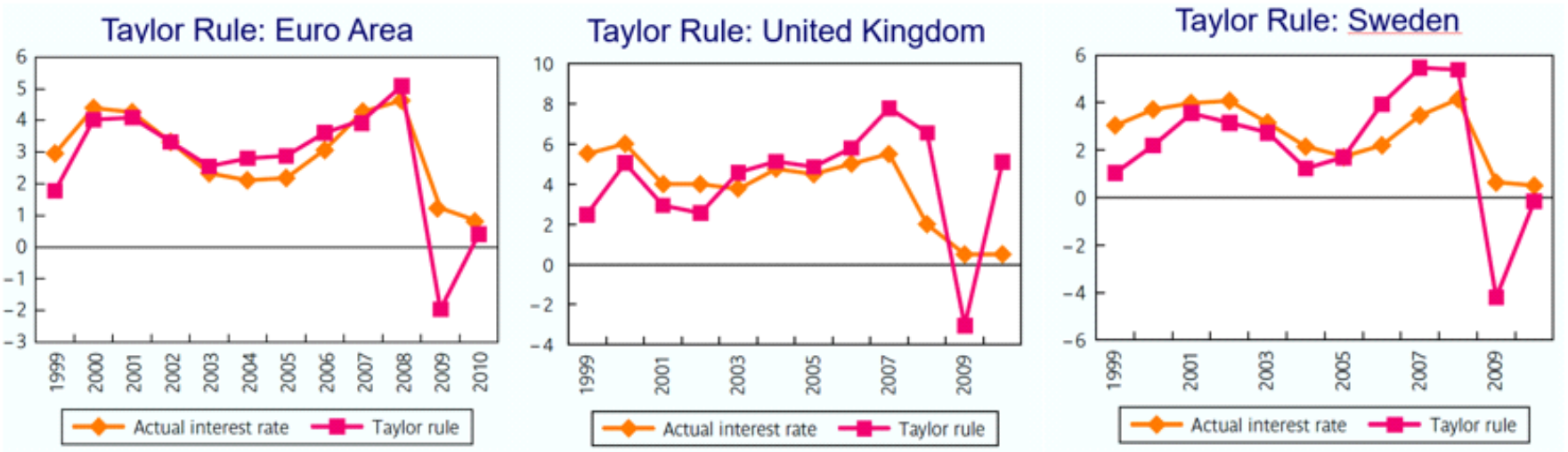
$$i = \bar{i} + a\left(\pi - \overline{\pi}\right) + b\left(\frac{Y - \overline{Y}}{\overline{Y}}\right)$$

with $a > 0$ and $b > 0$

- The trend level of output $\overline{Y}$ is often called **potential output**, and the term $\frac{Y-\overline{Y}}{\overline{Y}}$ is the output gap. The output gap is the difference between actual and potential output
- Parameters a and b reflect the importance that the central bank gives to each objective

The Taylor rule

- The Taylor rule anchors interest rate policy around a level $\bar{i}$ that is called the neutral or natural interest rate.
- It gives a reasonable picture of what central banks actually do: the way in which the central banks' interest rate reacts to inflation and output



The Taylor rule

- The main differences in actual interest rates and the interest rate implied by the Taylos rule appeared during the global financial crisis when the output gap was negative and unusually large.
- The Taylor rule would have implied a negative nominal interest rate which the central banks could not implement
- This situation is known as the **zero lower bound**

The channels of monetary policy

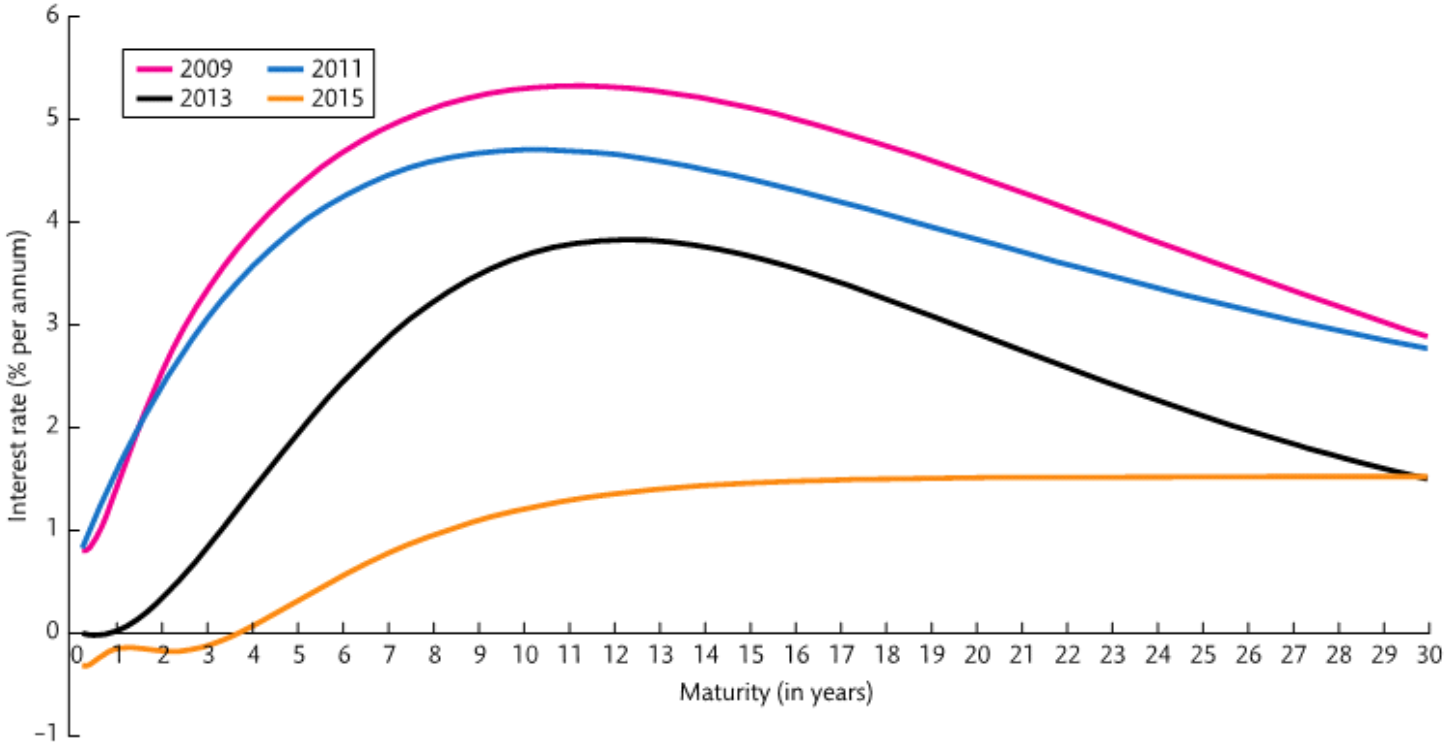
- Monetary policy is meant to affect the spending behaviour of households and firms according to the principles developed in lecture 9
- The interest rate affects the choice between consuming and saving as well as the borrowing costs of firms
- The transmission channels of monetary policy
  - The interest rate channel
  - The asset price channel
  - The credit channel
  - The exchange rate

The interest rate channel

- In lecture 9: longer term interest rates shape households' and firms' economic choices. But, central banks control very short term interest rates
- They control the short end of the yield curve while it is the rest of the curve that matters for spending decisions of the private sector
- Longer term interest rates reflect market expectations of future shorter term rates (the expectations theory of the term structure)
- Central banks must shape **expectations** of future interest rates $\Longrightarrow$ they must be able to convince the markets of their future actions $\Longrightarrow$ **communication** is an integral part of monetary policy
- To convince financial markets and the public central banks build a track record of competence, increase transparency (publication of forecasts, information on the interest rates they intend to set)

Euro area yield curves in the wake of the global financial crisis

The entire yield curve shifted downward between 2009 and 2015



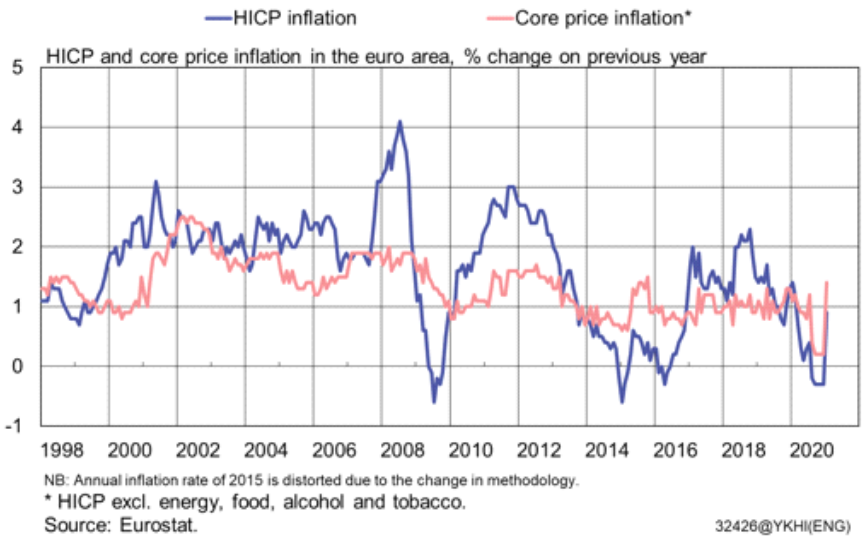
The asset price channel

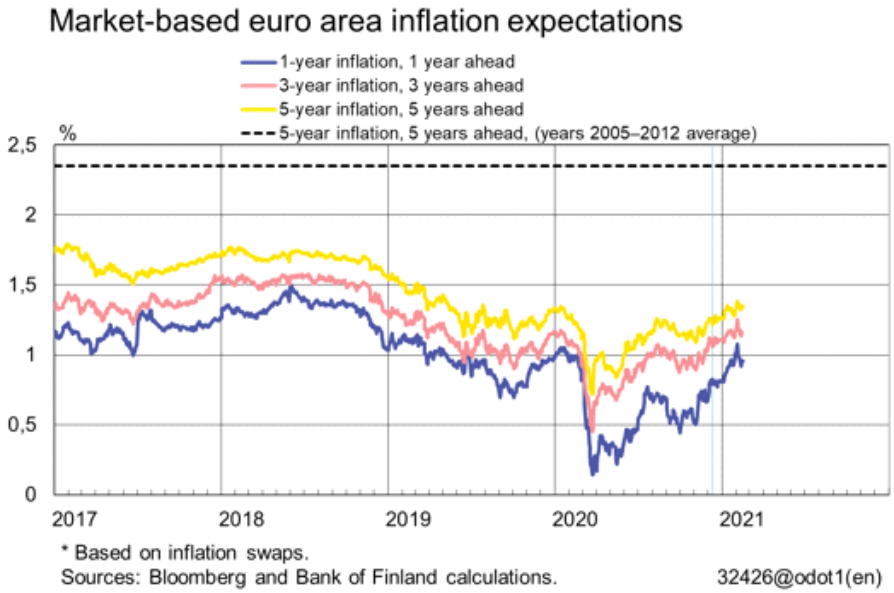
- A rise in the interest rate tends to decrease stock and bond prices, and housing prices.
- This reduces private wealth
- Households react by consuming less and saving more
- Declining stock prices also lead firms to postpone issue of shares, deteriorating the potential for investment

The credit channel

- Monetary policy can affect the economy via the availability of credit *independently of its cost*
- Commercial banks may be reluctant to issue loans, even if refinancing costs are low (liquid assets for prudential purposes, worry about general economic situation, mistrust in other banks)

Monetary policy in a low inflation environment

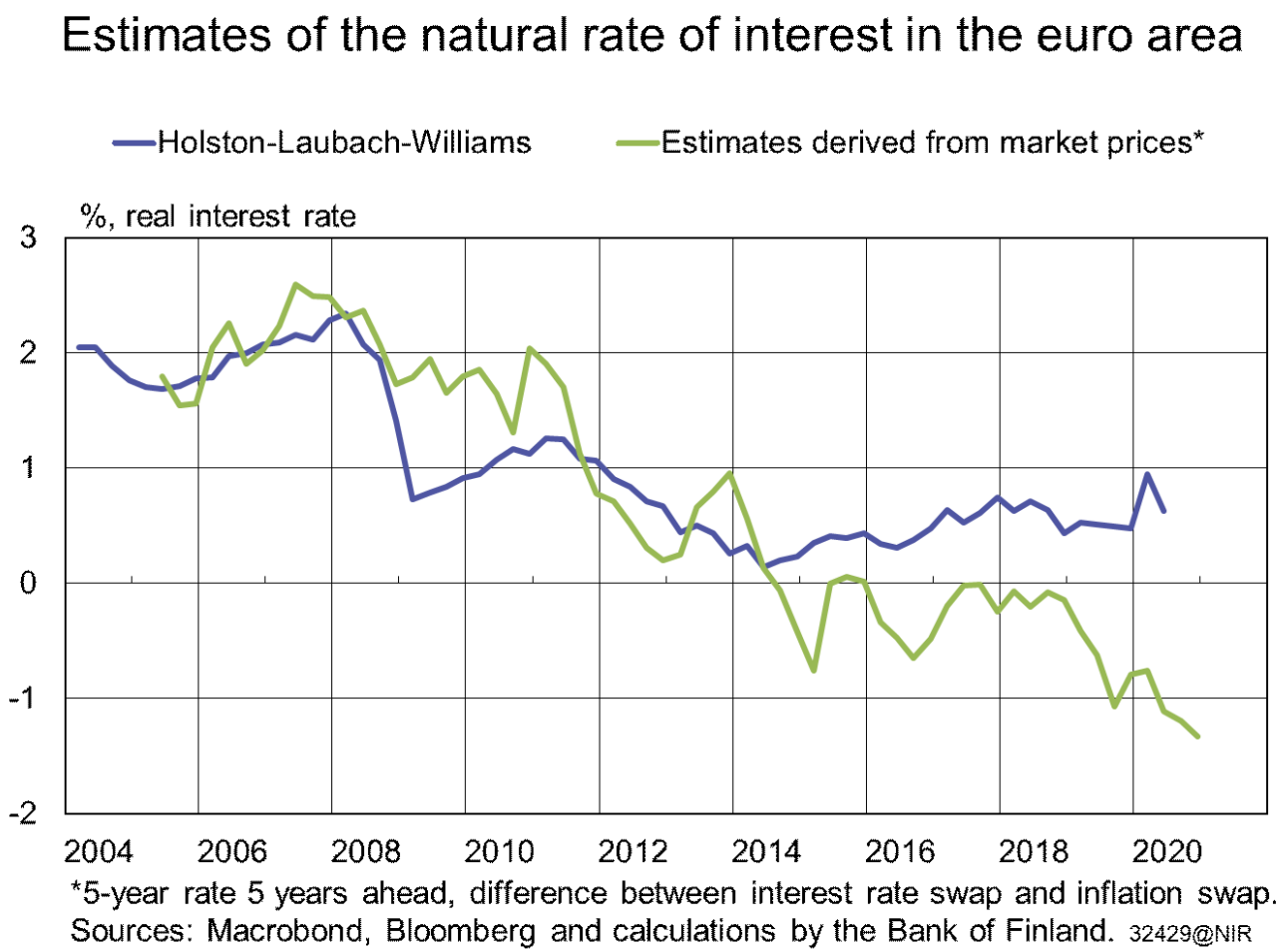




Declining long term real interest rates

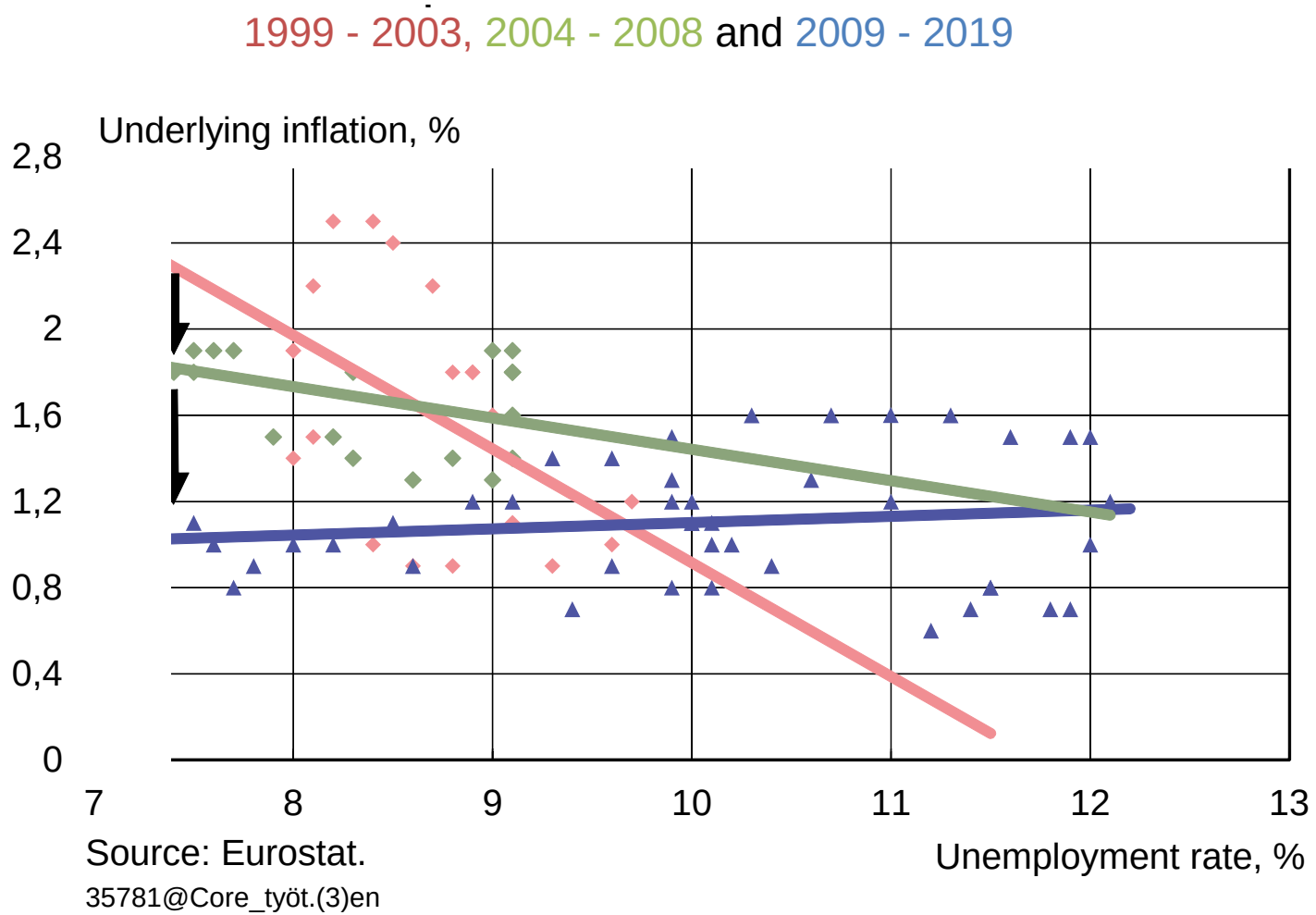
- Long-term real interest rates have been declining for a long time.
- Estimates of the level of **natural interest rates** suggest that the natural interest rate has fallen in the major advanced economies over the last 20 years. In the euro area, estimated to be significantly lower than before the global financial crisis.
- This may be due to an aging population, reflected in rising savings rates, or a general slowdown in productivity growth, reflected in declining investment, or both or other factors.
- The natural interest rate can be defined as a level of real interest rates that is consistent with macroeconomic equilibrium (steady state). It is therefore the real interest rate that would prevail if the economy had full employment, production at potential levels and stable inflation.
- The natural interest rate level is an important anchor for monetary policy, as it defines the "neutral" stance of monetary policy at any given time.
- When the real interest rate is below natural, monetary policy is accommodative, and when it is above natural, monetary policy is tightening

The low interest rates are due to the decline in the natural interest rate



The Phillips curve is not stable - it has flattened

Low unemployment has not generated faster inflation in the past decade or so



The zero, or effective, lower bound of interest rates

- If the natural interest is very low or even negative, this significantly reduces the room of manoeuvre for monetary policy, as the effective lower bound of interest rates makes it more difficult to create an accommodative stance.
- The use of the interest rate instrument is impaired
- Since the 2010's, many central banks have developed non-standard or unconventional policies designed to restore effectiveness to various monetary transmission channels

Unconventional monetary policy instruments

- **Negative interest rates**. Negative deposit rates are like a penalty or tax on banks for holding reserves
- **Quantitative easing (QE)**, large scale open market purchases directly in financial asset markets. Firm commitment by central banks to purchase government debt, private bonds, or even equities over a relatively long horizon (>2yrs). Because these assets remain on the CB balance sheet, QE creates money. The success of QE depends on the credit channel: the willingness of banks to lend out further
- **Forward guidance**. communication from a central bank about the state of the economy and likely future course of monetary policy

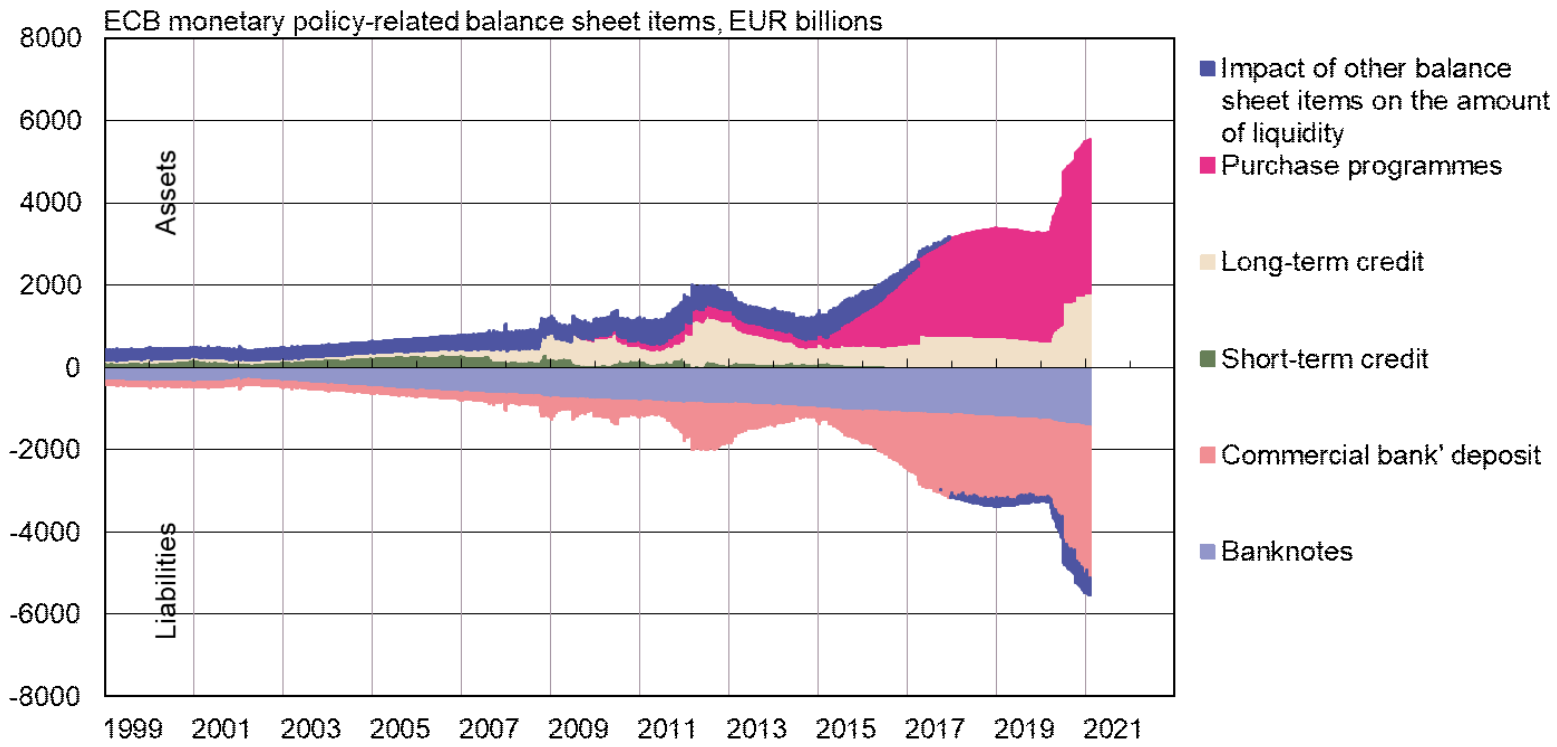
Non-standard monetary policy measures in the euro area

- Three-year LTROs - In recent years, the regular mone market operations have been complemented by two liquidity-providing long-term refinancing operations in euro with a three-year maturity, as well as by US dollar liquidity-providing operations.
- PELTROs – Pandemic emergency longer-term refinancing operations – On 30 April 2020 the ECB's Governing Council decided to conduct a series of seven pandemic emergency longer-term refinancing operations (PELTROs) to provide liquidity support to the euro area financial system and ensure smooth money market conditions during the pandemic period.
- TLTROs - Targeted longer-term refinancing operations - The targeted longer-term refinancing operations (TLTROs) are Eurosystem operations that provide financing to credit institutions for periods of up to four years. They offer long-term funding at attractive conditions to banks in order to further ease private sector credit conditions and stimulate bank lending to the real economy.

Non-standard monetary policy measures in the euro area

- APP - Asset purchases programme - While outright asset purchases have been implemented since 2009 under several programmes, the asset purchase programme was launched in October 2014 with the objective of sustaining growth across the euro area and consistently with the aim of achieving inflation rates below, but close to, 2% over the medium term.
- PEPP - Pandemic emergency purchase programme - On 18 March 2020 the ECB's Governing Council announced a new pandemic emergency purchase programme with an envelope of €750 billion, to last until the end of 2020. The temporary programme was designed as a response to the coronavirus emergency to address the unprecedented situation faced by our monetary union.

Unconventional measures and ECB balance sheet



Source: ECB.

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