

Economic Policy and Business Activity



LISBON
SCHOOL OF
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2nd Semester

Chapter 4

Monetary policy

4. Monetary policy

4.1 Introduction (*lecture 10*)

4.1.1 What do central banks do? (*lecture 10*)

4.1.2 The objectives of monetary policy (*lectures 10 & 11*)

4.2 Theories

4.2.1 Principles (*lectures 11 & 12*)

4.2.2 Transmission channels (*lectures 12 & 13*)

4.3 Policies

Notes:

1. Sections 4.2.3 and 4.2.4 of the student manual are not part of the course, so ignore them.
2. Section 4.3 Policies refers to our discussions in the practice classes.

Theory Lecture 10

Learning outcomes for lectures 10 & 11

- Explain the emergence of a macroeconomic role for monetary policy
- Explain how monetary policy is operated
- Explain the main objectives of monetary policy
- Explain the main functions of Central Banks (CBs)
- Explain the difference between conventional and unconventional measures in the context of CBs monetary policy

Monetary policy (MP): Introduction

- We can't talk about MP without talking about money and Central Banks (CBs)
- Money is an old device but the concept of monetary policy is relatively recent
- Different types of money:
 - Commodity money (objects such as salt, sugar, animals, metallic objects, etc)
 - Metallic money, especially coins
 - Face value = intrinsic value (e.g. gold coins)
 - Face value > intrinsic value (e.g. modern economy coins)
 - Paper money
 - Bank money
 - Digital money
 - ...

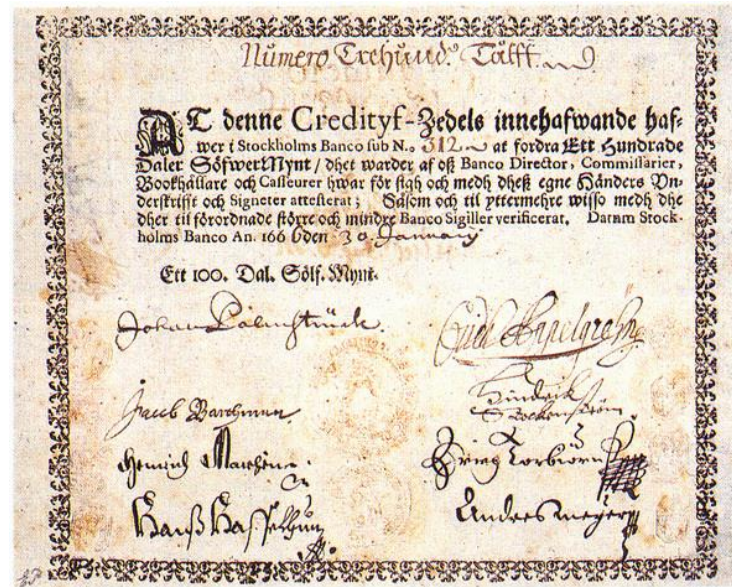
Monetary policy (MP): Introduction



Money in Mesopotamia circa 2000 BC



Metallic money (intrinsic value=face value)



One of the earliest banknotes in Europe, issued by Stockholm's Bank, 1661



Metallic money (intrinsic value < face value)

Monetary policy (MP): Introduction

- Initially CBs tasks were limited to printing and distributing banknotes and coins backed by gold, but nowadays they are very sophisticated policymakers and are responsible for MP
- Creation of some well-known CBs: Sweden CB- 1968, BoE - 1694, FED - 1914; Deutsche Bundesbank - 1948, BCE-1998



\$100 Dollar Gold Certificate, Series of 1922



**“One Hundred dollars in GOLD COIN
repayable to the bearer on demand”**

Monetary policy (MP): Introduction



“PROMISE to pay the bearer on demand One Pound Sterling at their head office here in Edinburgh”

Monetary policy (MP): Introduction



Monetary policy (MP): Introduction

- Some central banks don't include anymore the promise to repay the bearer of the money, e.g. the ECB



Monetary policy (MP): Introduction

- The emergence of a macroeconomic role for monetary policy can be linked to two experiences: the hyperinflation of the 1920s and the subsequent Great Depression
- Both experiences have been shown to be related to monetary policy errors – excessive money creation in the 1920s and excessive money tightening in the 1930s
- MP remained in the shadow of FP in the first post-World-War-II decades, and its importance only re-emerged as a consequence of the mistakes made in response to the inflationary shocks of the 1970s and the subsequent emergence of disinflation as a dominant policy objective
- A lasting consequence of the inflationary mistakes of the 1970s was also that most countries decided to grant independence to their central banks

Monetary policy (MP): Introduction

- By the late 1990s, a near-consensus was achieved that monetary policy should be geared towards **price stability**
- After the recent financial crisis which started in 2007, there was an additional effort from central banks both to convey and make certain their role of guarantors of **financial stability**
- One of the most relevant aspects of the evolution of monetary policy is its increasing sophistication and the growing importance of **credible communication and transparency of CBs** to market participants and private agents

Monetary policy (MP): Introduction

- The dramatic worsening of the economic situation in the aftermath of the 2008 financial crisis led MP to change the conventional course:
 - Policy interest rates were severely lowered and reached the zero bound, and
 - Central banks started engaged in unconventional monetary policy actions
- CBs unconventional actions included, beyond short-term lending to banks, two main initiatives:
 1. direct provision of liquidity to nonfinancial companies through the purchase of short-term securities as a result of the paralyzed banking system
 2. credit easing or quantitative easing by buying longer-term securities such as government bonds in order to keep the asset market operating and lower longer-term interest rates
- Unconventional measures illustrate CBs' mandate to preserve financial stability and their unique power to create money to this effect.
- Unconventional monetary policies were gradually slowed down when CBs were confident about the normalization of economic and monetary conditions

4.1.1 What do central banks do?

1. Liquidity provision
2. The price of liquidity
3. Liquidity in stress times
4. From short-term to long-term interest rates
5. Nominal and real interest rates
6. International linkages
7. Money and money aggregates



4.1.1 What do central banks do?

1. Liquidity provision

- CBs have the privilege of creating **base money (or high-powered money)**, that is, **issuing banknotes** and **providing liquidity to the financial system** in ways that *maintain price stability and promote a safe and efficient payment system*
1. The **issuance of banknotes is of second-order importance** in modern economies. Banknotes represent less than 10% of the economically relevant definition of money
 2. The **provision of liquidity to the financial system is more important** and relates directly to **CBs role of ensuring a safe payment system and a stable price of liquidity**. To achieve this CBs provide their own base money to commercial banks, and if commercial banks face difficulties in borrowing from each other (known as the money market or the interbank market), they can turn to CBs for the money they need to clear payments

4.1.1 What do central banks do?

1. Liquidity provision

How do CBs provide liquidity to the economy?

1. By issuing banknotes and coins
2. Through **open-market operations**, mainly of two types, which **consist of a short-term borrowing provided by CBs to commercial banks**:
 - a) purchases of financial assets by the central bank from commercial banks, or
 - b) repurchase agreements or repos of financial assets by the central bank from commercial banks

The FED tends to use a), while the ECB tends to use b).

4.1.1 What do central banks do?

1. Liquidity provision

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2. Through **open-market operations**, mainly of two types, which consist of a **short-term borrowing provided by CBs to commercial banks**:
 - a) purchases of financial assets by the central bank from commercial banks, or
 - b) repurchase agreements or repos, whereby the CB holds assets on its balance sheet for a fixed period. CBs lend new money to commercial banks and receive in exchange financial assets up to the same value that will be recovered if the loan is not refunded. Commercial banks commit to buying back these assets after a certain period of time (from one day to a few weeks), hence the name of repurchase agreements

The FED tends to use a), while the ECB tends to use b).

CBs decision on what is eligible as collateral is an important dimension of liquidity management and CBs may not accept all types financial assets for CBs liquidity provision (e.g. Greek government bonds)

4.1.1 What do central banks do?

1. Liquidity provision

- CBs can influence commercial banks' lending behaviour in different ways:
 1. by asking them to keep a proportion of the deposits received from the public as a deposit with the central bank. This deposit is called a **reserve requirement**
 2. by **setting a price for their liquidity service provision** to commercial banks (see 2. The price of liquidity)

4.1.1 What do central banks do?

2. The price of liquidity

- Commercial banks pay a fee in the form of short-term interest rate in order to get liquidity from the CB
- The higher the **refinancing rate or refi** (i.e. the rate applied to a repurchase agreement), the lower the demand for liquidity. Thus, by setting a price for its liquidity service, CBs influence the demand for it.
- The resulting **money-market rate** (i.e. the rate used in the interbank money market) will also influence all short-term interest rates in the economy and, to a certain extent, long-term interest rates. As a consequence it will influence the demand for credit and spending and saving behaviour

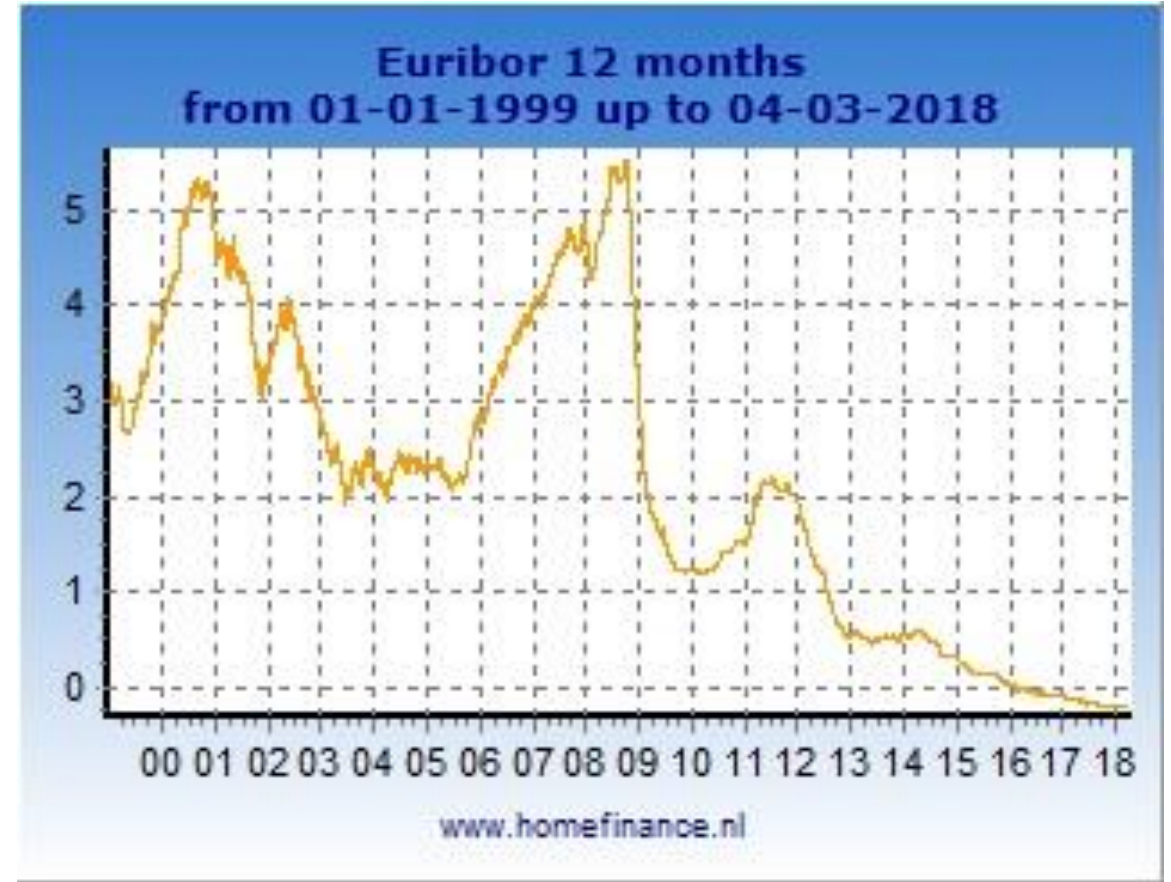
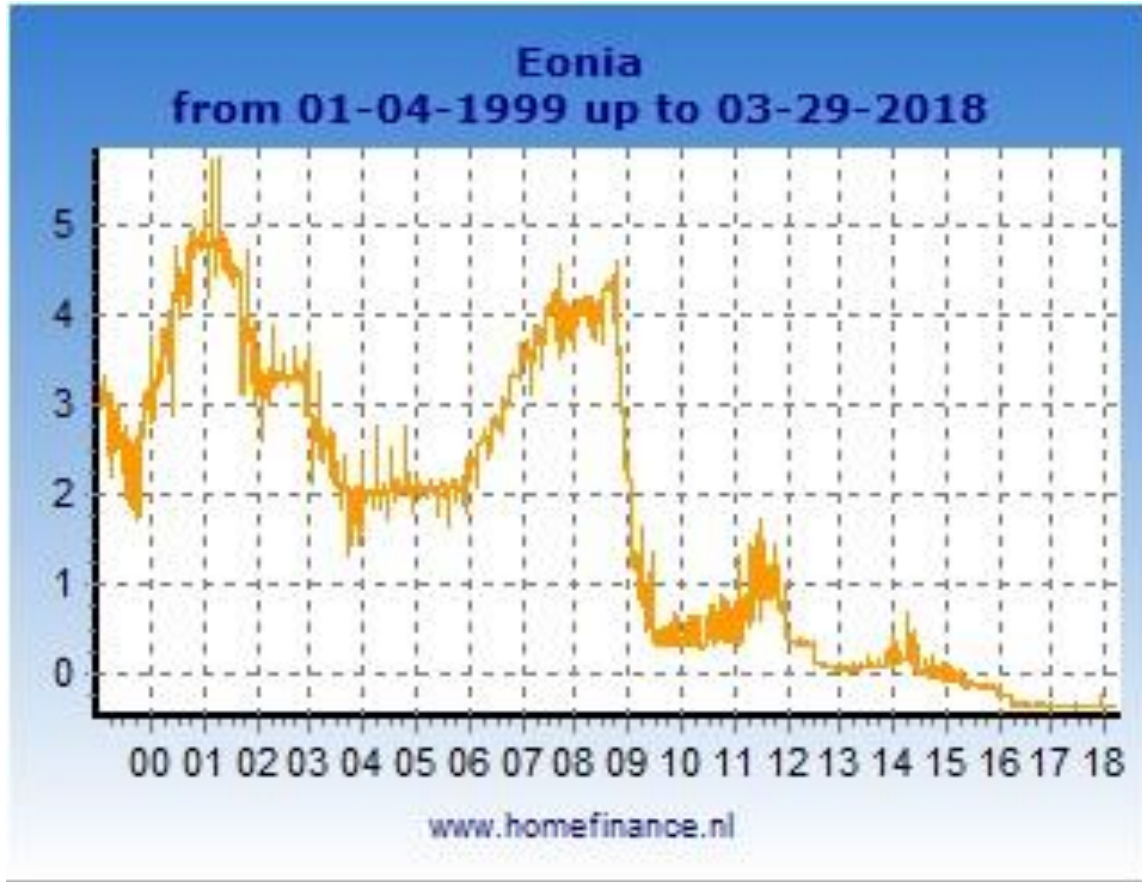
4.1.1 What do central banks do?

2. The price of liquidity

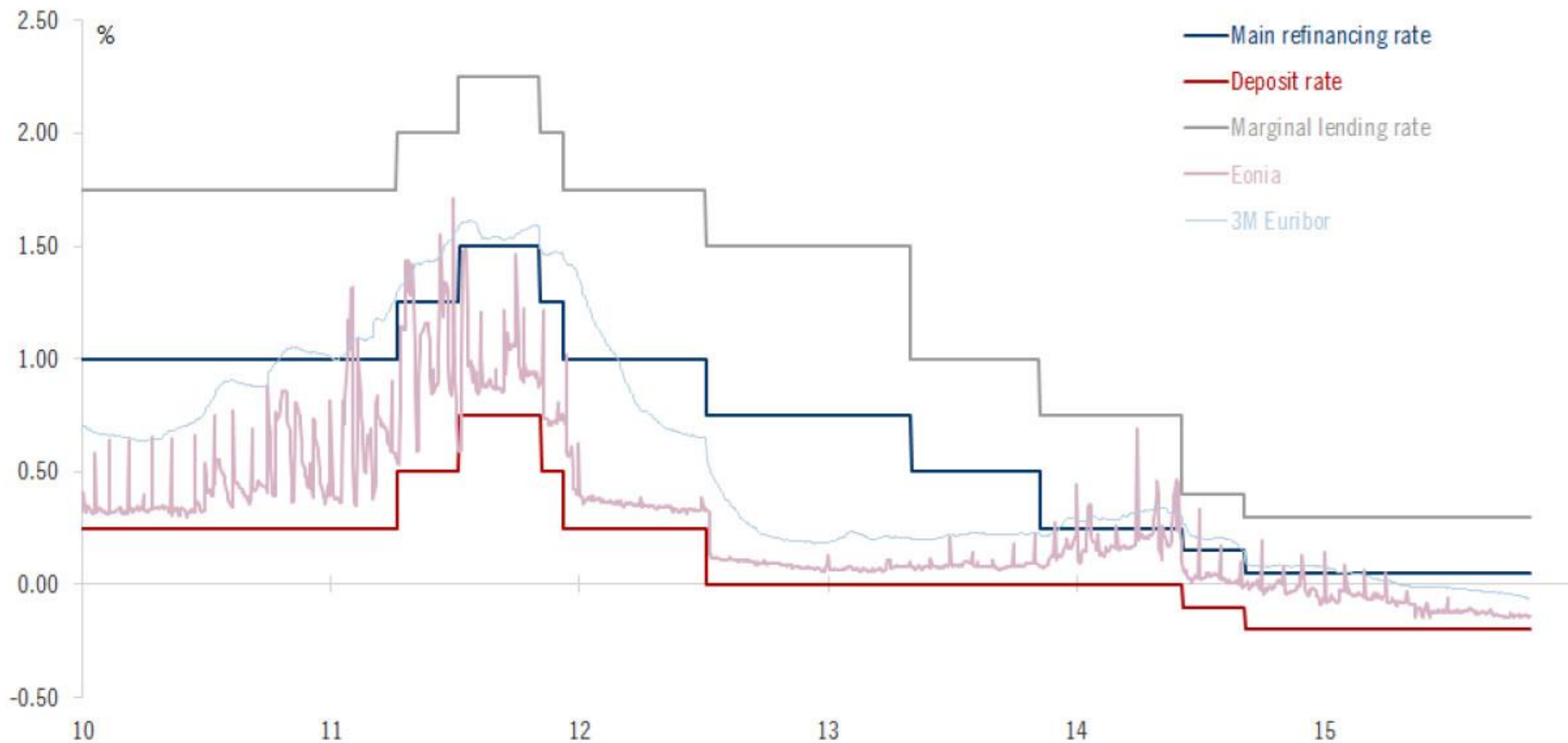
- In the euro area, the main refinancing rate (or refi) is complemented by two marginal financing rates that set a ceiling and a floor to market-rate fluctuations. These rates are sometimes called leading interest rates because they lead the market interest rate
- Every day the ECB measures the average of interbank rates in the money-market, which is called the EONIA (Euro Overnight Interest Average), from a panel of euro area banks. The EONIA fluctuates around the refi rate
- The ECB reference interbank rate for longer periods (1 week to 1 year) is known as EURIBOR (Euro Interbank Offered Rate) and determines interest rates operated by commercial banks on loans to firms and households. Every day the ECB measures the average of the EURIBOR for the different maturities (1week, 2 weeks, 1 month,..., 1 year)

4.1.1 What do central banks do?

2. The price of liquidity

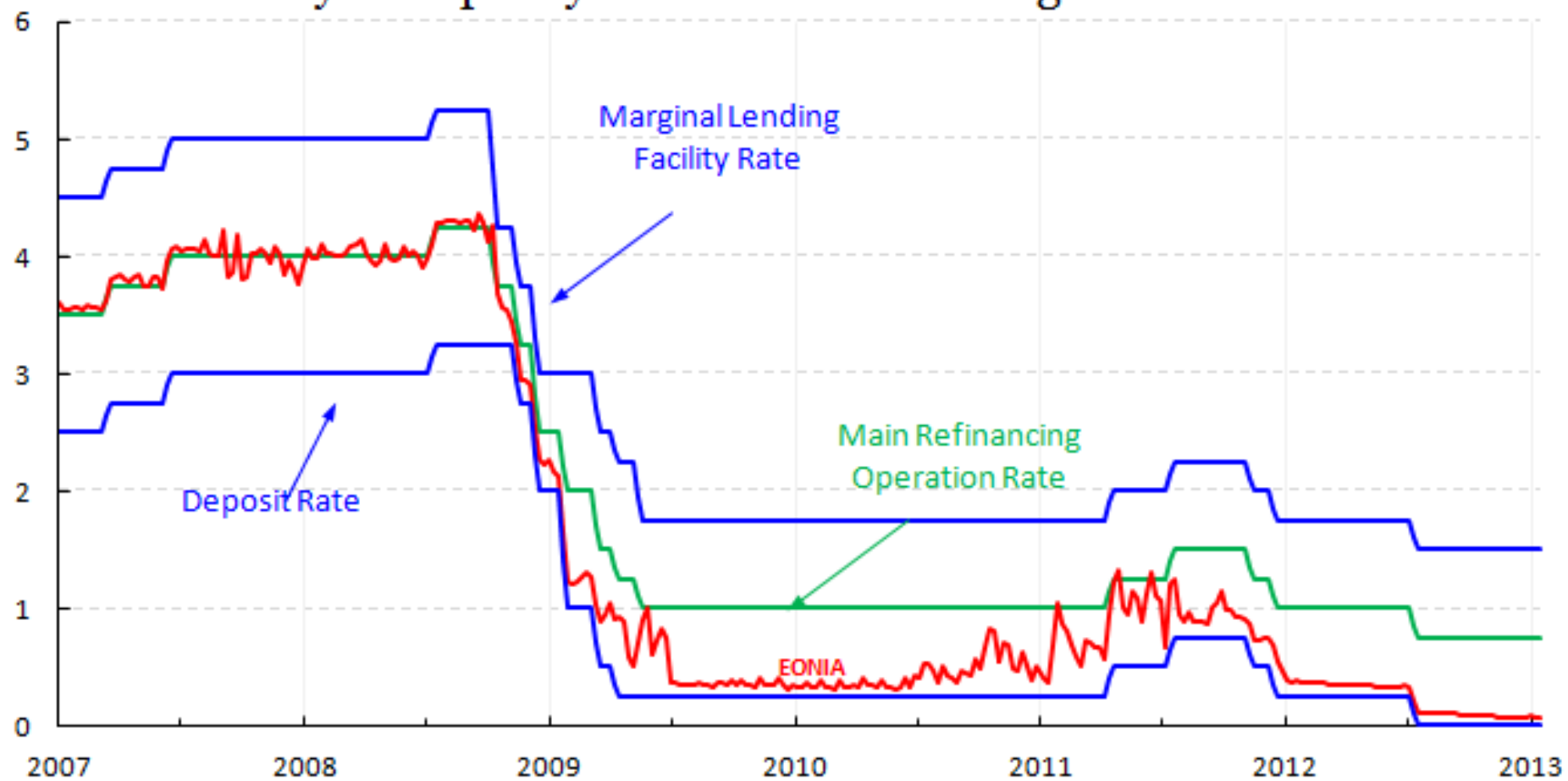


Euro area: ECB policy rates and short-term money-market rates

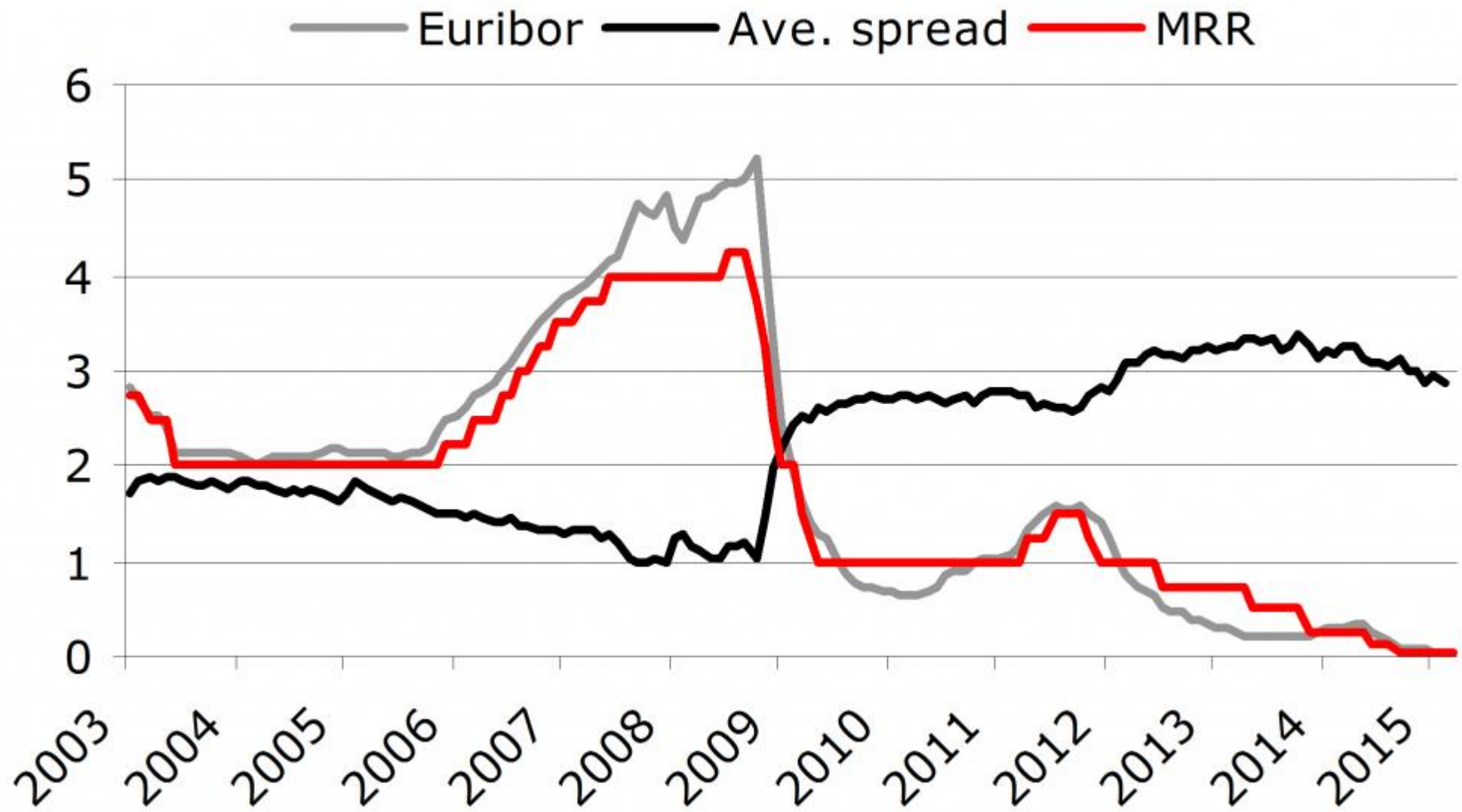


Source: ECB, Bloomberg, Pictet WM - AA&MR

Key ECB policy rates and the overnight rate



Source: ECB / Fulcrum Asset Management



MRR: ECB's main refinancing rate, refi

4.1.1 What do central banks do?

3. Liquidity in stress times

- In usual times banks extend credit to each other, and CB “only” monitors the process and influences interest rates through the provision of limited liquidity to the banking system
- However, when banks are unwilling to lend to each other - e.g. because potential lenders are uncertain of the ability of the borrowers to repay their debts, or because they themselves prefer to hoard cash in anticipation of future shortages -, CBs need to intervene in order to prevent **liquidity crises (i.e. to ensure financial stability)**
- Liquidity crises tend to be caused by financial shocks. A recent example was the US subprime credit crisis with initial signs apparent in summer 2007, causing fear that major banks would face funding problems or even bankruptcy. The result was a decline in the interbank liquidity provision because commercial banks were not lending to each other

4.1.1 What do central banks do?

3. Liquidity in stress times

- Two different types of liquidity, **market liquidity** and **funding liquidity**:
 1. **Market liquidity** can be defined as the ease with which a position in an asset can be liquidated without appreciably altering its price. Threats to it arise when assets that are normally traded in reasonable sizes with little price impact can only be transacted at a substantial premium or discount, if at all. The concept is **asset-specific**.
 2. **Funding liquidity** can be defined as the ease with which a solvent institution can service its liabilities as they fall due. Illiquidity occurs when solvent counterparties have difficulty in borrowing immediate means of payment to meet liabilities that are falling due. This concept is **institution-specific**.

4.1.1 What do central banks do?

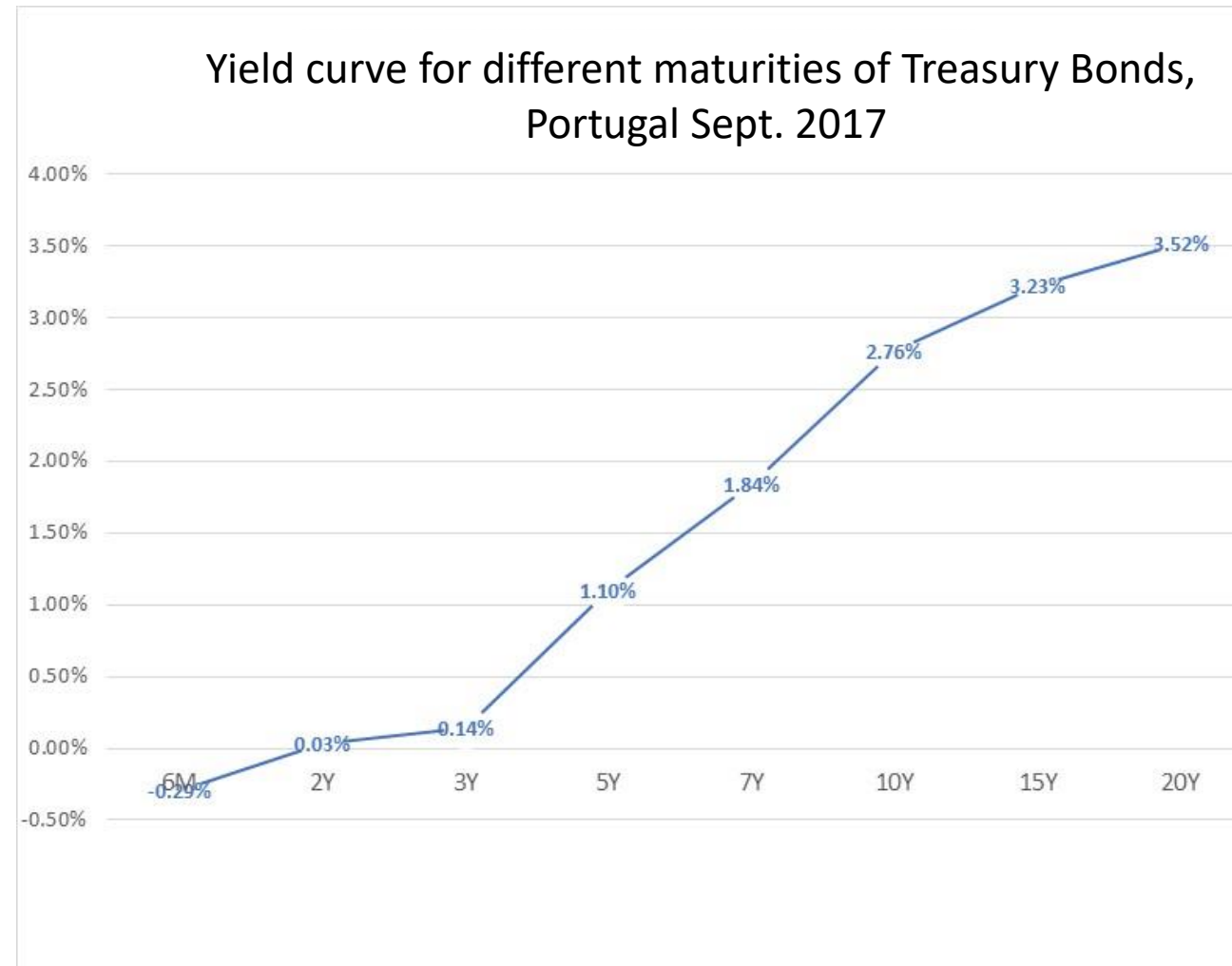
3. Liquidity in stress times

- The concepts of **market liquidity** and **funding liquidity** are interdependent because illiquidity of a given market affects institutions which are heavily involved in it, and vice-versa
- The crisis in 2007 started as a market liquidity crisis affecting mortgage-related assets and quickly became a crisis of the funding of institutions with significant exposure to the mortgage market
- Central banks assume a crucial role with regard to both categories of risks, especially when funding strains imperil the viability of financial institutions. In 2007-08, in the last stage of its policy action, central banks embarked on outright credit expansion

4.1.1 What do central banks do?

4. From short-term to long-term interest rates

- Short-term market interest rates remain close to official CB rates, and also influence interest rates for longer maturities
- Since investments with longer maturity have a more uncertain return, there is a **risk premium called the term premium** included in longer-term interest rates
- Accordingly, short-run interest rates tend to be lower and longer-term rates higher



4.1.1 What do central banks do?

4. From short-term to long-term interest rates

- The **yield curve (i.e. interest rates as a function of maturity)** is affected by expected monetary policy
- This is because portfolio managers investing over a long period can either hold long-dated assets or roll short-dated assets over time
- If they are not risk-averse, the long-dates interest rate should be the average of the sequence of expected future short-dated interest rates

4.1.1 What do central banks do?

4. From short-term to long-term interest rates

- Real world investors are generally risk-averse, and since long-term investment is riskier than short-run investments it generally yields higher interest than the succession of short-run investments
- More precisely, the interest rate for maturity N, i_t^N , can be expressed as a function of expected short-term rates $i_{t+\tau}^l$ and of a term premium ρ_t^N . Thus: (the yield curve is)

$$(1 + i_t^N)^N = (1 + i_t^l)(1 + E_t i_{t+1}^l) \dots (1 + E_t i_{t+N-1}^l)(1 + \rho_t^N)^N$$

where $i_{t+\tau}^l$ is the one-year interest rate in $t+\tau$ and ρ_t^N is the annualized term premium, defined as the extra return required by investors to compensate for holding riskier assets, it increases with N

4.1.1 What do central banks do?

4. From short-term to long-term interest rates

- Note that the longer-run interest rates incorporate **expectations concerning future monetary policy**, so they can change even when short-run rates are held constant
- This is one reason why CBs try to avoid creating surprises by communicating their intentions with respect to MP through pre-fixed regular speeches and interviews.
- By doing this, CBs can smooth the evolution of long-run interest rates. The next figure shows that the successive hikes of the main refinancing rate by the ECB (in 2006) were incorporated in interest rates of the 1-month+ maturity before they took place. The longer-term interest rates rose smoothly through the year

4.1.1 What do central banks do?

4. From short-term to long-term interest rates

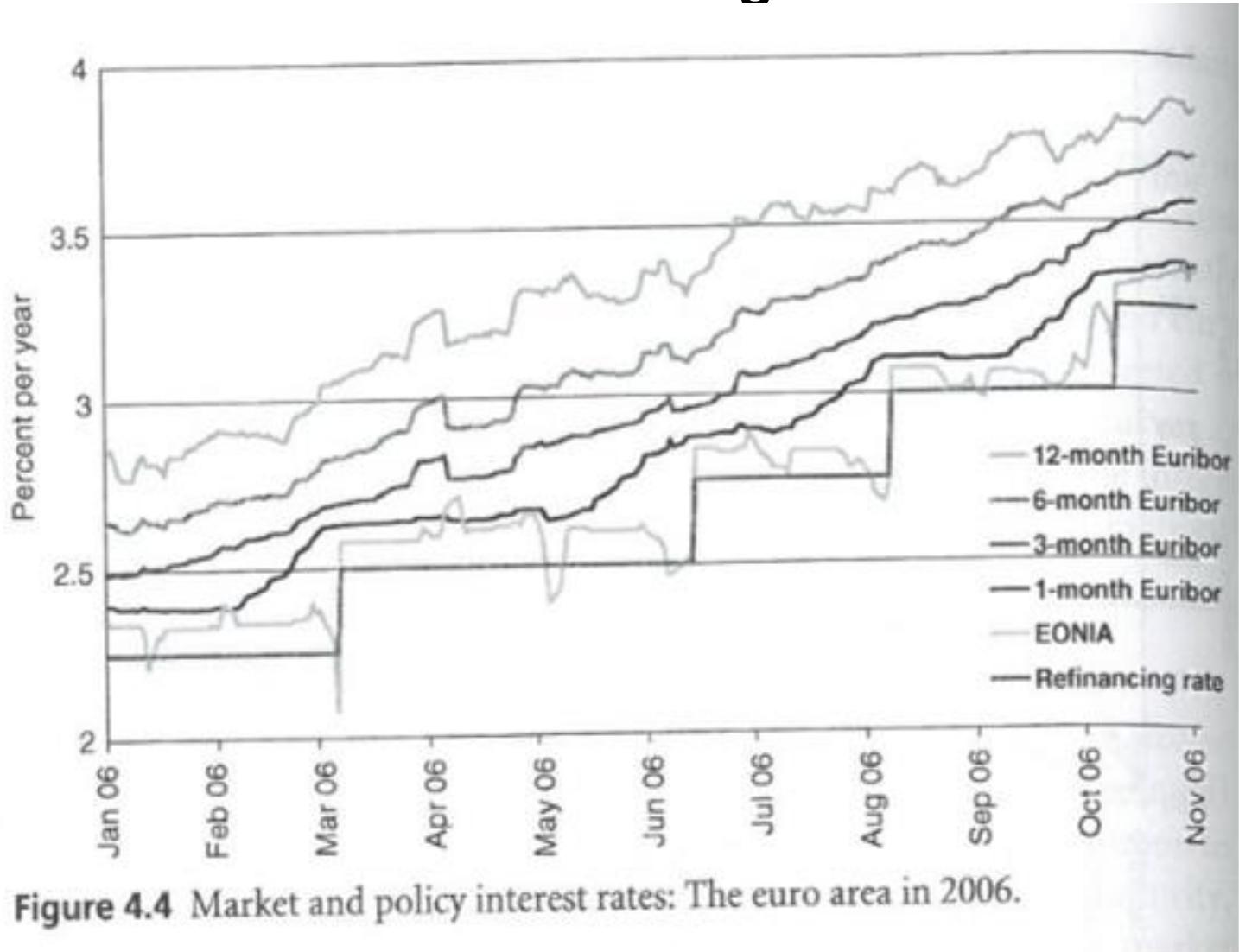


Figure 4.4 Market and policy interest rates: The euro area in 2006.

- The successive hikes of the main refinancing rate by the ECB (in 2006) were incorporated in interest rates of the 1-month+ maturity before they took place
- The longer-term interest rates rose smoothly through the year

4.1.1 What do central banks do?

5. Nominal and real interest rates

- The real interest rate is the difference between the nominal interest rate and the expected inflation rate over the same period
- Because the expected – rather than observed – inflation rate enters into its determination, it is sometimes called the ex ante real interest rate, while the difference between the interest rate and observed inflation is called the ex post real interest rate
- Both notions can be used but only **the ex ante real rate matters for economic decisions**

4.1.1 What do central banks do?

6. International linkages

- Capital mobility across countries distorts the link between MP and interest rates because investors can arbitrage not only between short-run and long-run assets, but also between domestic and foreign assets
- See figure: long-term rates in the euro area and in the US depend on expectations concerning future MP. However, for each maturity, investors can arbitrage between euro area and the US assets. This makes the interest rates interdependent

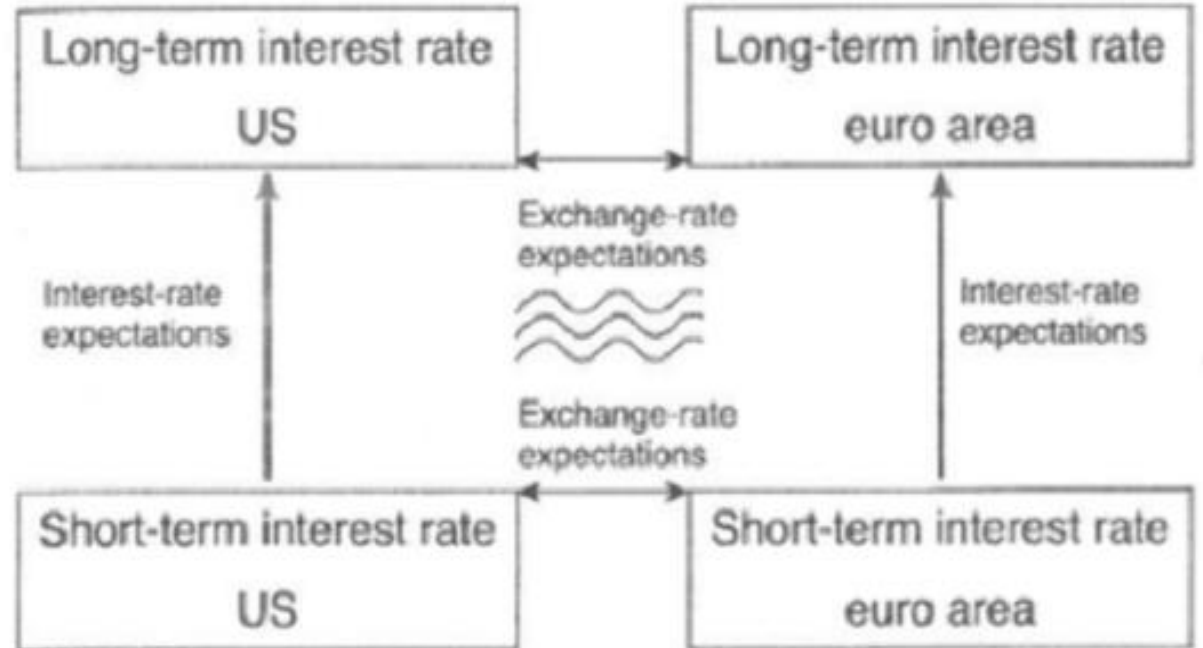


Figure 4.5 International interest rate linkages: A stylized view.

4.1.1 What do central banks do?

6. International linkages

- Interdependence does not mean identity, for two reasons:
 1. some countries are riskier than others because of higher indebtedness, political uncertainty or weak legal protection and financial supervision. Hence a country-risk premium is added to their interest rates in comparison to less risky countries, especially for long-run assets
 2. interest rates differ across countries if the exchange rate is expected to vary. This is because investors will require a higher return from an asset denominated in a currency that they expect will depreciate

4.1.1 What do central banks do?

7. Money and money aggregates

- Money is hard to define and to measure, especially as financial innovation has developed there is now a continuum of financial instruments which meet the typical definition of money (e.g. as medium of exchange)
- The main **money aggregates** are:

M0	money directly circulated by the central bank (coins and notes in circulation plus deposits of commercial banks at the central bank)
M1	M0 + demand deposit accounts in commercial banks
M2	M1 + deposits with a maturity of up to two years
M3	M2 + money market instruments, i.e. marketable securities with less than one year to maturity

More liquid assets

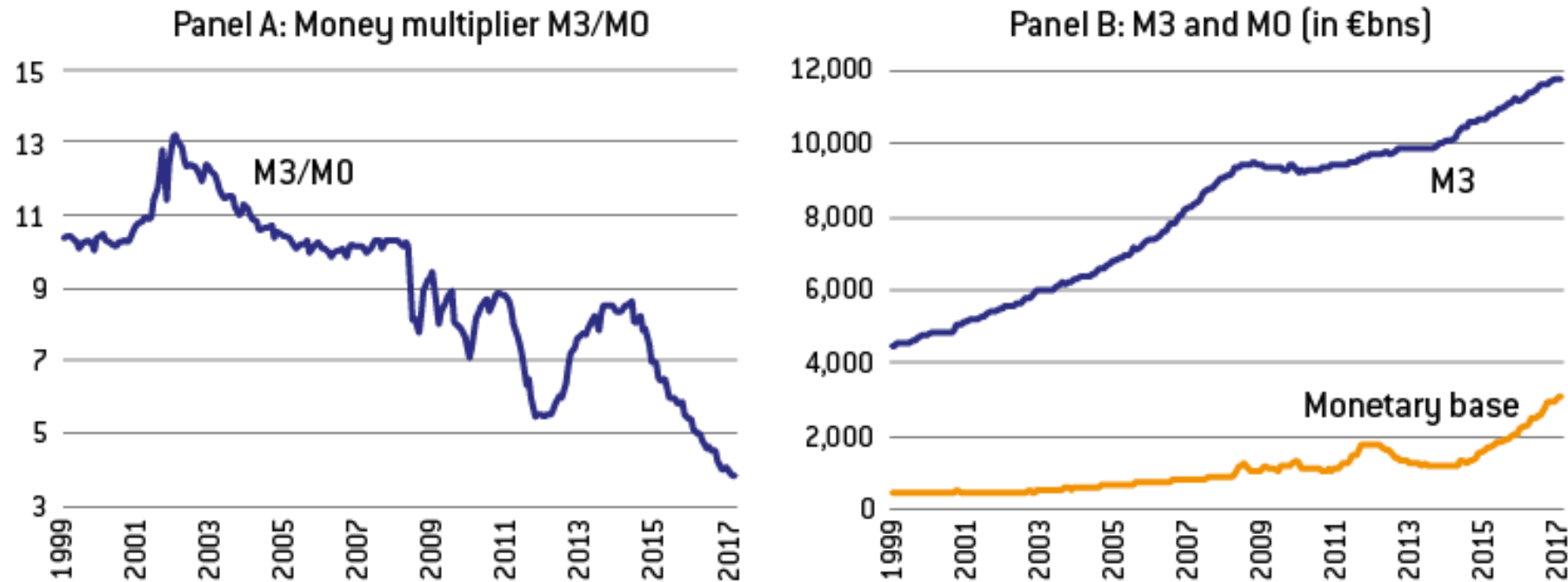


Less liquid assets

4.1.1 What do central banks do?

7. Money and money aggregates

Monetary aggregates and money multiplier in the euro area since 1999:



Since 2007 the multiplier has fallen considerably. The increase in M0 during the crisis has not led to a proportional increase in M3, nor has the ECB's 2012 decision to cut by 2 the reserve requirement led to a doubling of broad money M3 through quicker expansion of credit in the euro area

4.1.1 What do central banks do?

7. Money and money aggregates

- Control of M0 allows CBs to control the total amount of money in circulation. However, the link between M0 and other aggregates has loosened over time, especially because close substitutes to the least liquid components M2 and M3 have emerged as a consequence of financial innovations
- If commercial banks extend loans in constant proportion to the money received from CBs, the ratios of M1, M2, and M3 to M0 are constant and called **money multipliers**
- **Commercial banks create money by providing loans**, i.e., there is money creation each time the banking sector extends a loan to nonbank customers, because this amounts to increasing the total amount of deposits in the system

4.1.1 What do central banks do?

7. Money and money aggregates

- Historically, **monetary aggregates** played an important role in monetary policy. In the 1980s, most central banks relied on such aggregates to guide policy: monetary aggregates served as leading indicators of future inflation because they were supposed to be strongly correlated with future inflation (as predicted by quantity theory of money)
- CBs targeting low inflation would define a path for monetary aggregates consistent with price-stability objective. However, experiences with strict control of money aggregates, especially in the US and the UK in the late 1970s, resulted in high interest-rate instability, and money aggregates proved to be poor predictors of inflation in a financial-innovation context
- Aggregates were thus put aside as policy indicators and some CBs (e.g. US FED) don't publish them anymore

Theory Lecture 11

Learning outcomes for lectures 10 & 11

- Explain the emergence of a macroeconomic role for monetary policy
- Explain how monetary policy is operated
- Explain the main objectives of monetary policy
- Explain the main functions of Central Banks (CBs)
- Explain the difference between conventional and unconventional measures in the context of CBs monetary policy

4.1.2 The objectives of monetary policy

- The objectives that CBs should pursue constitute their mandate; they have varied over time and are still a matter of discussion among politicians and economists
- One of the lessons drawn from the inflation of the 1970s and the 1980s has been that central banks ought to be given more precise objectives; price stability emerged as the dominant one
- However, not all CBs have a mandate focused on price stability and those that do may have to pursue other objectives simultaneously
- The financial crisis of 2007-09 opened a discussion on whether CBs should be less focused on controlling price inflation and gear monetary policy more towards financial stability

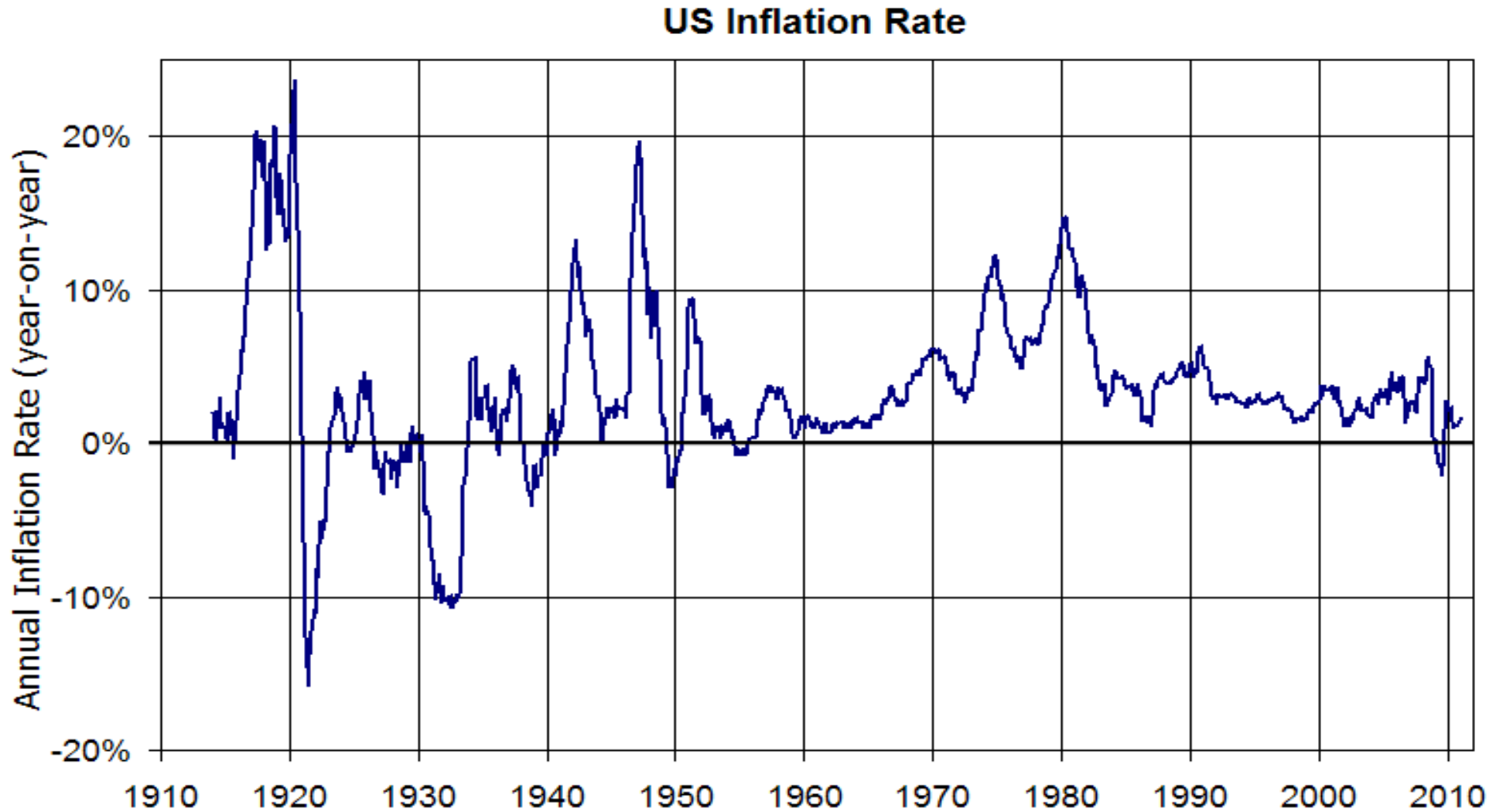
4.1.2 The objectives of monetary policy

- 1. Price stability**
- 2. Exchange-rate stability**
- 3. Output stabilization**
- 4. Financial stability**

I will talk about 1) and 4) first

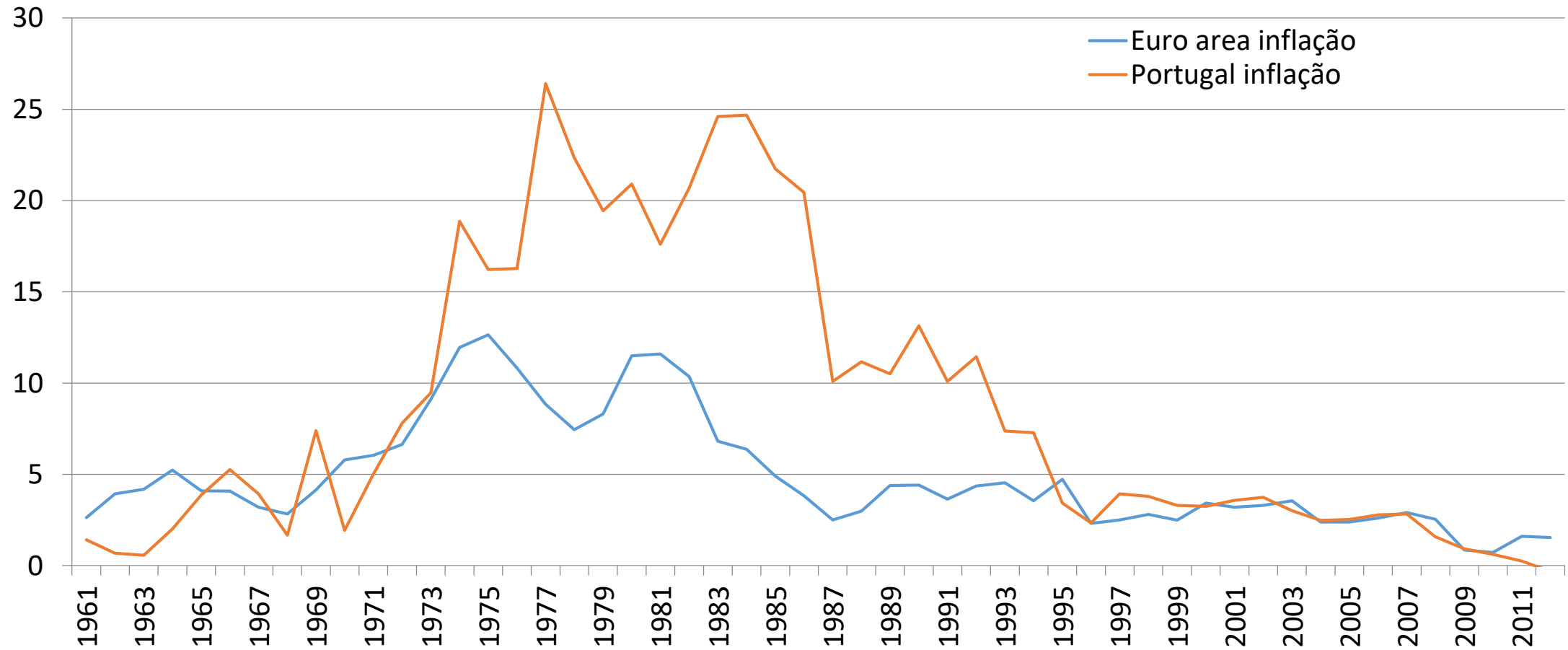
4.1.2 The objectives of monetary policy

1. Price stability



4.1.2 The objectives of monetary policy

1. Price stability



4.1.2 The objectives of monetary policy

1. Price stability

- Pursuing price stability consists of maintaining the real value of money, i.e its purchasing power: the quantity of goods, services or assets that one unit of money can buy.
- Justification for assigning a price-stability objective to CBs is threefold:
 1. price stability is a desirable objective from a social welfare point of view
 2. central banks are best placed to reach this objective
 3. assigning any other task to them would distract from accomplishing the former

4.1.2 The objectives of monetary policy

1. Price stability

- The most frequently mentioned benefit of price stability is that **inflation distorts economic decisions** through the implicit taxation of cash balances and it **blurs relative price signals**, thus **affecting the allocation of resources** in an economy
- Money-created inflation is also associated with Cantillon effect, which essentially says that inflation is a regressive tax, as it transfers wealth from creditors to debtors and represents a greater loss of income for lower income households
- This is why most central banks aim at keeping the inflation rate at a low value

4.1.2 The objectives of monetary policy

1. Price stability

Are central banks best placed to reach the price-stability objective?

- The monetarist answer: “inflation is always and everywhere a monetarist phenomenon”, pointing to a direct causal relation between quantity of money and inflation
- This proposition implies that price stability requires controlling the amount of money in circulation and makes monetary policy the natural instrument for controlling inflation
- However, the medium-term direct relationship between money and prices has broken down in recent times, and contemporary economic models do not give a special role to money
- There must therefore be other justifications for assigning the control of inflation to monetary rather than to fiscal policy

4.1.2 The objectives of monetary policy

1. Price stability

Are central banks best placed to reach the price-stability objective?

- The arguments are both economic and institutional:
 1. assumption of long-term neutrality of money, i.e. the disconnection, in the long run, between nominal variables and real variables. Though it has real effects in the short run, over a long horizon, monetary policy can best control nominal variables without affecting real variables. This is not the case for fiscal policy, which affects the composition of output both in the short run and in the long run
 2. controlling inflation should not be distracted by other policy objectives that may influence the price level, such as output targeting or the financing of public deficits. Independent institutions with a narrow mandate are better equipped to do this
- For these reasons, CBs have been put in charge of price stability in all countries

4.1.2 The objectives of monetary policy

1. Price stability

- Disinflation was a major achievement of the 1990s
- Some debate remains with respect to how much of the price stability observed in the 1990s and the early 2000s was due to
 - 1) favourable worldwide conditions associated with globalization (positive supply shock), and/or
 - 2) how much to the quality of monetary policies and institutions (institutional developments) is hard to tell
- The answer is most likely the two

4.1.2 The objectives of monetary policy

4. Financial stability

- **Financial stability** - i.e. the **proper functioning of banks and financial markets** - was not a major concern in the post Great Depression financial systems of the 1960s
- However, **after the progressive liberalization of the financial systems in the 1980s and the 1990s**, the issue **gained prominence** with the emergence of the worldwide financial crisis that started in 2007-08
- **Responsibility for financial stability is generally shared** between regulatory agencies that deal with one or several specific market segments (such as securities, banking, insurance, etc.), the central bank, and the Treasury

4.1.2 The objectives of monetary policy

4. Financial stability

- In general, the **responsibility of regulators and supervisors is microeconomic** in nature whereas the **central bank's is macroeconomic**
- The **micro-financial framework** involves setting standards to ensure that banks properly **manage the risks** they take and **hold sufficient capital to cover them**. This is the role of **prudential policy**, it is a necessary condition for financial stability but is not sufficient: even sound financial systems are subject to bubbles!
- Because MP acts through changing the relative price of present and future consumption as well as the incentive to invest, it relies on the banking and financial sectors that pass monetary impulses onto credit and market interest rates
- Therefore, **a safe banking and financial sector is crucial for MP transmission** and CBs are very concerned by financial stability. This can lead CBs to extend large amounts of liquidity to the banks in the short run when all of them are simultaneously seeking liquidity, and therefore cannot lend to each other

4.1.2 The objectives of monetary policy

4. Financial stability

- The reason why central banks are willing to provide liquidity to markets in times of stress is that events that endanger the ability of some borrowers to meet their obligations may degenerate into a chain reaction – what is called a **systemic crisis**
- The financial stability role of the CBs raises three policy issues which are a matter of ongoing discussion:
 - (1) Moral hazard
 - (2) Compatibility with price stability
 - (3) Implications for the definition of central bank objectives

4.1.2 The objectives of monetary policy

4. Financial stability

1) Moral hazard

- By acting as a lender of last resort that extends assistance to important financial institutions when they find themselves unable to raise money on the market, CBs may encourage imprudent risk-taking behaviour.
- Furthermore, the collateral provided by illiquid financial institutions in the context of repurchase agreements may be of inferior quality, which may imply that the CB de facto engages in implicit bail-out

4.1.2 The objectives of monetary policy

4. Financial stability

2) Compatibility with price stability

- In principle, the provision of liquidity by CBs in times of stress should not conflict with their macroeconomic objectives, in particular, price-stability
- This is true when assistance is provided to one particular institution, but less so when CBs engage in wholesale liquidity provision like in the aftermath of the crisis of 2007-09. In such situations, loans to banks increase the quantity of money that could result in inflation if extended beyond the liquidity stress period

4.1.2 The objectives of monetary policy

4. Financial stability

3) Implications for the definition of central bank objectives

- Central banks monitor asset prices as these convey information on possible future crisis and on possible developments in inflation. In particular, a rise in asset prices may lead to imprudent borrowing and their eventual fall may result in financial disturbance. However, in general, the control of asset prices has not been assigned to central banks' objectives

None of the three issues can be considered settled definitively. The role of CBs was once defined in a context where commercial banks were the main actors in the collection of savings and the allocation of financial resources, but traditional models are being challenged by the development of market-based finance, disintermediation, and the development of financial innovation

4.1.2 The objectives of monetary policy

2. Exchange rate stability

- An historically important role of monetary policy has been exchange-rate stability
- Until the 1990s, many countries relied on a fixed exchange rate as a means of controlling inflation and, after the demise of the Soviet bloc, several countries in transition decided to “anchor” their economy through the setting of a fixed exchange rate
- However, the attraction of fixed exchange-rates has faded away in recent years, though China and some smaller countries continue to peg their exchange rates (i.e. their currency external-value)

4.1.2 The objectives of monetary policy

3. Output stabilization

- Like fiscal policy, monetary policy has a short-run impact on aggregate demand.
- This is because in the presence of price rigidities a lower interest rate tends to encourage investment (through a lower real interest rate) and net exports (through a depreciated real exchange rate), and because higher prices reduce the purchasing power of those assets, like conventional fixed-rate bonds, that are not perfectly indexed to inflation
- Monetary policy can therefore be used to stabilize aggregate demand, i.e. support demand through an expansionary monetary policy when demand is weak and a restrictive monetary policy when demand is ballooning

4.1.2 The objectives of monetary policy

3. Output stabilization

- The rationale for counter-cyclical MP goes back to the Great Depression of the 1930s but, as for FP, the desirability and effectiveness of counter-cyclical MP are debated
- The existence of price rigidities, a hypothesis upon which counter-cyclical monetary policy relies, is not much debated anymore
- However, the long and variable lags involved in the transmission of MP impulses make the discretionary stabilization a delicate exercise which can transform a counter-cyclical policy into a pro-cyclical one. This is why the degree of central bank activism is a matter for discussion
- Market expectations may also impede counter-cyclical policy through the adjustment of long-run interest rates. E.g., long-run interest rate may increase in a recession if short-term rates are lowered aggressively and are expected to lead to future inflation

4.1.2 The objectives of monetary policy

3. Output stabilization

- CBs behave in practice as if they were aiming at minimizing the output gap. In 1993, John Taylor showed that the average reaction of the Federal Reserve to US inflation and the output gap could be captured by the **Taylor Rule**:

$$i_t = \tilde{r} + \pi_t + 0,5(\pi_t - \tilde{\pi}) + 0,5(y_t - \tilde{y}_t)$$

where i_t is the short-term nominal interest rate, π_t the inflation rate, $\tilde{\pi}$ the inflation objective, $(y_t - \tilde{y}_t)$ the output gap, \tilde{r} the “neutral” level of the real interest rate (equal to the growth rate of the economy, which maximizes consumption per capita at the steady state according to the golden rule of growth theory)

- Essentially, the Taylor rule sets interest rates based on current inflation and the gap between actual and potential output (i.e. output gap)

4.1.2 The objectives of monetary policy

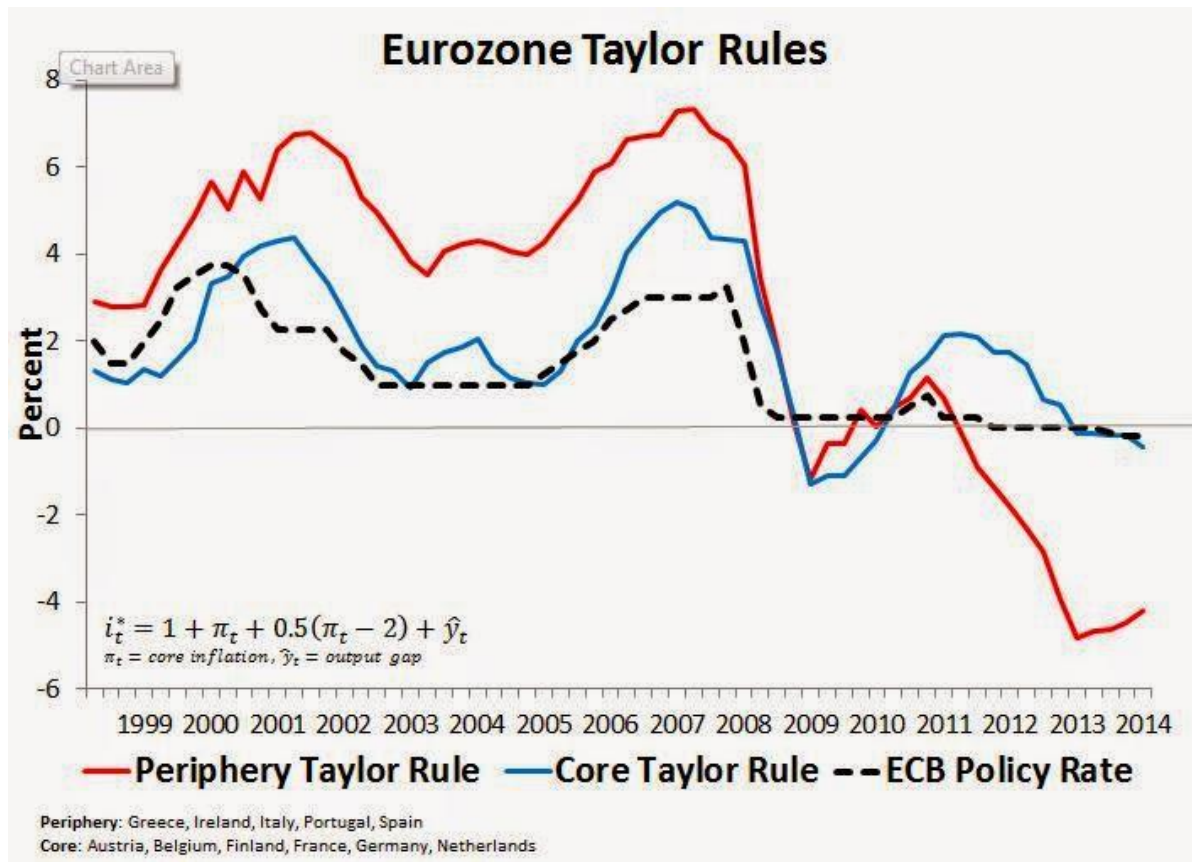
3. Output stabilization

- The **Taylor rule** has become **one of economists' basic tool to assess interest-rate variations**. Although it has no normative content, the Taylor rule is a useful standard for comparing monetary instances over time and across countries
- The fact that CBs appear to react to the output gap does not imply that they have an output-stabilization objective
- The **output gap** can be viewed as a measure of excess supply of goods and services in the economy, and thus **can be used as a predictor of future inflation**. Raising the interest rate is the appropriate reaction to curb future inflation when demand exceeds potential output, even for a CB that does not pursue output stabilization per se

4.1.2 The objectives of monetary policy

3. Output stabilization

- Essentially, the Taylor rule sets interest rates based on current inflation and the gap between actual and potential output (i.e. output gap)



- Indicates a pattern of the ECB setting its interest rate target in a manner more consistent with the core economies
- Monetary policy was too tight in 2008-2009 for both periphery and core regions
- Afterwards it was too tight for the periphery, suggesting the second stage of crisis was a regional monetary policy crisis localized to the periphery

4.1.2 The objectives of monetary policy

Summary:

- Of the four objectives only the first (price stability) is formally included in all CBs mandates
- Financial stability is a core objective of most CBs, though not necessarily explicitly
- The other objectives may or may not feature among the goals of the monetary institutions.
- See Table

	Legal vehicle	Price stability	Exchange-rate stability	Output stabilization	Financial stability
US Fed	Full Employment and Balanced Growth Act, a.k.a. "Humphrey-Hawkins Act"	Yes	No, but may intervene on exchange markets, at the request of US Treasury.	Yes, on an equal footing with price stability.	Yes
ECB	EU Treaty (since Maastricht Treaty of 1992)	Yes	No, but exchange rates are part of the second pillar of the monetary-policy strategy, and the ECB has the sole right to conduct foreign-exchange operations.	No, but may intervene on exchange markets.	Not explicitly
Bank of England	Bank of England Act, 1998	Yes, definition of price stability belongs to government.	No	Yes, secondary to price stability.	Yes
Bank of Japan	Bank of Japan Law, 1997	Yes	No, but may be instructed to intervene on exchange markets.	No, only as a consequence of price stability.	Yes

Theory Lecture 12

Learning outcomes for lecture 12

- Explain the different principles underpinning monetary policy, and respective underlying models and/or theories
- Explain the principle of the long-run neutrality of money and its relation to the Quantity Theory of Money
- Explain the reasons for the short-run disconnect between monetary growth and inflation (the existence of short-run nominal rigidities)
- Explain the different principles underlining CBs decision on the level of their interest rate(s)
- Explain the main justifications for the interdependence between monetary and fiscal policies in the long and short run

4.2 Theories: Introduction

- Monetary policy has been and still is a very active field of research, where the dialogue between theoreticians and practitioners is strong and where theory has had major influence on the design of policy institutions
- In the 1960s and 1970s, the monetarist challenge to conventional Keynesian wisdom emerged from what was initially a critique of monetary-policy practices, notably through the rational expectation models
- The notions of time consistency and credibility, which would make their way into the basic toolkit of policymakers, were also first experimented within the monetary-policy field
- Finally, the contemporary micro-founded neo-Keynesian models embodying price rigidities were developed in response and with the aim of providing sound theoretical foundations to monetary stabilization

4.2 Theories: Introduction

- This section contains:
 - 4.2.1 discussion of the principles that underpin monetary policy (lecture 12)
 - 4.2.2 discussion of MP transmission mechanisms (lecture 13)

4.2.1 Principles underpinning monetary policy

- 1. The long-run neutrality of money**
- 2. Short-run nominal rigidities**
- 3. Optimal interest-rate setting**
- 4. Central bank credibility**
- 5. Are monetary and fiscal policies interdependent?**

4.2.1 Principles underpinning monetary policy

1. The long-run neutrality of money

- It is now widely accepted that **changes in money supply do not affect real variables in the long run, a property known as the long-term neutrality of money**
- This is a consequence of the role of money as a unit of account: In the long run, doubling the quantity of money in circulation, or replacing a currency by another one of higher value, has no impact on real variables such as GDP, real wages, real interest rates, or the real exchange rate.
- Only nominal variables (nominal GDP, nominal wages, nominal interest rates, and the nominal exchange rate) are affected.

4.2.1 Principles underpinning monetary policy

1. The long-run neutrality of money

- The **Quantity Theory of Money** is the simplest model consistent with this approach. Money velocity V is defined as the nominal production allowed by the circulation of one money unit during one year: $PY = MV$
- where P is the general price level, M the money supply, and Y the real GDP. Assume V is a constant or evolves at a constant rate independently of monetary policy. If the CB can control the growth rate of money supply, then, for a given GDP growth rate and a given evolution of velocity, it is also able to control inflation, since:

$$\Delta P/P = \Delta V/V + \Delta M/M - \Delta Y/Y$$

4.2.1 Principles underpinning monetary policy

1. The long-run neutrality of money

- According to the Quantity Theory of Money, the definition of a monetary-policy target requires estimating growth of potential output and the trend evolution of monetary velocity. The monetary target then follows
- The ECB in 1999 used the quantity theory of money to define the first pillar of its monetary strategy. It targeted money-supply growth at 4.5% a year, consistent with a 1.5% inflation rate, a 2.5% real GDP growth in the euro area, and a decrease of velocity by 0.5% a year:

$$1.5\% = - 0.5\% + 4.5\% - 2.5\%$$

- In this approach, the monetary aggregate (M) plays the role of an intermediate objective that is easily observable and more under the control of the CB than the final objective of price stability, yet whose evolution is a good predictor of the final objective

4.2.1 Principles underpinning monetary policy

1. The long-run neutrality of money

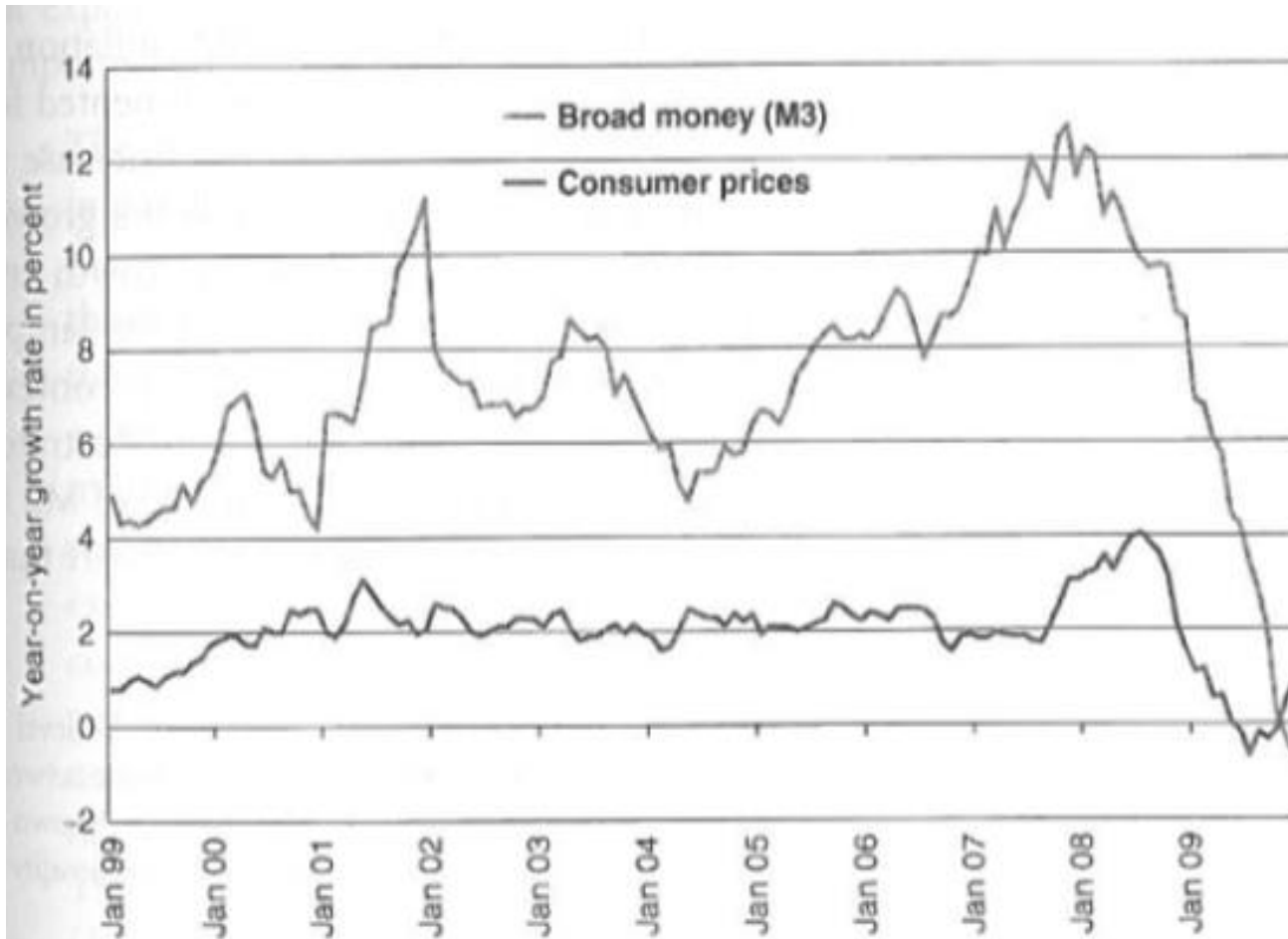


Figure B4.8.1a Money growth and consumer-price-index (CPI) inflation. Euro area, 1999–2009.

- In 2003, the ECB decided to downplay this first pillar because money growth had been continuously higher than the target without any major consequence for inflation (see Figure B4.8.1a)

4.2.1 Principles underpinning monetary policy

1. The long-run neutrality of money

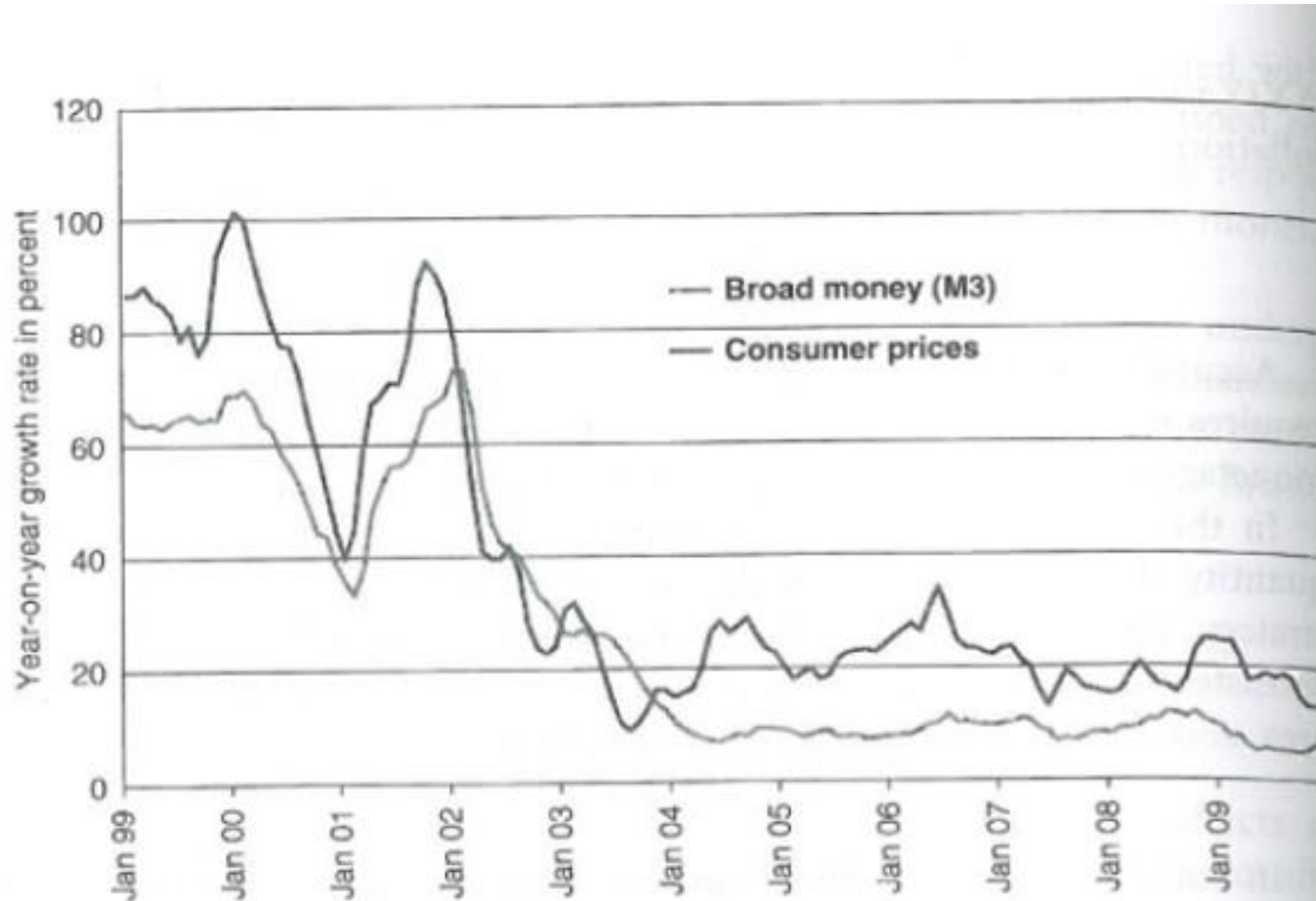


Figure B4.8.1b Turkey, 1999–2009.

Sources: a) European Central Bank, b) OECD.

- Note that the link between money supply and inflation remains robust in high-inflation countries (see Figure B4.8.1b).

4.2.1 Principles underpinning monetary policy

1. The long-run neutrality of money

- The long-run regularity of the link between money growth and inflation (a consequence of money neutrality) has been documented in several studies
- However, two important remarks should be made:
 1. the neutrality of money does not imply that monetary policy has no influence on real economic performance. It is widely accepted that high and unstable inflation have detrimental effects on growth
 2. the strength of the relationship between money growth and inflation comes from the long horizon and from the inclusion in the sample of high-inflation countries. In the short run and in a low-inflation context, there is little relationship between money growth and inflation

4.2.1 Principles underpinning monetary policy

2. Short-run nominal rigidities

- One key explanation for the short-run disconnect between monetary growth and inflation is the existence of nominal rigidities, that is, the fact that following a shock on the supply of money, prices and/or nominal wages adjust less than fully in the short run
- Therefore, a rise in money supply increases the real value of monetary holdings, which affects other real variables, including the real interest rate and real consumption

4.2.1 Principles underpinning monetary policy

2. Short-run nominal rigidities

- In Keynes's General Theory, a rise in money supply leads to
 1. in the **short run** to a fall in the interest rate. A lower nominal and real interest rate encourage private agents to hold money in spite of their little return and stimulate the demand for goods and services (which in turn increases money demand). If there is excess production capacity, GDP rises
 2. in the **longer run**, however, prices increase, bringing the interest rate and GDP back to their initial values
- Hence, in the Keynesian framework, money-market equilibrium is achieved in the short run through nominal and real interest-rate adjustment rather than through price adjustment

4.2.1 Principles underpinning monetary policy

2. Short-run nominal rigidities

- In summary, the short-run impact of monetary policy on real variables such as output or employment relies on incomplete price adjustment, that is, the existence of nominal rigidities
- Three types of explanation of nominal rigidities have been proposed: imperfect information, staggered contracts, and menu costs

4.2.1 Principles underpinning monetary policy

2. Short-run nominal rigidities

- The existence of short-term nominal rigidities is not incompatible with the long-term neutrality of money: a monetary expansion will have an impact on real variables in the short run, but this effect will gradually be phased out by price adjustment
- Higher money growth may speed up price adjustment, because the cost of non-adjustment is greater
- In the extreme case of hyperinflation, price adjustment is almost instantaneous

4.2.1 Principles underpinning monetary policy

3. Optimal interest-rate setting

- You already know that CBs' main monetary responsibility is to decide on the level of their interest rate(s) - **But what should guide this decision?**
 1. In the 1960s the response to this question was largely had hoc and discretionary
 2. Then the monetarist revolution of the 1970s and the 1980s advocated for setting interest rates at a level consistent with the desired path for the monetary aggregates
 3. However, as we saw before, the link between money growth and inflation has proved to be loose, at least in the short run. In addition, financial liberalization and financial innovations have made the control of monetary aggregates difficult

4.2.1 Principles underpinning monetary policy

3. Optimal interest-rate setting

- CBs have started looking for an alternative strategy, new models of monetary policy have been developed in which monetary aggregates play a secondary role, or are altogether ignored
- One example is the “**new Keynesian**” **theory of monetary policy**, which proposes the CB sets the short-term interest rate so as to keep the future inflation rate and the future output gap as close as possible to its targets
- In this model, the CB adopts a forward-looking approach. That is, it does not seek to control the current inflation or output gap but only their **expected values**. This implies the true objectives are the forecasts for inflation and for the output gap (because delays in the monetary-transmission mechanisms do not allow the central bank to control current variables)

4.2.1 Principles underpinning monetary policy

3. Optimal interest-rate setting

- Since output gap is negatively related to real interest rate and positively related to inflation, the two objectives of the central bank are consistent in the presence of demand shocks (which move inflation and the output gap in the same direction), but contradictory in the presence of supply shocks (which move them in opposite directions)
- The policy implication is that CBs should completely offset demand shocks even if they only care about inflation, whereas they should only partially offset supply-side shocks
- Another implication of the “new Keynesian” model, which relies on rational expectations combined with auto-correlated shocks, is that CBs should raise interest rate by more than one percent when expected inflation increases by one percentage point, in order for the real interest rate to rise. This rule has been followed by the Fed and by the ECB since 1999

4.2.1 Principles underpinning monetary policy

4. Central bank credibility

- This refers to the **problem of time inconsistency** (see chapter 2) and **inflation bias**, and has been used as an argument for the independence of CBs
- The use of discretionary MP by politically controlled CBs means they may use expansionary monetary policies for political reasons (e.g. re-election), and thus not appropriately aligned to output and unemployment levels. This can lead to anticipated inflation expectations such that in the long term output and unemployment remain at the same level (long-run money neutrality)
- This is called an **inflation bias**: the CB mistakenly or intentionally targets a higher level of natural output (i.e. positive output gap) in order to reduce unemployment, leading to inflation

4.2.1 Principles underpinning monetary policy

4. Central bank credibility

- The inflation bias disappears if the CB can commit to a certain inflation target – for instance, because it is independent with an explicit inflation-targeting mandate or because it is more inflation-averse (conservative) than society
- In this case, private agents will no longer anticipate an excess of monetary expansion, or a mitigated reaction to cost-push supply shocks
- By reducing inflation expectations, this strategy is designed to reduce the need for high interest rates in the short term, which in turn reduces the output cost of fighting inflation
- This will happen only if CBs are regarded by the public as being bound by their mandates or being truly conservative

4.2.1 Principles underpinning monetary policy

4. Central bank credibility

- The credibility of the central bank can be defined **as its ability to stick to its own policy announcements** (“say what they do and do what they say”). Credibility is undermined by the problem of time-inconsistency (see chapter 2)
- To make them effective in terms of optimal achievements, CBs need to commit to **monetary rule(s)**. One **popular monetary rule is inflation targeting**, where the CB targets the average expected inflation rate over the next one or two years
- Another monetary rule, especially in developing countries, is a fixed exchange-rate regime, where the CB commits to intervene so as to keep the nominal exchange rate stable
- For the credibility of the CB, it is also important to embrace a long horizon, which implies long mandates and independence from politicians bound by the election

4.2.1 Principles underpinning monetary policy

4. Central bank credibility

- In summary, to enhance credibility, most modern CBs combine:
 1. a mandate to achieve price stability,
 2. formal independence from the government, guaranteed by law (e.g. ECB independence is part of the EU treaty),
 3. long mandates, and
 4. a commitment scheme such as inflation targeting

4.2.1 Principles underpinning monetary policy

5. Are monetary and fiscal policies interdependent?

- In the long run, independence of monetary policy from fiscal policy is only possible if fiscal policy is sustainable or if the central bank is indifferent to the risk of government bankruptcy
- If public debt ratio exceeds its sustainable long-run level and fiscal authorities refrain from undertaking a fiscal retrenchment, asset holders will anticipate:
 - 1) government default. In this case the CB may be hurt by the loss of value of its assets. More importantly there will also be economic consequences relating to commercial bank defaults
 - 2) debt monetization (i.e. CB bails out the government through a massive purchase of its bonds and raises money supply accordingly), with its inflationary consequences

4.2.1 Principles underpinning monetary policy

5. Are monetary and fiscal policies interdependent?

- The long-run interdependence between fiscal and monetary policy implies that lasting monetary stability is very unlikely if the fiscal authority behaves in irresponsible way
- Two examples of this type:
 - Argentina prior to the 2002 crisis: Although the country was committed by law to maintaining a fixed exchange rate to the US dollar and the currency issued by the CB was supposed to be fully backed by the foreign exchange reserves, the extravagant behaviour of the federal and sub-federal fiscal authorities forced the government to abandon the dollar peg and this led to a violent currency and financial crisis
 - In the euro area, the Greek crisis that broke out in 2010 was of the same nature

4.2.1 Principles underpinning monetary policy

5. Are monetary and fiscal policies interdependent?

- The long-run interdependence is the main justification for limiting public borrowing in a monetary union (as discussed in Chapter 3)
- In the short run, there is no consensus on the desirability of coordinating monetary and fiscal policies to achieve a policy-mix, at least as long as monetary policy remains effective
- Opponents of coordination point out that coordination can threaten CBs independence and argue that the rivalry between monetary and fiscal policy can be solved by making monetary policy fully independent
- Specific coordination issues arise when monetary policy reaches the zero bound on nominal interest rates and embarks on unconventional policies

Theory Lecture 13

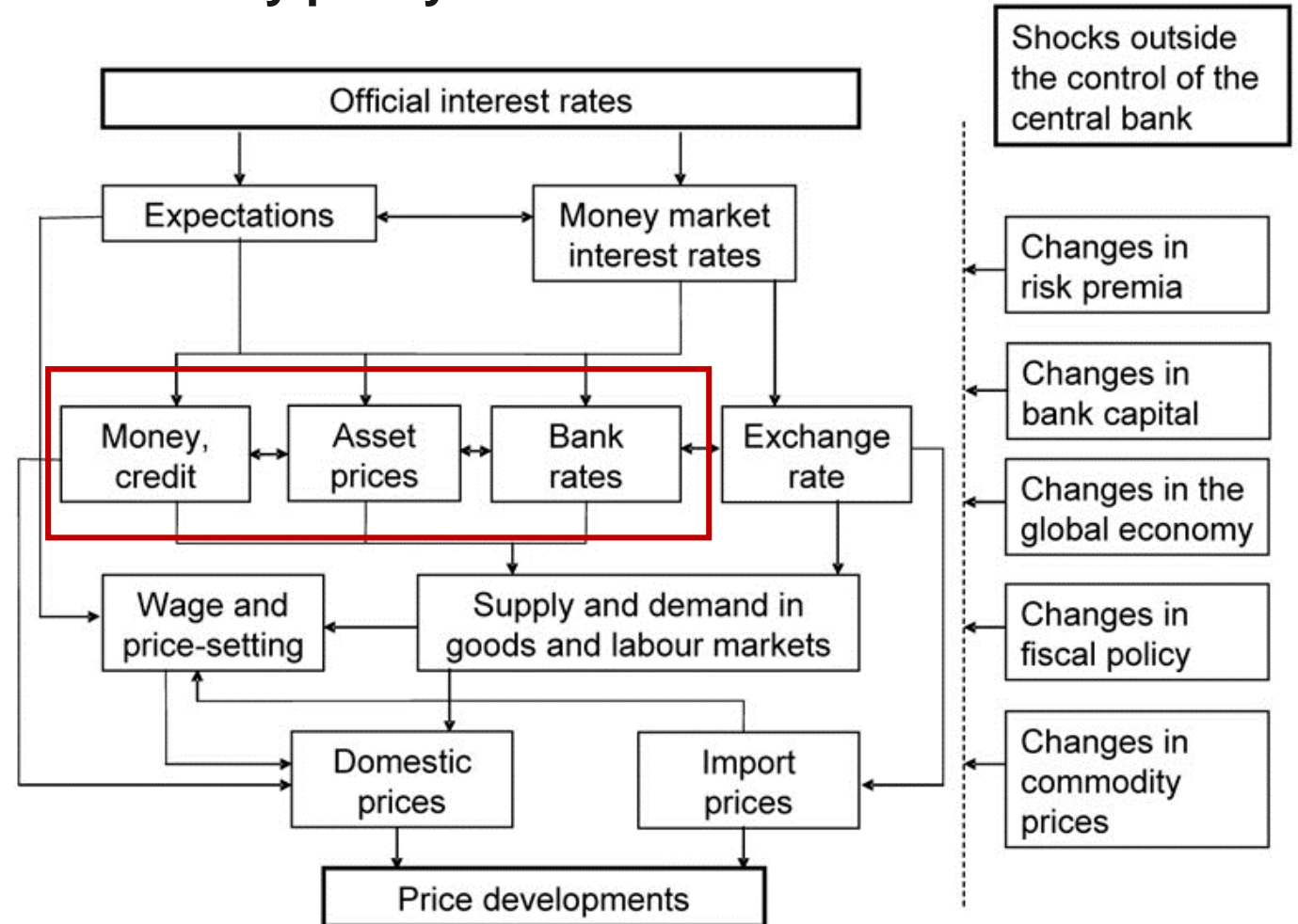
Learning outcomes for lecture 13

- Explain the main transmission channels of monetary policy decisions, namely:
 - Explain the interest rate channel
 - Explain the asset price channel
 - Explain the credit channel
- Discuss how the strength of the various transmission channels may differ across countries

4.2.2 Transmission channels of monetary policy

1. The interest-rate channel
2. The asset-price channel
3. The credit channel

Illustration of the main transmission channels of monetary policy decisions



4.2.2 Transmission channels of monetary policy

1. Interest rate channel

- This is the traditional Keynesian channel:

In the presence of nominal rigidities, a monetary expansion leads to a fall in the (nominal and real) interest rate, and consequently a revival of investment and durable-goods consumption

In the short run, this results in a multiplier effect (see Chapter 3) on the demand for goods and services

4.2.2 Transmission channels of monetary policy

1. Interest rate channel

- Note, however, that the only interest rate which is directly affected by monetary policy is the overnight nominal interest rate (EONIA), while aggregate demand depends on expected real interest rates at longer-term horizons
- The impact of a MP thus depends on (i) which interest rates matter most for economic agents, and (ii) how longer term interest rates are affected by the change in the overnight rate
- Evidence shows that countries differ considerably along the 1st and 2nd dimension, leading to asymmetries in the transmission of the same monetary impulse to member countries

4.2.2 Transmission channels of monetary policy

2. Asset price channel

- This channel relies on the negative relation between asset prices and interest rates
- A decrease in the interest rate generally raises the value of financial assets held by **households**, who, in turn, partially consume this extra wealth
- Such wealth effects played an important role in:
 - Japan in the early 1990s, when the burst of the asset-price bubble had a negative impact on consumption;
 - The US in 2001, when the sharp fall in stock prices also had a negative impact on consumption, whereas the rise in real estate prices tended to sustain US consumption during the 2000s

4.2.2 Transmission channels of monetary policy

2. Asset price channel

- The asset-price channel also affects the corporate sector. A rise in stock prices increases the profitability of new capital expenditures (also known as Tobin's q), which supports investment
- Tobin's q is the ratio of the market value of companies/assets to the cost of renewal of their stock of physical capital/assets (it is the central variable of the neoclassic theory of investment). Investment depends on average q or on marginal q

$$\text{Tobin's } Q = \frac{\text{Market Value of assets}}{\text{Replacement Value of assets}}$$

- The importance of the asset-price channel has increased over time as a consequence of the general rise in the wealth-to-income ratio and the increased sophistication of financial markets which allow households to withdraw equity from their wealth without actually selling assets

4.2.2 Transmission channels of monetary policy

3. Credit channel

- The credit channel results from the impact of the interest rate on the supply of credit because if banks have better refinancing conditions from CBs they tend to increase their supply of credit to the economy
- Banks' financial health is crucial for the transmission of monetary policy: When the banks' balance-sheets are burdened with nonperforming loans, i.e. loans with high probability of default, or impaired assets, i.e. financial assets that are not traded any more or whose market value is much lower than when they were purchased by the bank, banks are less willing to grant new loans (this is called a credit crunch)
- When the short-term interest rate decreases, bank tend to relax credit constraints which should increase credit supply. In addition, a lower interest rate also raises the value of the assets used to guarantee the loans, and therefore the companies' access to credit

4.2.2 Transmission channels of monetary policy

3. Credit channel

- In an imperfect-information world, banks cannot assess properly the quality of all the investment projects for which borrowers request loans, which leads them to include a default premium in the credit cost in all loans
- This default premium penalizes good investments whose probability of failure is low, but risky projects will not be discouraged because borrowers know their probability of failure is high and accept paying the correspondent premium
- The more banks increase the interest rate, the more they discourage good projects and select bad ones: this **adverse selection problem** leads banks to restrict credit rather than price risk
- **Credit rationing** affects especially small- and medium-size enterprises, who do not have access to capital markets and depend more on bank financing

4.2.2 Transmission channels of monetary policy

3. Credit channel

- These relations show that the link between monetary policy and fiscal policy does not only run from the latter to the former (through debt monetization)
- Public money can also be crucially needed to restore the effectiveness of monetary policy, through a recapitalization of banks, and by relieving them of their impaired assets
- This latter point was forcefully put forward by the International Monetary Fund (IMF) in the crisis period 2007-09

4.2.2 Transmission channels of monetary policy

Assessing the different channels

- None of these transmission channels relies on a direct effect of money growth on inflation, as postulated by the quantity theory of money
- The impact of money growth on inflation is channelled by interest rates, asset prices and bank credit through their respective on aggregate demand
- A direct link between monetary policy and inflation could be introduced by assuming that price expectations are affected by monetary policy, but it would be illogical to introduce expectations that are not consistent with the assumption of the model

4.2.2 Transmission channels of monetary policy

Assessing the different channels

- The strength of the various transmission channels varies from country to country
 1. The higher the proportion of short-term or variable-rate loans in the country, the stronger the interest-rate channel
 2. The asset-price channel depends on the extent of asset holdings by domestic consumers
 3. The importance of the credit channel depends on share of small-to-medium-sized enterprises (SMEs) in output and on their dependence in relation to bank credit