

# Monetary Policy in a Modern Monetary System

Theory and Practice from a Eurosystem Perspective

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# Part I – A Modern Monetary System

# Central banks: **main tasks**

- Monetary policy: CBs supply **“outside” money** (currency and central bank reserves) to the private sector and **maintain its value stable** over time, by influencing **“inside” money** creation.
- Payment system: CBs promote the smooth operation of payment and settlement system through which **“outside” money** is exchanged.
- Supervision and financial regulation: CBs affect **“inside” money** creation and regulate its use.

# Monetary Policy

*“Monetary policy is the process by which the monetary authority controls the supply of **money**, often targeting a **rate of interest** for the purpose of promoting **stable prices** and **low unemployment**”* Wikipedia

# Money

“Money is anything that people will accept in exchange for goods or services, in the belief that they may, in turn, **exchange it, now or later, for other goods or services**”, United States, Congress. House. Banking and Currency Committee. (1964)

«In a market economy, any two economic agents are free to agree on the **means of payment** to be used to settle a transaction. **Acceptance** of any form of **money** will, however, depend on the receiver’s **confidence** that, subsequently, a third party will accept that money in trade.” BIS, Committee on Payment and Settlement Systems (2003)

“Money is helpful when there are **absence-of-double-coincidence** difficulties that **cannot be easily overcome with credit**” Neil Wallace (2008)

# Money

Money is a **social technology** with the following functions:

1. **a unit of account;**
2. **a store of value.**
3. **a medium of exchange;**

## 1. Unit of account

- A standard numerical **unit of measurement** of the **market value** of goods, services, and other transactions.
- It is used as a method for **comparing the economic value** of dissimilar objects.

# Money

## 2. Reserve of value

- Money, just like any other financial asset (and some **real asset**) is a form of **credit** as it is a **repository of purchasing power over time**.
- Store of value does not mean that money must have intrinsic value:
  - **Commodity money** is an object that has intrinsic value as a consumption good or as an input, while.
  - **Fiat money** (Fiat = "*let it become*",) is an **intrinsically valueless object** or record that is widely accepted as a means of payment.

## 3. Medium of exchange

- As a **medium of exchange** money avoids the inefficiencies of an economic system characterized by:
  - **Limited or no commitment.**
  - **Imperfect monitoring.**
  - **Lack of coincidence of wants.**
- Many assets are reserve of value, but money is also a medium of exchange because it is the **most liquid** reserve of value.

# Liquidity

- Liquidity describes the degree to which an **asset** can be **quickly** exchanged without affecting its **price**.
- Money is the **most liquid asset**, because
  - it can be “exchanged” for goods and services **instantly with no loss of value**.
  - There is **no wait** for a suitable buyer of money.
  - There is **no trade-off** between **speed** and **value**.

# Liquidity

- Example: *If a person wants a \$1,000 refrigerator, **money is the asset that can most easily be used to obtain it.***
  - *If that person has no money, but a **rare book** that has been valued \$1,000, it is unlikely to find someone willing to trade the refrigerator for the book.*
  - *Instead, he will have to **sell the book** and use the money to purchase the refrigerator.*
  - *That may be fine if the person **can wait** months to make the purchase, but it could present a problem if the person only had a few days.*
  - *He may have to **sell the book at a discount**, instead of **waiting** for a buyer who was willing to pay the full value.*

# Money: **Narrow Banking System**

- In the Renaissance, merchants looking to keep their coins and valuables in safekeeping depositories **deposited** gold and silver at goldsmiths, receiving in exchange **a note** for their deposit.

Bank	
Assets	Liabilities
Gold <b>100</b>	Deposits <b>100</b>

- These notes gained acceptance as a **medium of exchange** for commercial transactions and thus became an early form of **circulating paper money**.

# Money: **Narrow Banking System**

- A banking system where banks just behave as goldsmith, holding high quality liquid assets (HQLA) - such as central bank reserves or government bonds - in front of deposits is called **Narrow Banking System**.

Narrow Bank			
Assets		Liabilities	
HQLA	<b>100</b>	Deposits	<b>100</b>

# Money: Fractional Reserve Banking

- As the notes were used directly in trade, the goldsmiths observed that people would **not usually redeem all their notes at the same time**,
- and they saw the opportunity to “print” notes in excess to their coin reserves (or gold) and use them for **interest-bearing loans**.
- The goldsmith had only **a fraction** of the amount of gold needed to meet the claims against him.

Bank	
Assets	Liabilities
Gold 100	Deposits 150
Loans 50	

- The **fractional-reserve banking** was born: goldsmiths, from passive guardians of gold, charging fees for safe storage, became **interest-paying** and **interest-earning** banks ...

# Money: Fractional Reserve Banking

- In a modern monetary system, the **fractional-reserve banking** means that the banking sector holds **high quality liquid assets (HQLA)**, in general **central bank reserves**, equal to a **fraction** of its **deposit liabilities**

Bank			
Assets		Liabilities	
HQLA	10	Deposits	100
Loans	100	Bonds	5
		Capital	5

- In a **fractional-reserve banking** system, banks
  - provide **maturity and liquidity transformation**: transform households and firms **long-term illiquid liabilities** (loans) into banks' **short-term liquid liabilities** (deposits).

# Money: Fractional Reserve Banking

- In a fractional-reserve banking system, banks provide two services:
  - **Payment system:** banks intermediate already existing money between buyers and sellers. They transfer deposits (inside money) between depositors of the same bank or between a depositor of the bank and a depositor of another bank
  - **Maturity and Liquidity transformation:** banks create new money that did not previously exist. They transform households and firms **long-term illiquid liabilities** (loans) into banks' **short-term liquid liabilities** (deposits).

# Money: Fractional Reserve Banking

- The transformation of
  - illiquid and long-term liabilities of economic agents
  - into liquid and short-term assets for those same agents,favour economic growth ...
- ... but, **if not regulated**, this transformation process may generate **negative externalities** on the economy and, as a consequence,
  - **price instability** and
  - **financial instability**
- **Monetary policy** and **financial regulation** affect the **creation of private money**

# Money: **Fractional Reserve Banking**

## ■ Price instability:

- If the banking system **creates too much inside money** by providing **too much credit** to the economy ...
- ... and the economy is already **producing** at its **potential** ...
- ... excess demand has the only effect of **increasing prices**

# Money: Fractional Reserve Banking

## ■ Financial instability:

- Liquidity and maturity transformation (loans have longer maturity than deposits). **Risk of deposit run-off = Liquidity risk.**

Bank	
Assets	Liabilities
HQLA ↓	Deposits ↓
Loans	Bonds
	Capital

- Quality transformation (loans are riskier than deposits). **Risk of loan default = Solvency risk.**

Bank	
Assets	Liabilities
HQLA	Deposits
Loans ↓	Bonds
	Capital ↓

# Money: **Narrow Banking vs Fractional-Reserve System**

- In a **Narrow Banking System**, loans would be made by other financial intermediaries.
- That is, the **deposit taking and payment activities** would be separated from **financial intermediation activities**.
- In a **Narrow Banking System**, there would not be **maturity transformation**

# Money: **Narrow Banking vs Fractional-Reserve System**

## Narrow Banking System.

Bank	
Assets	Liabilities
CB Reserves (or HQLA) <b>50</b>	Deposits <b>50</b>

Other Financial Intermediary	
Assets	Liabilities
Loans <b>50</b>	Bond <b>40</b>
	Capital <b>10</b>

## Fractional Reserve Banking System.

Bank	
Assets	Liabilities
CB Reserves (or HQLA) <b>50</b>	Deposits <b>50</b>
Loans <b>50</b>	Bonds <b>40</b>
	Capital <b>10</b>

# Inside and Outside Money

## ■ Outside Money:

- Issued (outside the private sector) by the **Central bank**
- **Reserves + Currency**
- **Most liquid** asset in the economy

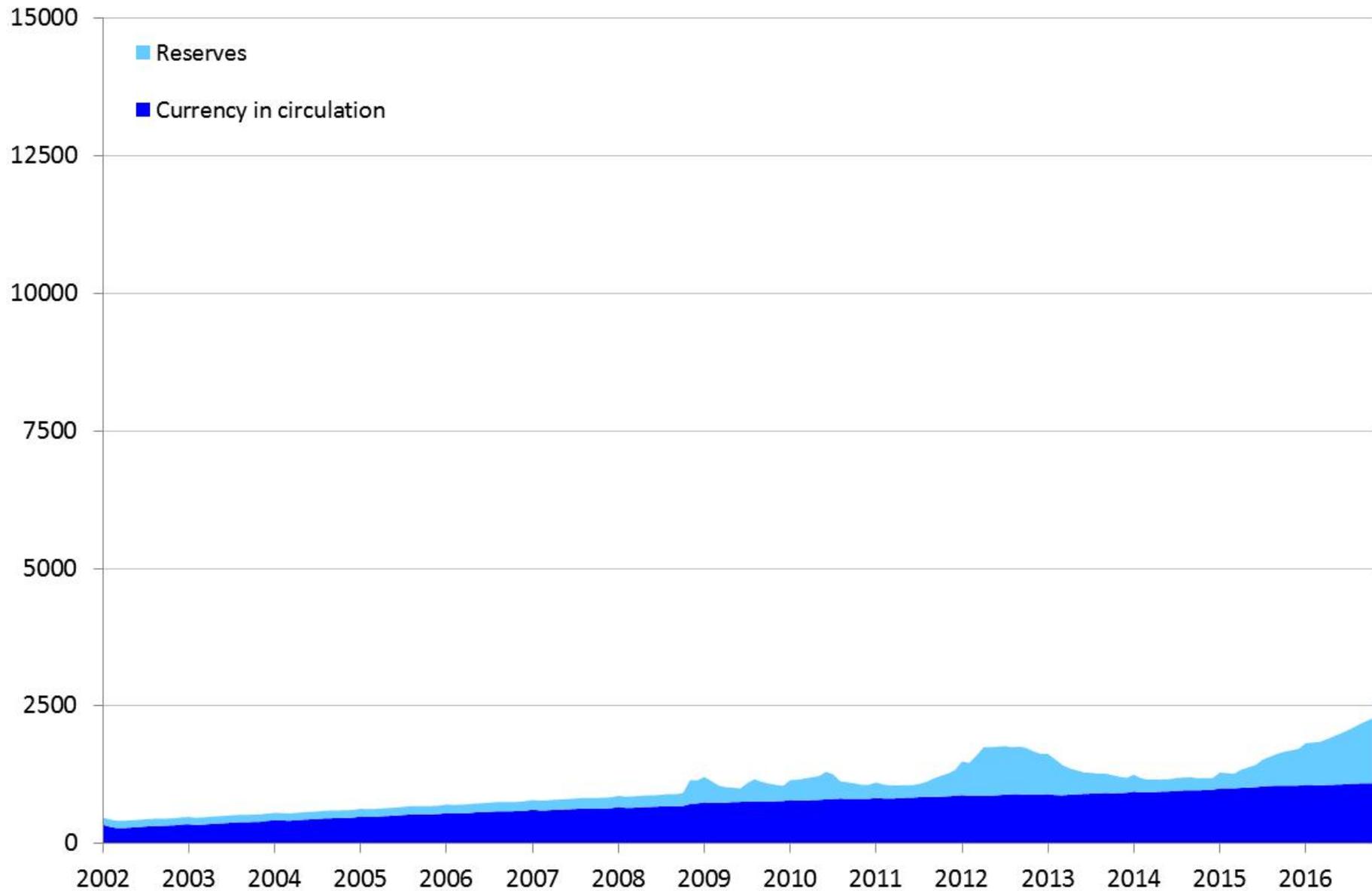
## ■ Inside Money:

- Issued (inside the private sector) usually by **banks**
- **Deposits + all transferable assets** (issued by private sector)

Central Bank		Banks		Households & Firms	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Gold	<b>Currency</b>	<b>Reserves</b>	<b>Deposits</b>	<b>Deposits</b>	Loans
Securities	<b>Reserves</b>	<b>Currency</b>	Interbank	<b>Currency</b>	Bonds
Loans to banks	c/ Government	Securities	Bonds	Securities	
	Capital	Loans	Capital	Bonds	Capital

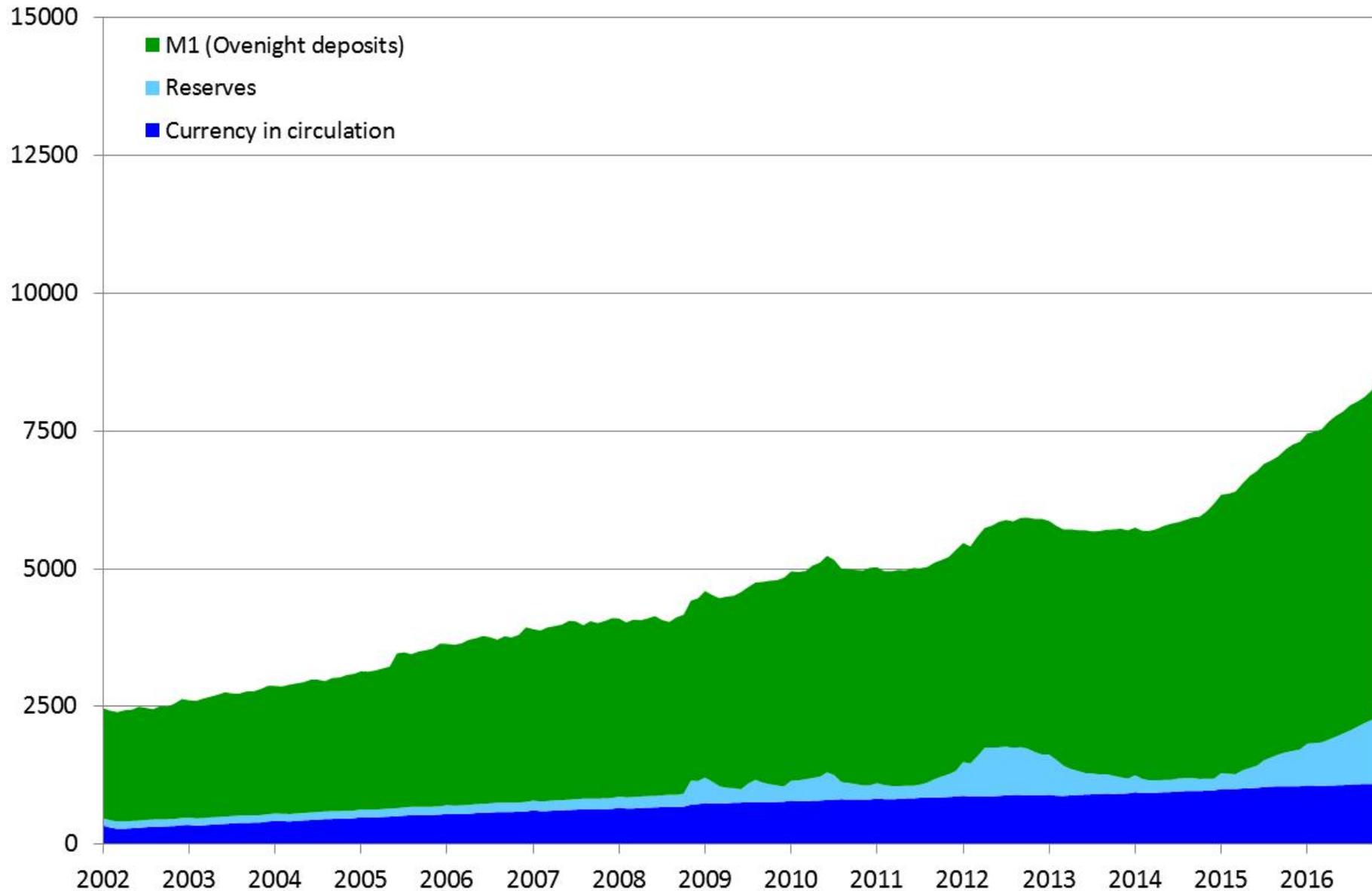
# Inside and Outside Money

## Outside Money – Euro Area (bn €)



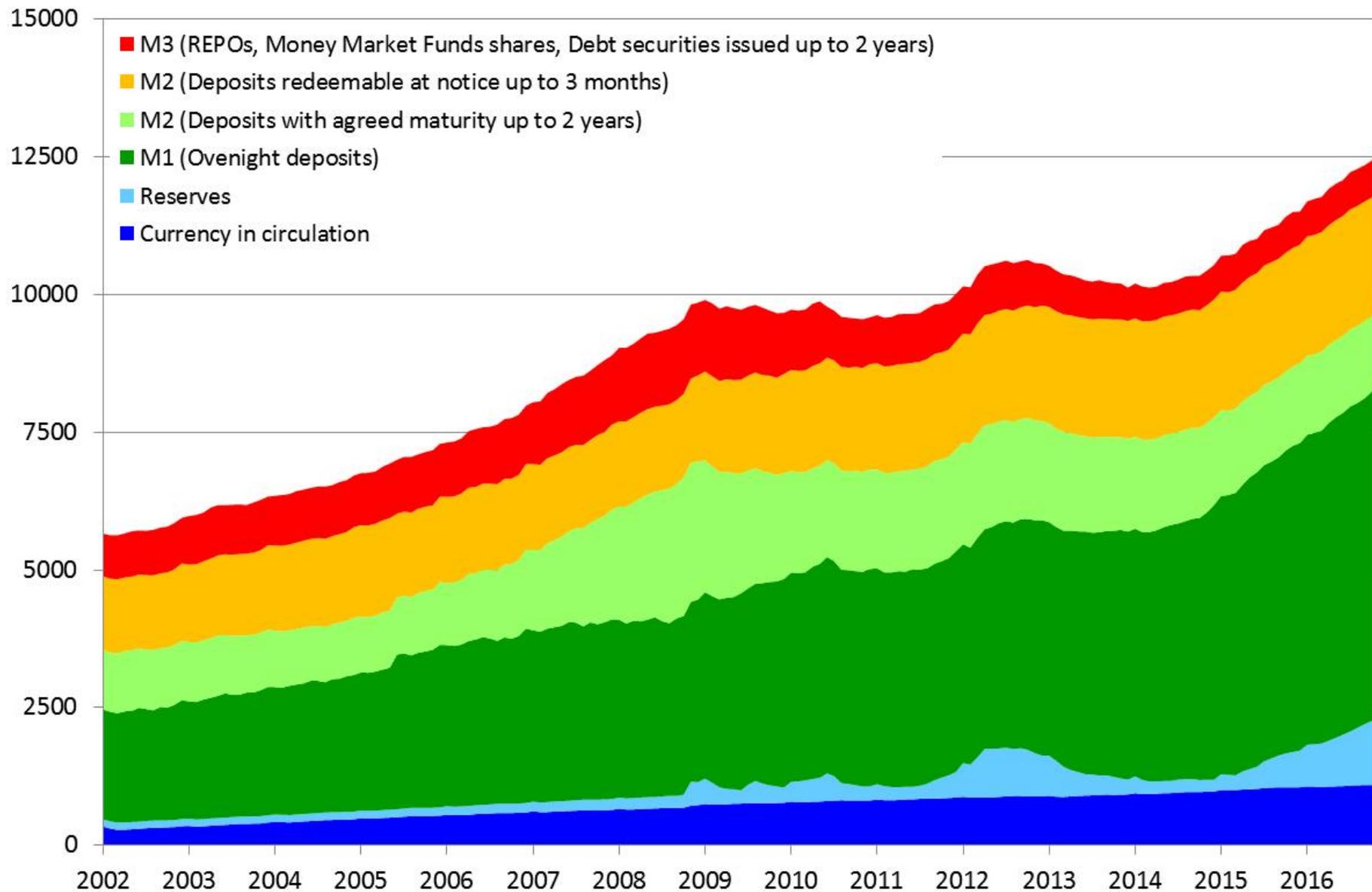
# Inside and Outside Money

## Outside and Inside Money – Euro Area (bn €)



# Inside and Outside Money

## Outside and Inside Money – Euro Area (bn €)



# Outside Money: **Currency**

- Currency (**banknotes** + **coins**) is generally designed as the particular form of money that has **legal tender** in a given jurisdiction.
- Legal tender implies:
  - **mandatory acceptance**: the creditor of a payment obligation cannot refuse euro banknotes and coins unless the parties have agreed on other means of payment;
  - **acceptance at full face value**: the monetary value of euro banknotes and coins is equal to the amount indicated on the banknotes and coins.
  - **power to discharge from payment obligations**: a debtor can discharge himself from a payment obligation by tendering euro banknotes and coins to the creditor.

# Outside Money: Central Bank Reserves

**Central bank reserves** are used

- to settle payments between **banks** (*ex: suppose a depositor of bank A has to buy a good that costs 100€ from a depositor of bank B*)

Bank A	
Assets	Liabilities
Reserves -100€	Deposits -100€
Currency	Bonds
Other assets	Capital

Bank B	
Assets	Liabilities
Reserves +100€	Deposits +100€
Currency	Bonds
Other assets	Capital

- and by **banks** to obtain currency from the **central bank** (*ex: suppose a bank A need a banknote of 100€*)

Bank A	
Assets	Liabilities
Reserves -100€	Deposits
Currency +100€	Bonds
Other assets	Capital

Central Bank	
Assets	Liabilities
Gold	Currency +100€
Securities	Reserves -100€
Loans to banks	Other liabilities

# Outside & Inside Money in a Modern Monetary System

- The **fractional-reserve banking** means that the banking sector holds reserves equal to a fraction of its **deposit** liabilities
- The **fractional-reserve banking** allows banks
  - to act as **financial intermediaries** between borrowers and savers, and
  - to provide the function of **maturity and liquidity transformation**, ...
  - ... by exchanging **long-term illiquid liabilities** issued by households, firms, and government (asset side of the banks' balance sheet) for **short-term liquid assets** (deposits; liability side of the banks' balance sheet) issued by banks and that are used by borrowers (buyers) in exchange for goods and services.

# Inside and Outside Money

- **Money** needs **trust**: money is accepted as a medium of exchange only if in the future it can be used to buy goods or services.
- Inside money: trust in terms of **soundness of the bank's balance sheet**.
- Outside money: since it is designed as **legal tender** (i.e. recognized by law that can be used to extinguish a public or private debt, or meet other financial obligation),
  - in theory, there is **no need of soundness of the balance sheet** of the central bank per se, ...
  - ..., instead, trust depends on **credibility** of the monetary authority in maintaining the value of money stable over time.

# Interest rates: **definition**

In a **credit contract** the nominal interest rate is the extra amount of money that is paid by **debtors** for the use of money that they **borrow** from **lenders**.

When money is loaned, the lender **delays spending** the money on consumption. Since, in general, people prefer consume now to consume later (i.e. they **discount** the future), the (nominal) interest rate on (almost) all forms of credit is positive ( $>0$ ).

# Interest rates: **the components**

- Different types of credit,
  - different **borrowers**
  - different **degrees of liquidity** (transferability)
  - different **maturities**
- Different components of interest rates,
  - **Risk-free (expected) component**: interest rate on credit contract issued by the safest economic agents (higher degree of commitment to repay).
  - **Counterparty risk component**: related to the probability of not being repaid.
  - **Liquidity component**: related to the transferability of the credit contract.
  - **Term premia component**: related to the maturity of the contract.
  - **Expected inflation component**: related to future inflation

# Interest rates: **the components**

- Different types of interest rates
  - The **Risk-free (expected) component** is the average between the **actual (spot) short-term risk-free interest rate** and **future (expected) short-term risk-free interest rates**
  - The **interest rate on long-term contracts** includes a **term-premium** to compensate investors for locking up their money for long stretches rather than constantly rolling it over.
- Since outside money is the most liquid type of credit, issued by the safest agent, its **interest rate is the lowest**.

# Interest rates: **nominal vs real interest rates**

- Nominal vs real interest rate: **credit contracts** (and money) are in general expressed in **nominal terms** (amount of money), while economic agents care about **real variables** (amount of goods and services that they can receive in exchange of a given amount of money).
- Inflation (percentage increase of prices) reduces the lender's or investor's **purchasing power** so that they cannot buy the same amount of goods or services at maturity with a given amount of money as they could when money was lent.

$$\pi_t = \frac{P_{t+1} - P_t}{P_t}$$

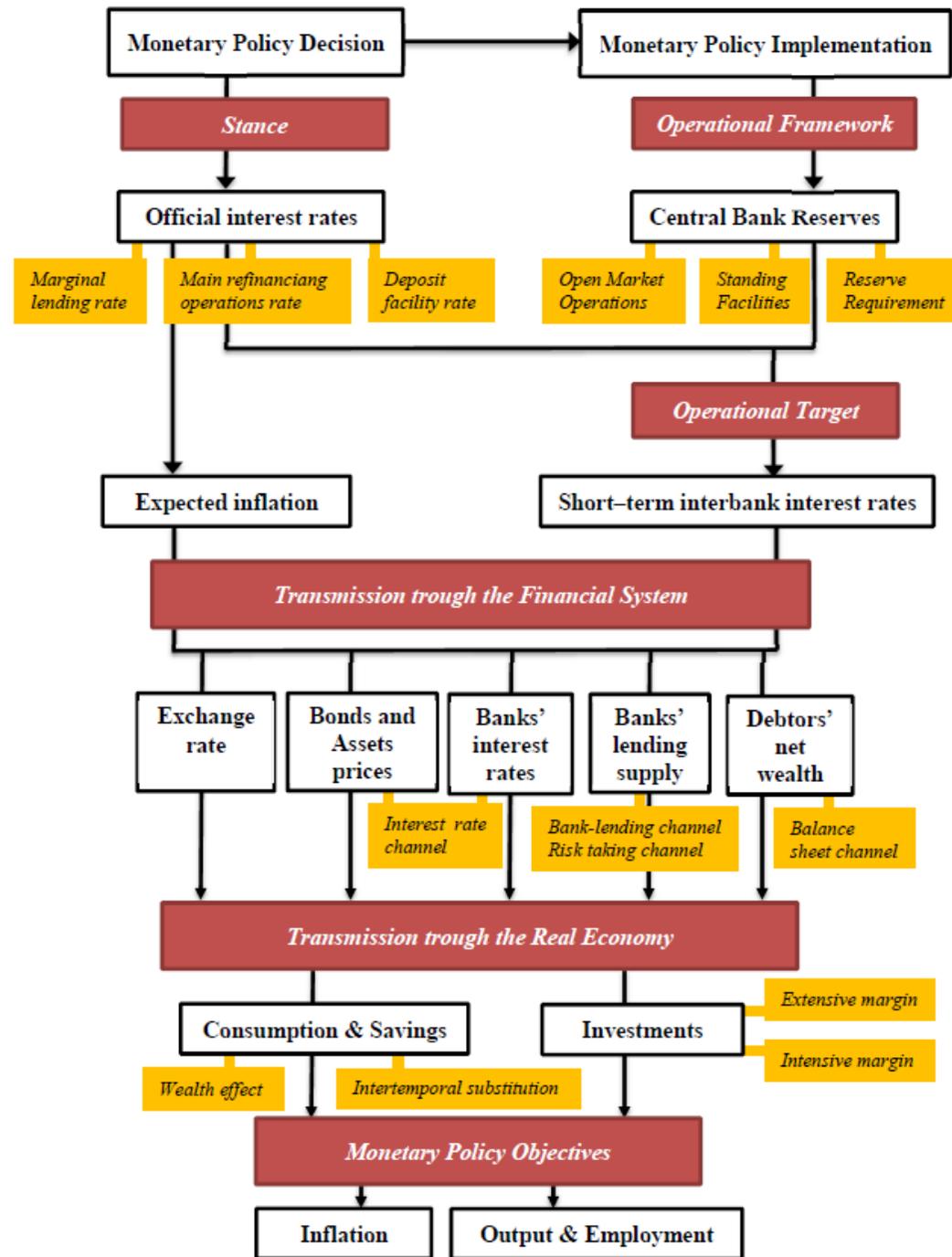
## Part II – Monetary Policy in Normal Times

# Monetary policy: How does it work?

*“To set the right course for **monetary policy** requires not only a clear direction for the **objective** of policy but also an understanding of how the **instruments** of policy affect the economy and, ultimately, **inflation**. What, then, is the mechanism by which monetary policy controls inflation?”*

Mervyn King, 1994

# Monetary policy: How does it work?



## Monetary Policy in Normal Times: The Theory

# Monetary policy: **How does it work?**

1. From outside money and official interest rates to interbank short-term interest rates
  - The Central bank is the **monopoly supplier** of outside money (**currency in circulation** and **central bank reserves**), and ...
  - ... to the extent that **outside money** is **essential** in an environment where economic agents (i) **cannot fully commit** and there is **no record keeping technology** (**inside money** is an **imperfect substitute** of outside money), ...
  - ... the **Central bank** is able not only to set the **quantity** and the **price** (**interest rate**) at which it provides **outside money** to the economy...
  - ... but also to **steer the interest rates** at which banks lend to each other **outside money** at very short-term maturities (**interbank market**).

# Monetary policy: **How does it work?**

## 2. From interbank short-term interest rates to the full spectrum of financial asset prices and interest rates

- The transmission mechanism through the financial markets, allows the CB to affect all other **nominal interest rates** in the economy ...
  - the **risk-free nominal interest rates at all maturities**, by affecting **expectations** about future monetary policy decisions,
  - some **risk-components** of interest rates
  - **asset prices**
  - and the **exchange rate** ...

# Monetary policy: **How does it work?**

## 3. From nominal to real interest rates

- If **prices do not fully adjust** instantaneously to changes in nominal interest rates, then the Central Bank is able to affect **real interest rates**.

## 4. From real interest rates to aggregate demand

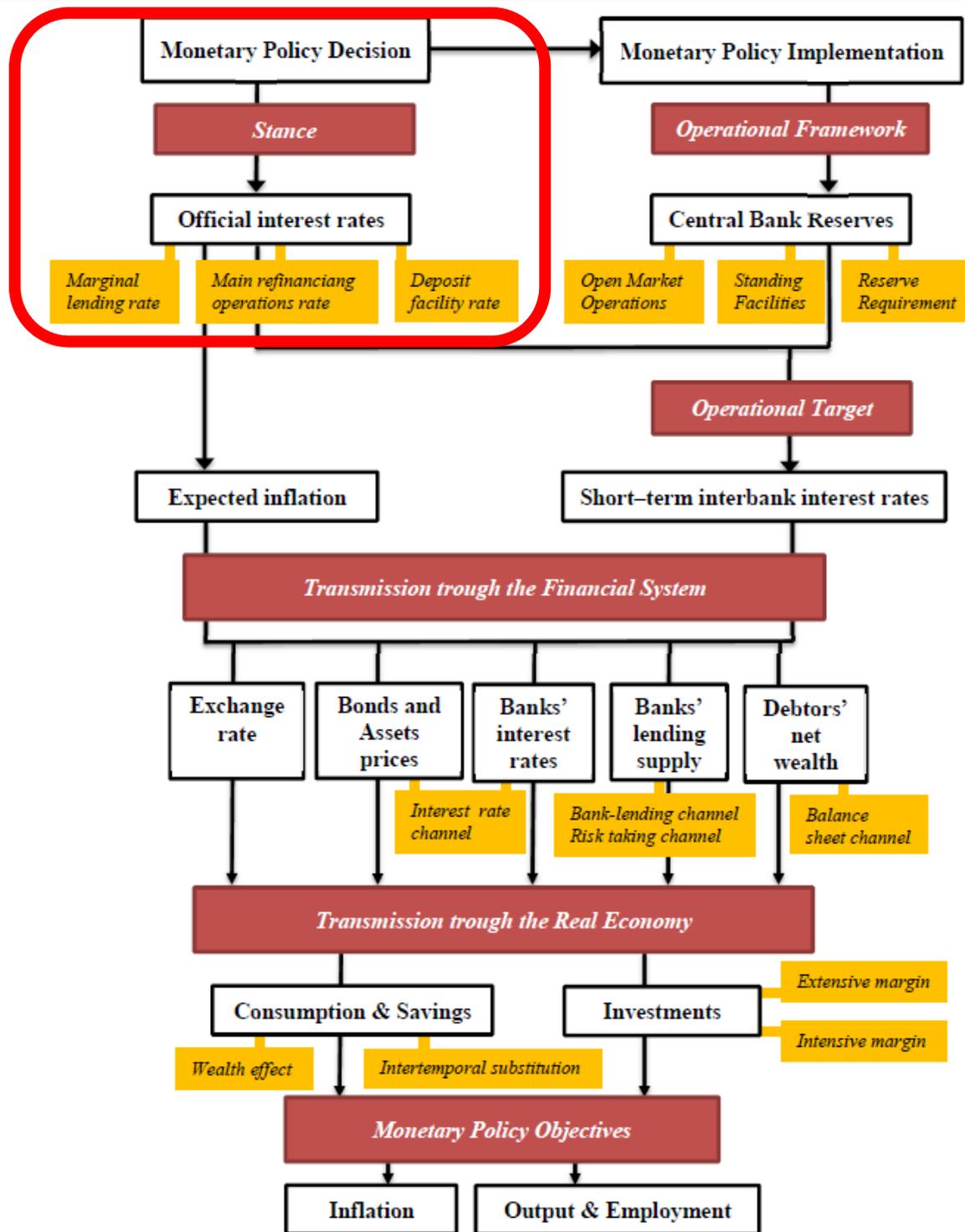
- Real interest rates affect
  - **investment** and production decisions of **firms**
  - **consumption** and **saving** decisions of **households**

# Monetary policy: **How does it work?**

## 5. From aggregate demand to aggregate prices and output

- Since the aggregate demand of goods and services depends on consumption and investments, ...
- ... the central bank by changing **the short-term nominal rate** is able to affect the **aggregate demand** and to the extent that the economy is not yet at its potential, **aggregate output and prices**.

# The Monetary Policy Stance



# The Monetary Policy Stance: **Monetary Policy Objectives**

- The monetary policy stance is the **contribution** made by monetary policy to **economic, financial and monetary developments**.
- The **stance** is assessed and **decisions** are taken based on:
  - the **definition** of the **objective**
  - the **analysis** of the **economic developments**:
    - monetary and financial conditions
    - real economy and shocks
- The Central bank **signals** its monetary policy **stance** by **setting** and **announcing** the **policy interest rates**

# The Monetary Policy Stance: **Monetary Policy Objectives**

- The main objective of monetary policy is
  - to **preserve the value** (purchasing power) of **money**,
  - i.e. to **preserve price stability**.
- While price stability is the **primary goal** of monetary policy for most central banks, other goals are often mentioned, such as
  - full **employment** and
  - stable **economic growth**,

# The Monetary Policy Stance: **Monetary Policy Objectives**

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  - stable **economic growth**,

# The Monetary Policy Stance: **Monetary Policy Objectives**

## Euro area

- “*The primary objective [...] to maintain **price stability**. Without prejudice to the objective of price stability, the ESCB shall **support the general economic policies in the Union** with a view to contributing to the achievement of the **objectives** of the Union as laid down in **Article 3 of the Treaty on European Union**”.*
- “... It shall work for the sustainable development of Europe based on **balanced economic growth** and price stability, a highly competitive social market economy, aiming at **full employment** and social progress, ...” **Article 3, Treaty on European union**

# The Monetary Policy Stance: **Monetary Policy Objectives**

## UK

- “... to deliver *price stability* – low inflation – and, subject to that, to support the Government’s economic objectives including those for *growth and employment*.” **Bank of England Act**

## Japan

- “... aimed at achieving *price stability*, thereby contributing to the sound *development of the national economy*.” **Bank of Japan Act**

## US

- “... to promote effectively the goals of *maximum employment, stable prices, and moderate long-term interest rates*.” **Federal Reserve Act**

# The Monetary Policy Stance: **Monetary Policy Objectives**

## What is «price stability»?

### Euro area:

- “a year-on-year increase in the *Harmonised Index of Consumer Prices (HICP)* for the euro area of *below but close 2%*”, to be maintained over *the medium term*”.

### US:

- “inflation at the rate of *2 %*, as measured by the annual change in the *price index for personal consumption expenditures*, is most consistent over the longer run with the Federal Reserve’s statutory mandate.
- *The Committee would be concerned if inflation were running persistently above or below this objective.*”

# The Monetary Policy Stance: **Monetary Policy Objectives**

## What is «price stability»?

### Japan:

- *“a state where various economic agents including households and firms may make decisions regarding such economic activity as consumption and investment without being concerned about the fluctuations in the price levels of goods and services in general.”*
- *“The Bank sets the “price stability target” at 2 % in terms of the year-on-year rate of change in the consumer price index (CPI)”*

### Canada:

- *“... keeping inflation, measured as the year-over-year rate of increase in the total consumer price index, low, stable and predictable over the medium term, at an annual rate of 2% — the midpoint of a control range of 1 to 3%.”*

## Why “price stability”?

### 1. Less uncertainty in planning future economic activity.

- In a market economy, rational firms and consumers take decisions based on their **forecasts of the future** (including future prices)
- Since inflation and deflation increase **uncertainty** regarding future prices, economic agents would find it **difficult to make rational judgment based on reliable economic forecasts**.
- In addition, a **higher premium** due to increased uncertainty would raise long-term interest rates, which, in turn, would dampen investment (and, therefore, potential growth).

## Why “price stability”?

2. **Signaling function of relative prices.** When the general price level is stable, changes in the prices of individual goods and services are directly reflected in **changes in relative prices**.
- In a market economy, consumers and firms base their consumption and investment decisions on **information** derived from **prices**.
  - **If general prices are unstable** it will be difficult to judge whether observed changes in individual prices reflect
    - changes unique to particular goods and services (such as changing consumer preferences) or
    - a mere reflection of the change in the general price level

## Why “price stability”?

3. **Avoiding an unintended effect on income distribution.** With unanticipated inflation (or deflation), there is an opposite effect on creditors and debtors income and wealth.
- If **unanticipated inflation** occurs,
    - **financial assets** such as deposits, whose principal and interest are fixed in nominal terms, will **lose their value in real terms**, and **creditors incur losses**.
    - Conversely, **financial liabilities** that are fixed in nominal terms will **lose value in real terms**, and **debtors benefit**.
  - A similar situation would be seen in the case of all contracts expressed in nominal terms, such as for **wages** that are fixed in nominal terms.

# The Monetary Policy Stance: **Monetary Policy Objectives**

## Why medium term?

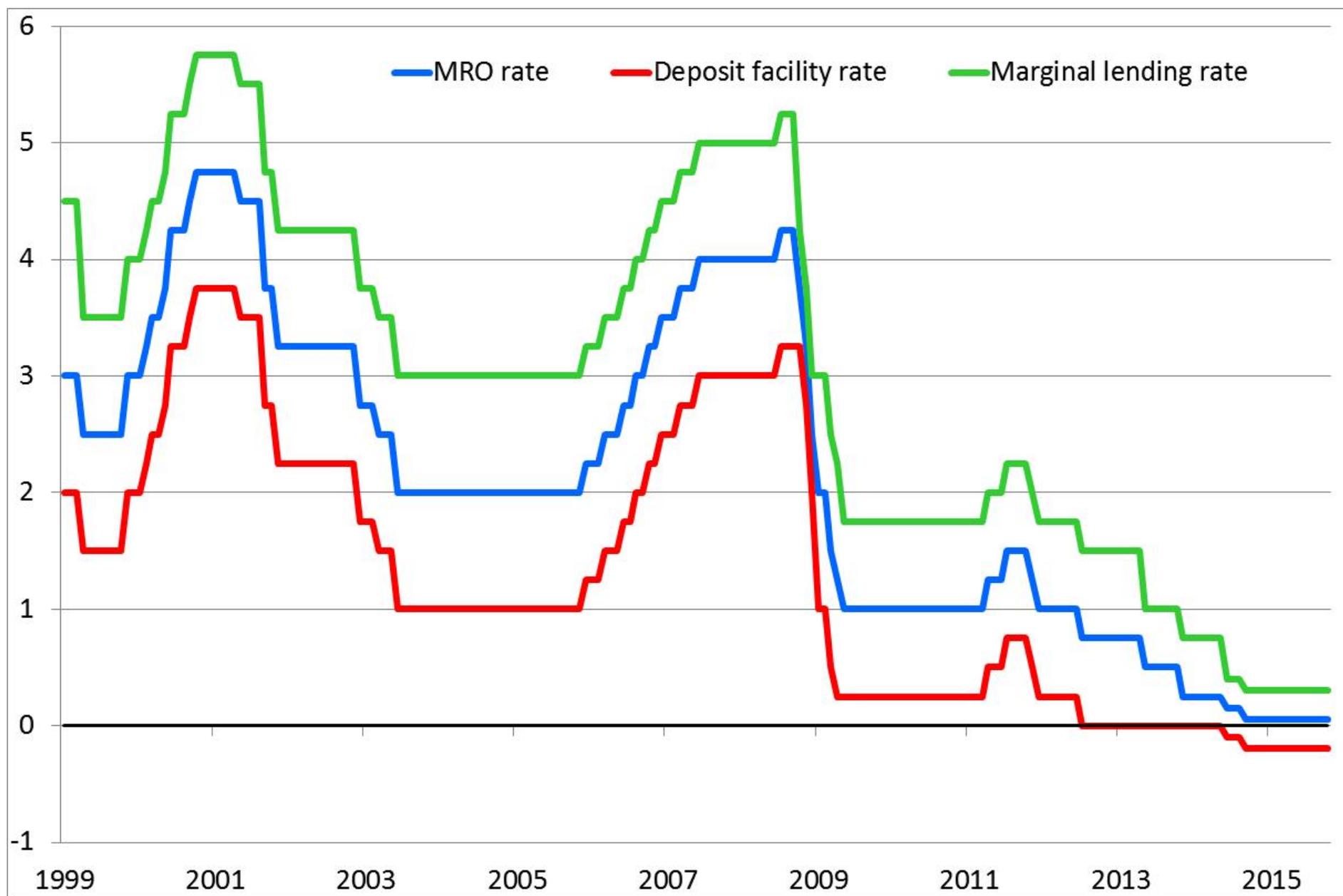
1. It takes into account “long and variable lags” in **transmission of monetary policy** and in economic developments.
2. It **prevents excessive activism**, which may raise volatility of output and inflation (e.g.: Orphanides, Williams, 2004).
3. It acknowledges the **uncertainty surrounding the effects of shocks**.

# The Monetary Policy Stance: **Policy interest rates**

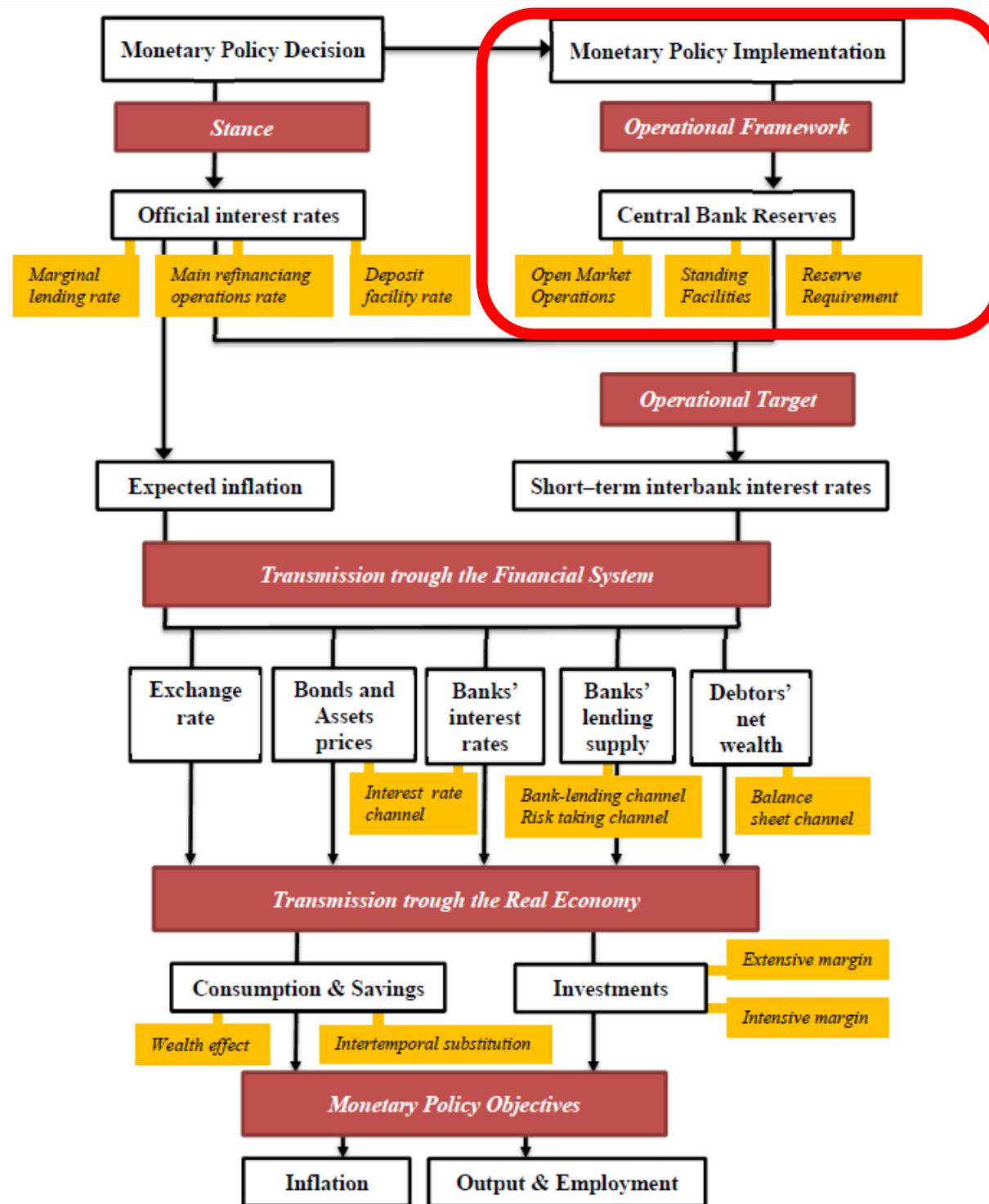
- The Central bank **signals** its monetary policy stance by setting and announcing the **policy interest rates**
- In a “**Corridor System**”, such as the one used by the Eurosystem, the policy interest rates are:
  - the **interest rate on the main refinancing operations**, which normally provide the bulk of liquidity to the banking system;
  - the **rate on the deposit facility**, which banks may use to make overnight deposits with the Eurosystem.
  - the **rate on the marginal lending facility**, which offers overnight credit to banks from the Eurosystem.

# The Monetary Policy Stance: Policy interest rates

## Policy interest rates (Eurosystem)



# The Monetary Policy Implementation



# The Monetary Policy Implementation

«[**Money**] is a commodity subject to great *fluctuations of value* and those fluctuations are easily *produced* by a **slight excess** or a **slight deficiency** of quantity. Up to a certain point money is a **necessity**.” Bagehot (1873)

- The central bank in order to influence the nominal interest rates in the economy should
  - first be able to affect the **interest rate** at which banks exchange **reserves** in the **interbank market**;
  - in order to be able to affect interbank interest rates **reserves** should **not have a perfect substitute**;
  - in other words, the central bank should make **reserves necessary** for the banking system, so that
  - the **interest-rate elasticity** of demand is **extremely low** (the banks are willing to pay whatever price the central bank decides.)

# The Monetary Policy Implementation

- In normal times, the monetary policy implementation consists in “aligning” its **operational target** with its **stance**.
  - In the Eurosystem, this consists in steering the **short-term market interest rates** toward the **MRO rate**.
- In order to do that the Central bank
  - **signals** its **stance** to the financial markets by announcing its decisions on **policy interest rates**
  - **assesses** the **liquidity needs** of the banking system and
  - **supplies or absorbs** the appropriate amount of **reserves** through *open market operations* in order to maintain the system neither in a **liquidity deficit** nor in an **excess liquidity** condition.

# The Monetary Policy Implementation: **Liquidity Needs**

- Liquidity needs depend on **three factors**:
  - Reserve requirements: the minimum amount of reserves a credit institution is **required to hold** with the Central bank over a predefined **maintenance period**.
  - Autonomous factors: reflect transactions that are **not controlled by the central bank** but affect the supply of reserves directly.
  - Excess reserves: reserves in **excess to reserve requirement** and **autonomous factors**.

# The Monetary Policy Implementation: **Reserve Requirement**

- The fulfilment of the reserve requirement is measured on the basis of **end-of-day snapshots** (i.e. intra-day levels of reserves are not relevant) of the reserve held at the Central bank.
- The requirement has to be fulfilled on **average** over a **maintenance period** (i.e. average of the end-of-day balances in the reserve accounts over the maintenance period).
- The **size** of the reserve requirement of a specific bank is normally set as a function of specific items of its balance: for the euro area the **stock of liabilities to non-banks with a maturity below two years**.
- The reference stock of liabilities is the one of the **previous maintenance period**.

# The Monetary Policy Implementation: **Reserve Requirement**

- In a **corridor system**, banks may hold reserves in two different accounts at the central bank: in the **reserve account** or in the **deposit facility**.
- Reserves to satisfy **reserve requirement** are held in the **reserve account**, since they are **remunerated** at the MRO rate.
- Reserves in the **reserve account** in **excess** of reserve requirement are **not remunerated**.
- **Excess reserves** are usually held in the **deposit facility**, where they are remunerated at the **deposit facility rate**.

# The Monetary Policy Implementation: **Autonomous Factors**

- Autonomous factors could be decomposed into
  - **banknotes** in circulation
  - **government deposits** at the CB
  - **net portfolio**: the sum of net foreign assets, domestic assets and other autonomous factors (OAF).
- They are called “**autonomous factors**” because they are (in large part) determined either by
  - the **behaviour of the public**, as in the case of **banknotes** in circulation, or
  - by **institutional arrangements** that are not under the control of the liquidity management of the ECB, as in the case of **government deposits**.

# The Monetary Policy Implementation: **Autonomous Factors**

## ■ Government deposits.

- *Suppose the government issue a 100€ bond that is bought by a depositor of Bank A.*

Bank A	
Assets	Liabilities
Reserves -100€	Deposits -100€
Currency	Bonds
Other assets	Capital

Central Bank	
Assets	Liabilities
Gold	Currency
Securities	Reserves -100€
Loans to banks	Gov. Dep. +100€
	Other liabilities

- *Suppose the Government pays 100€ to an employee that has a current account at Bank A*

Bank A	
Assets	Liabilities
Reserves +100€	Deposits +100€
Currency	Bonds
Other assets	Capital

Central Bank	
Assets	Liabilities
Gold	Currency
Securities	Reserves +100€
Loans to banks	Gov. Dep. -100€
	Other liabilities

# The Monetary Policy Implementation: **Autonomous Factors**

- **Banknotes in circulation.** *Suppose a depositor asks to Bank A to convert 100€ from his current account in to a 100€ banknote. Suppose the bank does not have the 100€ banknote.*
  - *Bank A obtains the banknote from the Central bank ...*

Bank A	
Assets	Liabilities
Reserves -100€	Deposits
Currency +100€	Bonds
Other assets	Capital

Central Bank	
Assets	Liabilities
Gold	Currency +100€
Securities	Reserves -100€
Loans to banks	Gov. Dep.
	Other liabilities

- *Bank A provides the banknote to his depositor*

Bank A	
Assets	Liabilities
Reserves	Deposits -100€
Currency -100€	Bonds
Other assets	Capital

# The Monetary Policy Implementation: **Excess Reserves**

- In normal times, excess reserves are held primarily as a cushion to **buffer against unexpected payment shocks**.
- Since in normal times the reserves injected by the central bank in order to satisfy **reserve requirement** and **autonomous factors** are sufficient also to have a **correct functioning of the payment system** (i.e., banks use those reserves to settle payments), **excess reserves** are close to **zero**.
- Since reserves in excess to reserve requirement held in the reserve account are not remunerated, usually banks hold excess reserves in the **deposit facility** where they are remunerated at the **deposit facility rate**.

# The Monetary Policy Implementation: **Operational Framework**

- The **operational framework** is the set of **instruments** used by the central bank to **manage the amount of outside money** in the economy.
- In general central banks provide reserves through **two types of operations**:
  - **Open market operations (OMO)**: operations executed on the **initiative of the central bank** in order to help banks meet their **liquidity needs** or to **withdraw excess liquidity** from the system.
  - **Standing facilities**: these facilities allow credit institutions, on their own initiative, to either **borrow liquidities (until the next morning)** from their national central banks using the **marginal lending facility (ML)**, or to **deposit excess liquidities** with their national central banks using the **deposit facility (DP)**.

# The Monetary Policy Implementation: **Operational Framework**

- Open market operations: can be divided into two types: **permanent** and **temporary**.
  - Permanent OMOs involve **outright purchases** or **sales** of **securities**; they are generally used to accommodate the **longer-term factors driving the liquidity needs** of the banking system (primarily, for example, the trend growth of currency in circulation).
  - Temporary OMOs are typically used to address reserve needs that are **transitory in nature**; these operations are either **repurchase agreements** (REPOs) – the Central bank buys (or sell) a security under an agreement to resell (or rebuy) that security in the future – or **collateralized loans** (or term deposits)

## Eurosystem's operational framework

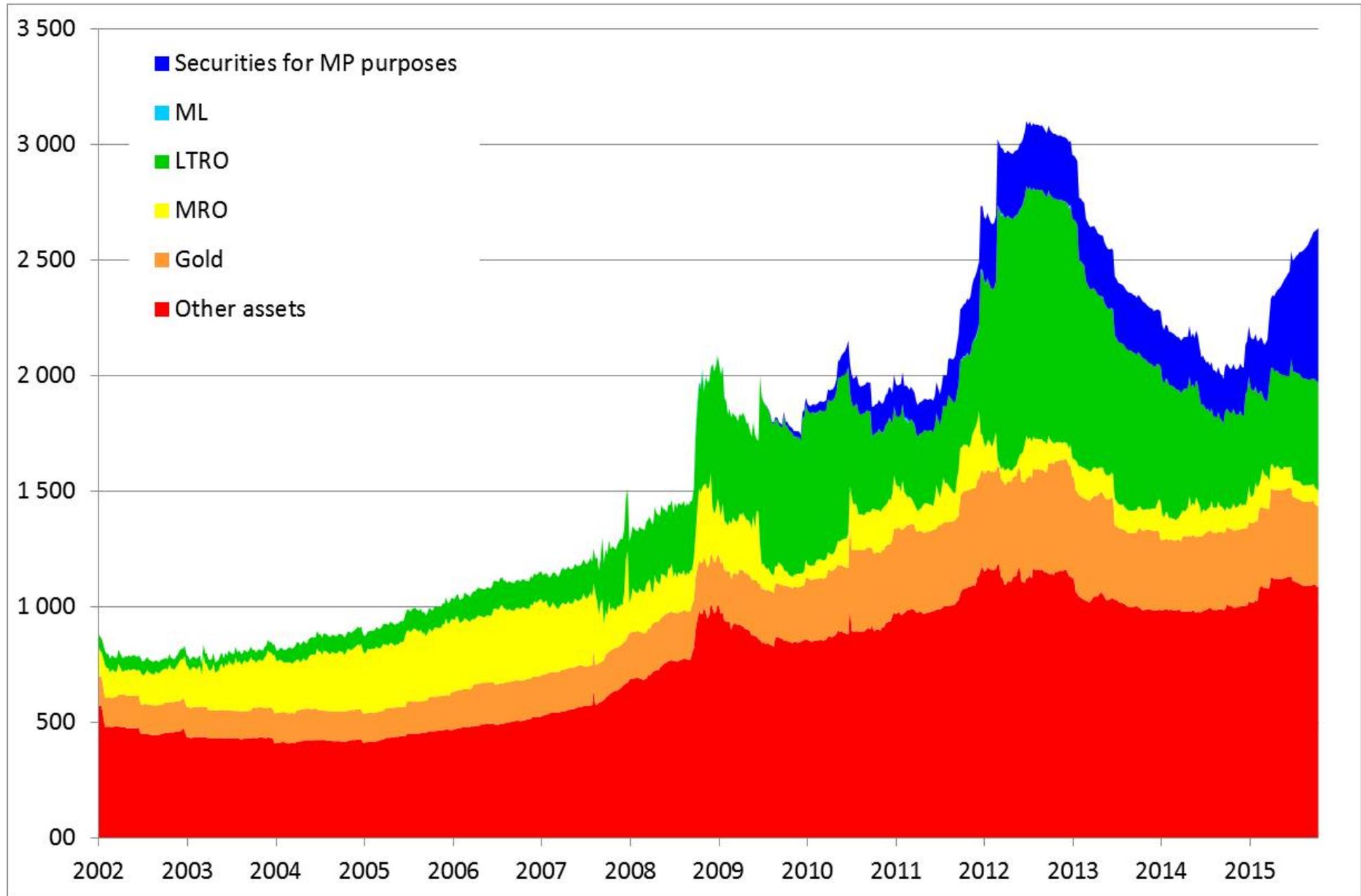
- **Open Market Operations (OMO):**
  - Main refinancing operations (MRO),
  - Longer-term refinancing operations (LTRO),
  - Fine-tuning operations.
  
- **Standing Facilities:**
  - Marginal Lending (ML),
  - Deposit Facility (DF).
  
- **Reserve requirements (RR)** for credit institutions.

# The Monetary Policy Implementation: **Operational Framework**

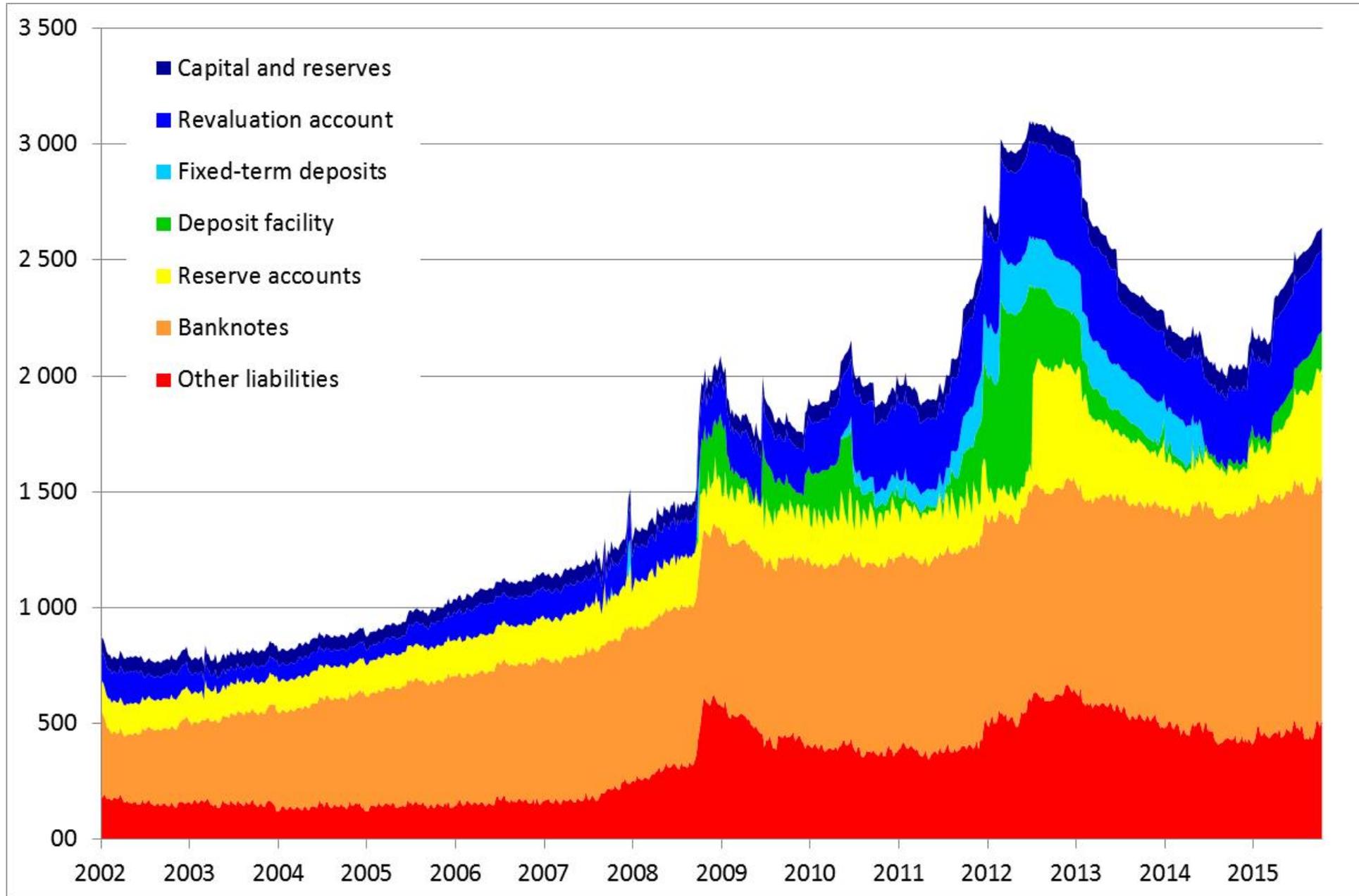
## Simplified central bank balance sheet

<b>Assets</b>	<b>Liabilities</b>
<u>Autonomous factors</u>	<u>Autonomous factors</u>
<i>Gold</i>	<i>Currency in circulation</i>
<i>Other autonomous factors</i>	<i>Government deposits</i>
	<i>Other autonomous factors</i>
<u>Monetary Policy instruments</u>	<u>Monetary Policy instruments</u>
<i>Open market operations</i>	<i>Reserve account</i>
<i>Marginal lending</i>	<i>Deposit facility</i>
	<i>Fixed term deposits</i>
	<u>Capital &amp; Reserves</u>

## Eurosystem's balance sheet – Assets



## Eurosystem's balance sheet – Liabilities



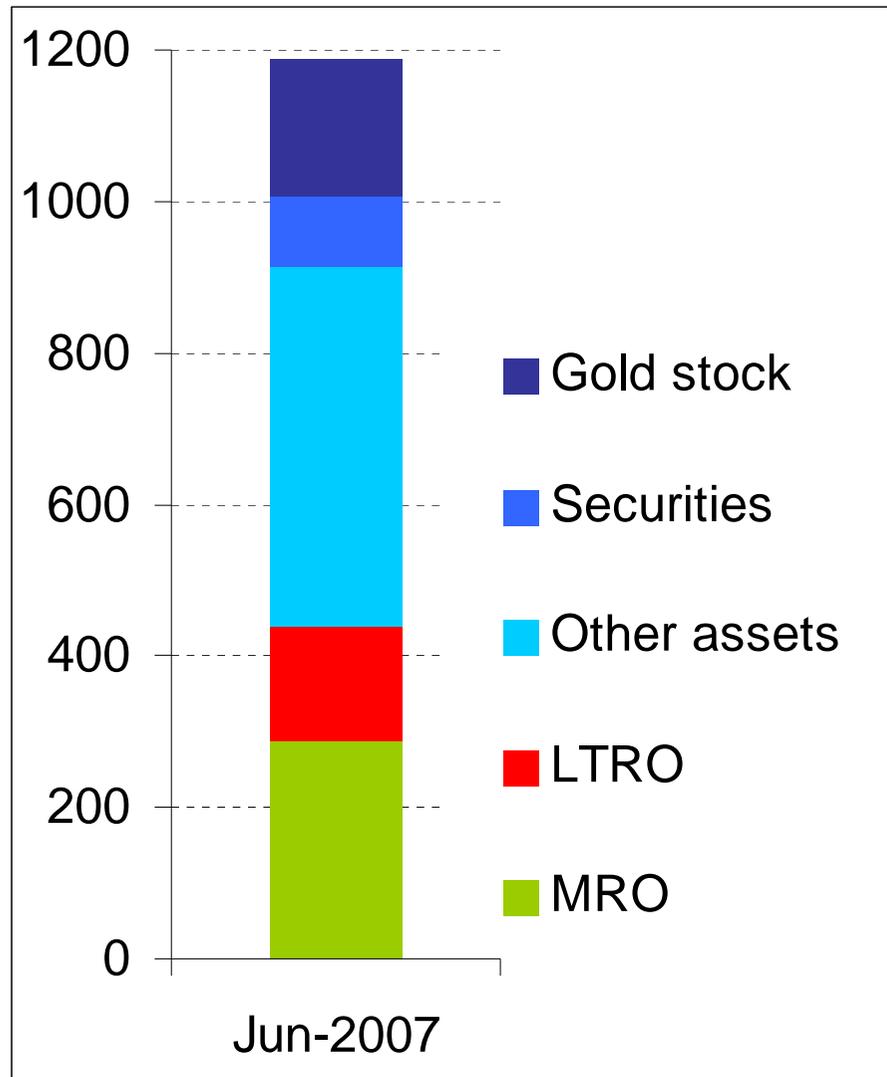
## Eurosystem's operational framework (pre-crisis)

- **Some characteristics of OMOs:**
  - **Fixed amount tenders** with flexible rates
  - LTRO and MRO (**mostly MRO**)
  - **Small number of participants** in the tenders
  - Relatively **large liquidity deficit** (e.g. the amount of reserves the banking sector needs in order to satisfy the **liquidity needs**).

# The Monetary Policy Implementation: **Operational Framework**

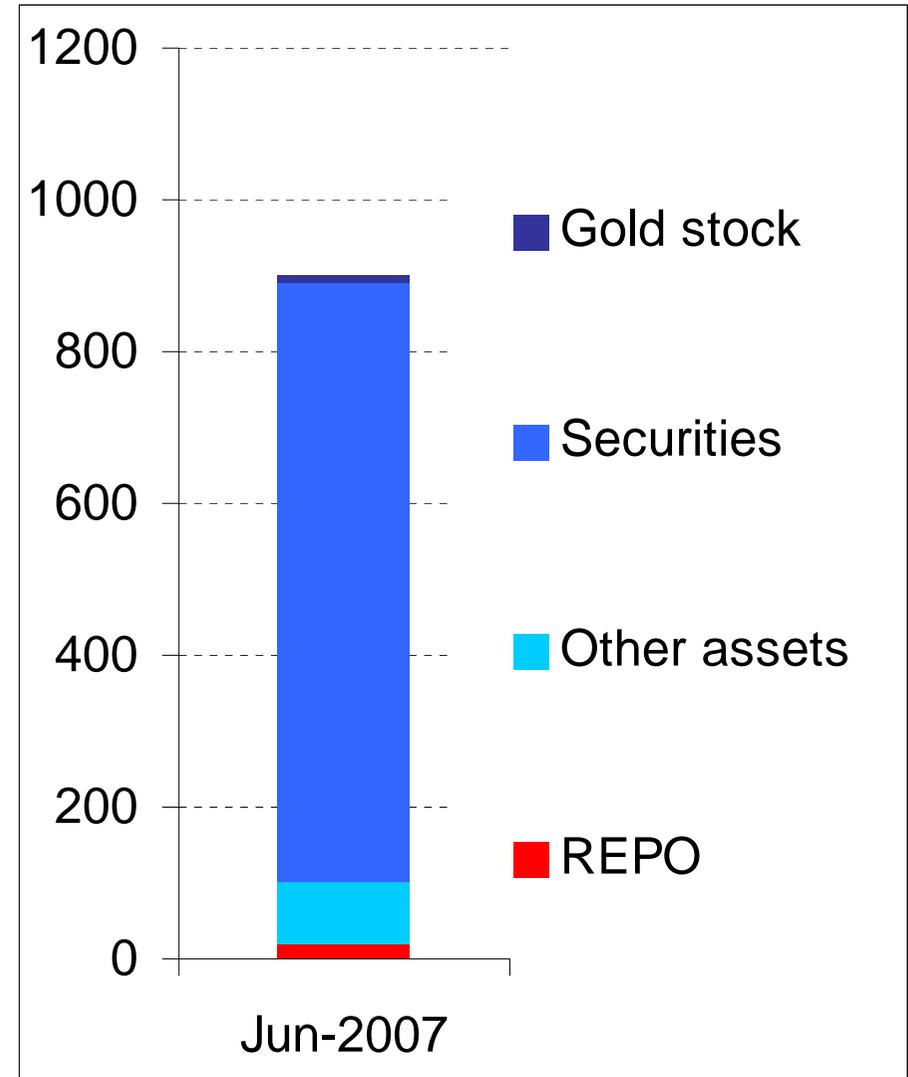
## Eurosystem balance sheet: Assets

(€ blns)



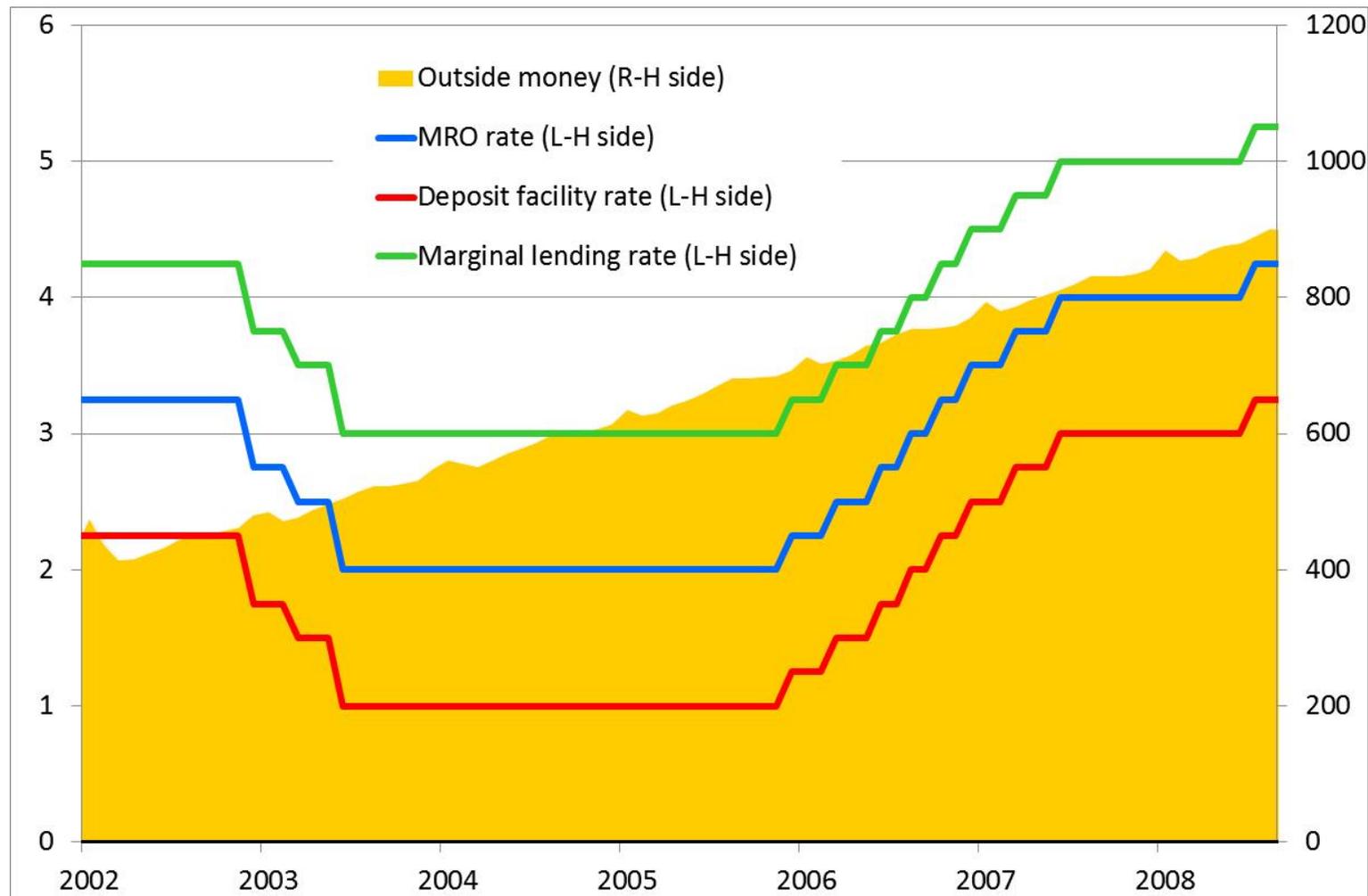
## Fed balance sheet: Assets

(\$ blns)



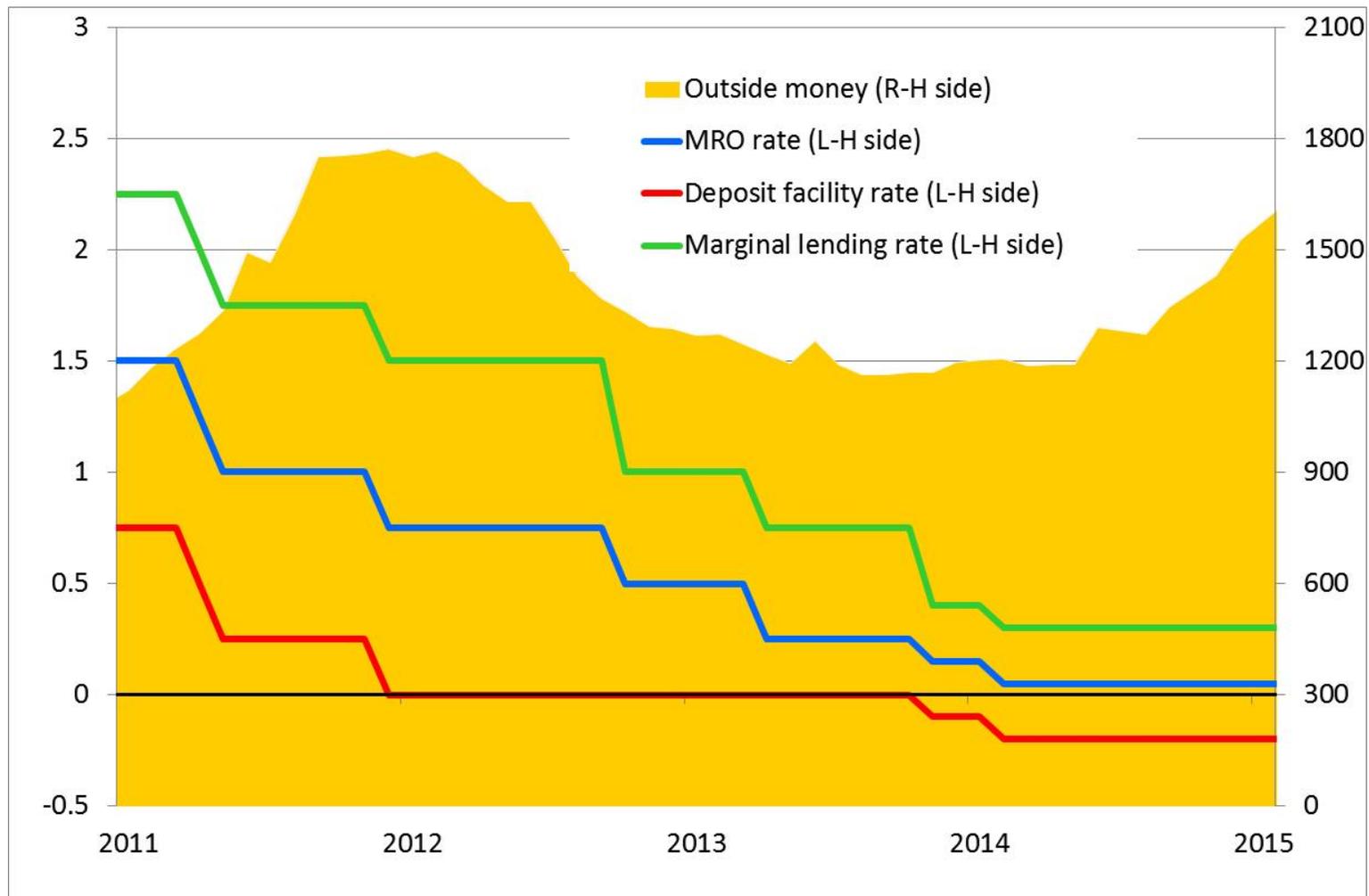
# The Monetary Policy Implementation: **Short-Term Interbank Interest Rate**

- Decoupling principle. Borio & Disyatat (2010): “*The same amount of bank **reserves** can coexist with very different levels of **interest rates**; ...*”.



# The Operational Target: **Short-Term Interbank Interest Rate**

- **Decoupling principle**. Borio & Disyatat (2010): “*The same amount of bank reserves can coexist with very different levels of interest rates; conversely, the same **interest rate** can coexist with **different amounts of reserves**”.*



## *An Example*

- *Reserve requirement = 2% of deposits in the previous maintenance period (to be fulfilled on average in the current maintenance period);*
- *Maintenance period = 2 days;*
- *No autonomous factors;*
- *No excess reserves in the system;*

For simplicity I don't consider in the balance sheets the interest rate payments

# The Monetary Policy Implementation: **Operational Framework**

*Day 1: Each bank obtains 2€ of reserves from CB and places them in the reserve account (C/Res.) at the CB ...*

Bank A			
Assets		Liabilities	
C/Res.	<b>2€</b>	Deposits	100€
Loans	120€	CB lending	<b>2€</b>
Assets	10€	Bonds	10€
		Capital	20€

Bank B			
Assets		Liabilities	
C/Res.	<b>2€</b>	Deposits	100€
Loans	120€	CB lending	<b>2€</b>
Assets	10€	Bonds	10€
		Capital	20€

*... Bank A lends 1 € to firm A ...*

Bank A			
Assets		Liabilities	
C/Res.	2€	Deposits	<b>101€</b>
Loans	<b>121€</b>	CB lending	2€
Assets	10€	Bonds	10€
		Capital	20€

**No need for reserves  
to make a loan**

# The Monetary Policy Implementation: **Operational Framework**

... firm A buys machinery from firm B, depositor of Bank B ...

Bank A			
Assets		Liabilities	
C/Res.	1€	Deposits	100€
Loans	121€	CB lending	2€
Assets	10€	Bonds	10€
		Capital	20€

**Reserves are used to settle payments**

Bank B			
Assets		Liabilities	
C/Res.	3€	Deposits	101€
Loans	120€	CB lending	2€
Assets	10€	Bonds	10€
		Capital	20€

... at the end of day 1 Bank B moves 1€ to deposit facility...

Since reserves in excess to res.require. are not remunerated in the reserve account, Bank B at the end of the day move excess reserves to the deposit facility

Bank B			
Assets		Liabilities	
C/Res.	2€	Deposits	101€
Dep.Fac.	1€	CB lending	2€
Loans	120€	Bonds	10€
Assets	10€	Capital	20€

# The Monetary Policy Implementation: **Operational Framework**

*Day 2: At the end of the maintenance period Bank A borrows 1€ in the money market (MM) from Bank B to fulfill reserve requirement ...*

Bank A	
Assets	Liabilities
C/Res. <b>2€</b>	Deposits 100€
Loans 121€	MM debt <b>1€</b>
Assets 10€	CB lending 2€
	Bonds 10€
	Capital 20€

Bank B	
Assets	Liabilities
C/Res. 2€	Deposits 101€
Dep.Fac. <b>0€</b>	CB lending 2€
MM loans <b>1€</b>	Bonds 10€
Loans 120€	Capital 20€
Assets 10€	

# The Monetary Policy Implementation: **Operational Framework**

*... since in day 1 Bank A deposited only 1€ in the reserve account, in order to satisfy the reserve requirement it still need 1€ of reserves Bank A goes in **marginal lending** with the Central Bank ...*

Bank A			
Assets		Liabilities	
C/Res.	<b>3€</b>	Deposits	100€
Loans	121€	ML CB	<b>1€</b>
Assets	10€	MM debt	1€
		CB lending	2€
		Bonds	10€
		Capital	20€

# The Monetary Policy Implementation: **Operational Framework**

Day 3: Bank A and B settle their debts with the Central bank ...

Bank A			
Assets		Liabilities	
C/Res.	0€	Deposits	100€
Loans	121€	ML CB	0€
Assets	10€	MM debt	1€
		CB lending	0€
		Bonds	10€
		Capital	20€

Bank B			
Assets		Liabilities	
C/Res.	0€	Deposits	101€
MM loans	1€	CB lending	0€
Loans	120€	Bonds	10€
Assets	10€	Capital	20€

# The Monetary Policy Implementation: **Operational Framework**

*...and contemporaneously obtain new reserves from central bank to satisfy the new reserve requirement ...*

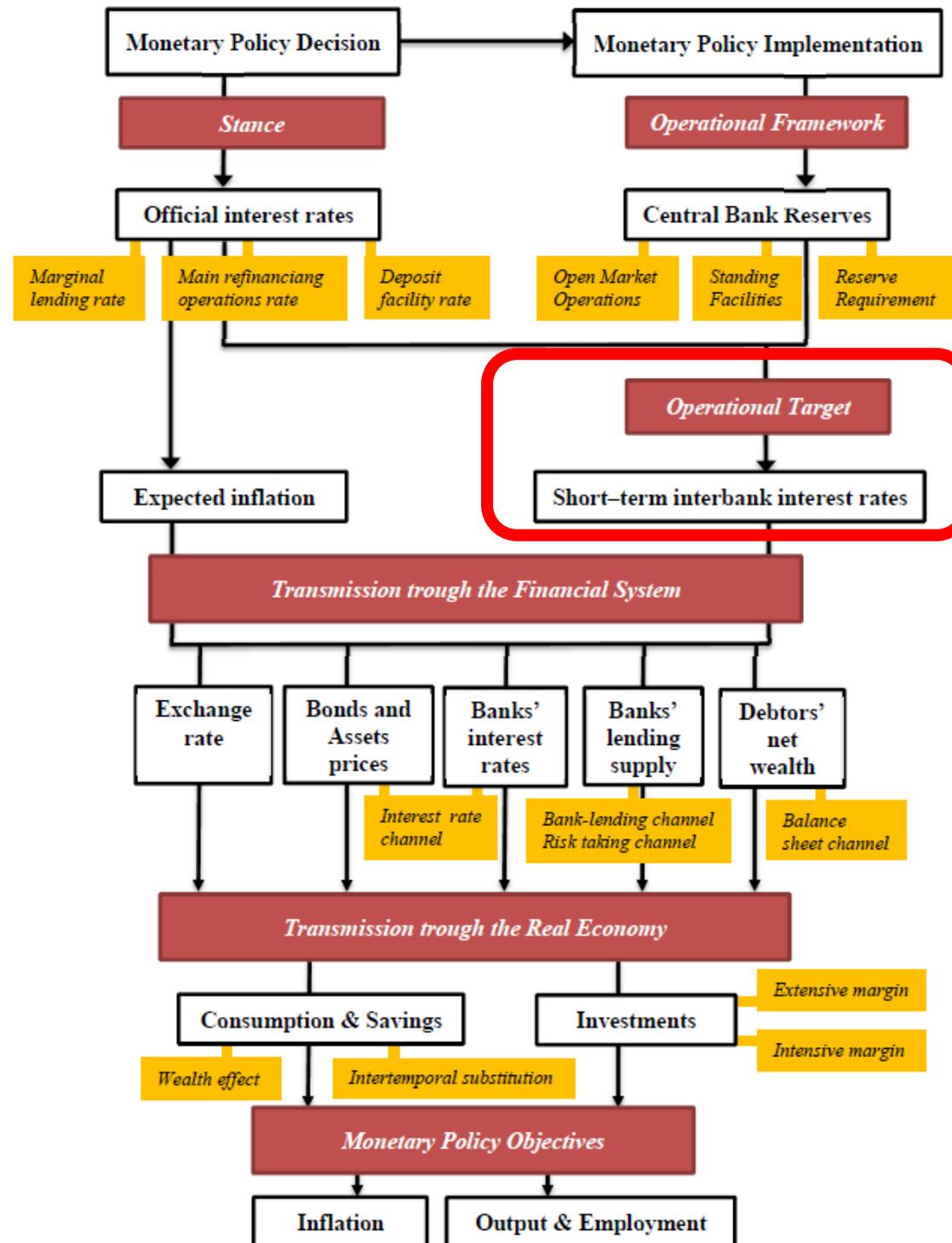
**Central banks provide the amount of reserves necessary to meet the liquidity needs of financial institutions;**

Bank A			
Assets		Liabilities	
C/Res.	2€	Deposits	100€
Loans	121€	MM debt	1€
Assets	10€	CB lending	2€
		Bonds	10€
		Capital	20€

Bank B			
Assets		Liabilities	
C/Res.	2.02€	Deposits	101€
MM loans	1€	CB lending	2.02€
Loans	120€	Bonds	10€
Assets	10€	Capital	20€

**Commercial banks have the ability to create (inside) money by granting new loans, which in turn generate deposits;**

# The Operational Target



# The Operational Target

- The **operational target** of monetary policy can be considered as the first step in the **transmission mechanism** and is a variable with the following characteristics:
  - it can (**sufficiently**) **be controlled** by the central bank;
  - it is **economically relevant**, in the sense that it effectively influences the ultimate objective of monetary policy;
  - it **defines the stance** of monetary policy, in the sense that it is set by the policy decision-making body of the central bank;
  - it gives the **necessary and sufficient guidance** to the monetary policy implementation officers in the central bank on what to do.

# The Operational Target

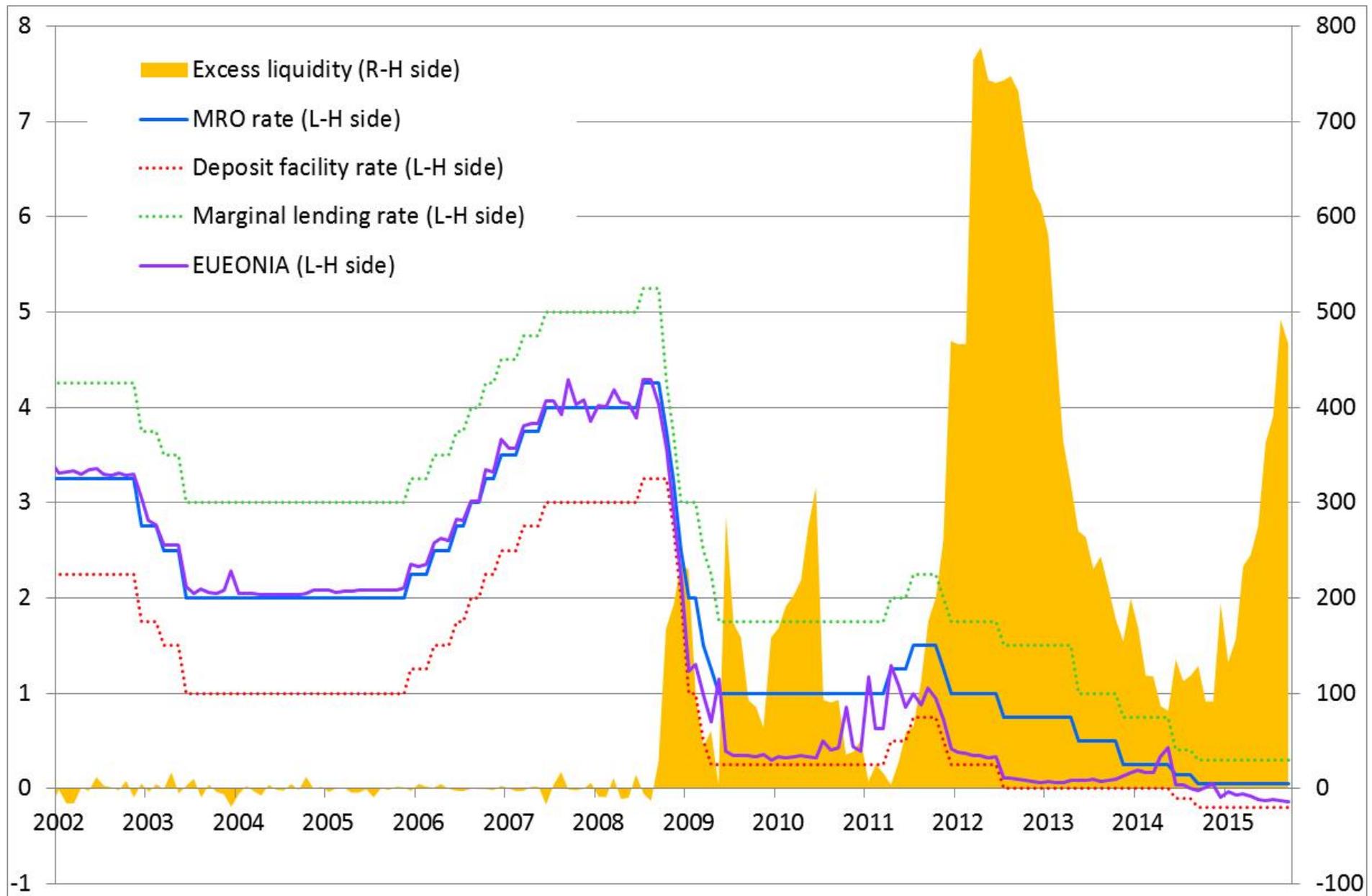
- There are essentially three main types of **operational targets** that are used by central banks:
  - a **short-term interest rate**;
  - a **quantitative**, reserve-related concept;
  - a **foreign exchange rate**, for central banks which peg their own currency strictly to a foreign one.

# The Operational Target: **Short-Term Interbank Interest Rate**

- In normal times the operational target of main central banks is **the short-term interbank interest rate**, i.e. the interest rate at which banks lend to each other reserves for a very short period of time.
- The target is derived on the basis of a **macroeconomic model** of the **transmission mechanism** between short-term interest rates and the ultimate target of monetary policy.
- During **normal times** the central bank only cares about injecting the banking system with the **appropriate amount of reserves** while their **distribution among depository institutions takes place endogenously** through the interbank market.
- When market conditions are quiet, central banks' **monopolistic power** in the provision of reserves allows them to **steer interest rates in the interbank market very accurately**.

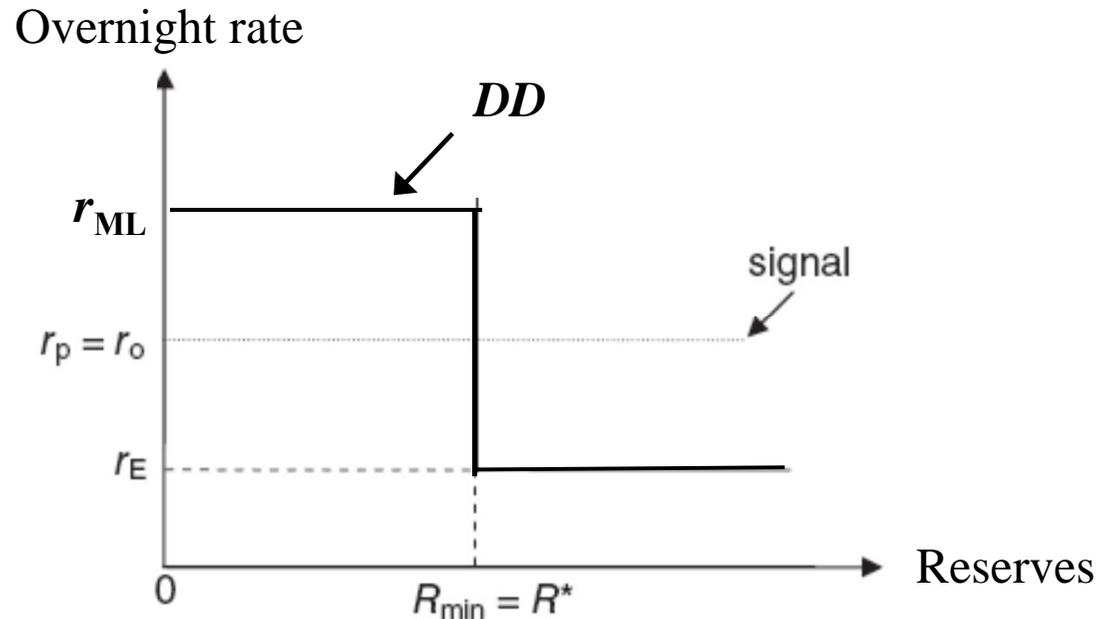
# The Operational Target: **Short-Term Interbank Interest Rate**

## Reserves & overnight interest rate (Eurosystem)



# The Operational Target: **Short-Term Interbank Interest Rate**

## Overnight interest rate in a corridor system



$r_p$ , policy rate (minimum rate);  $r_E$ , deposit facility rate (rate on excess reserves);  $r_{ML}$ , rate on marginal lending;  $r_o$ , overnight rate

$R_{min}$ , minimum amount of balances required for settlement purposes;

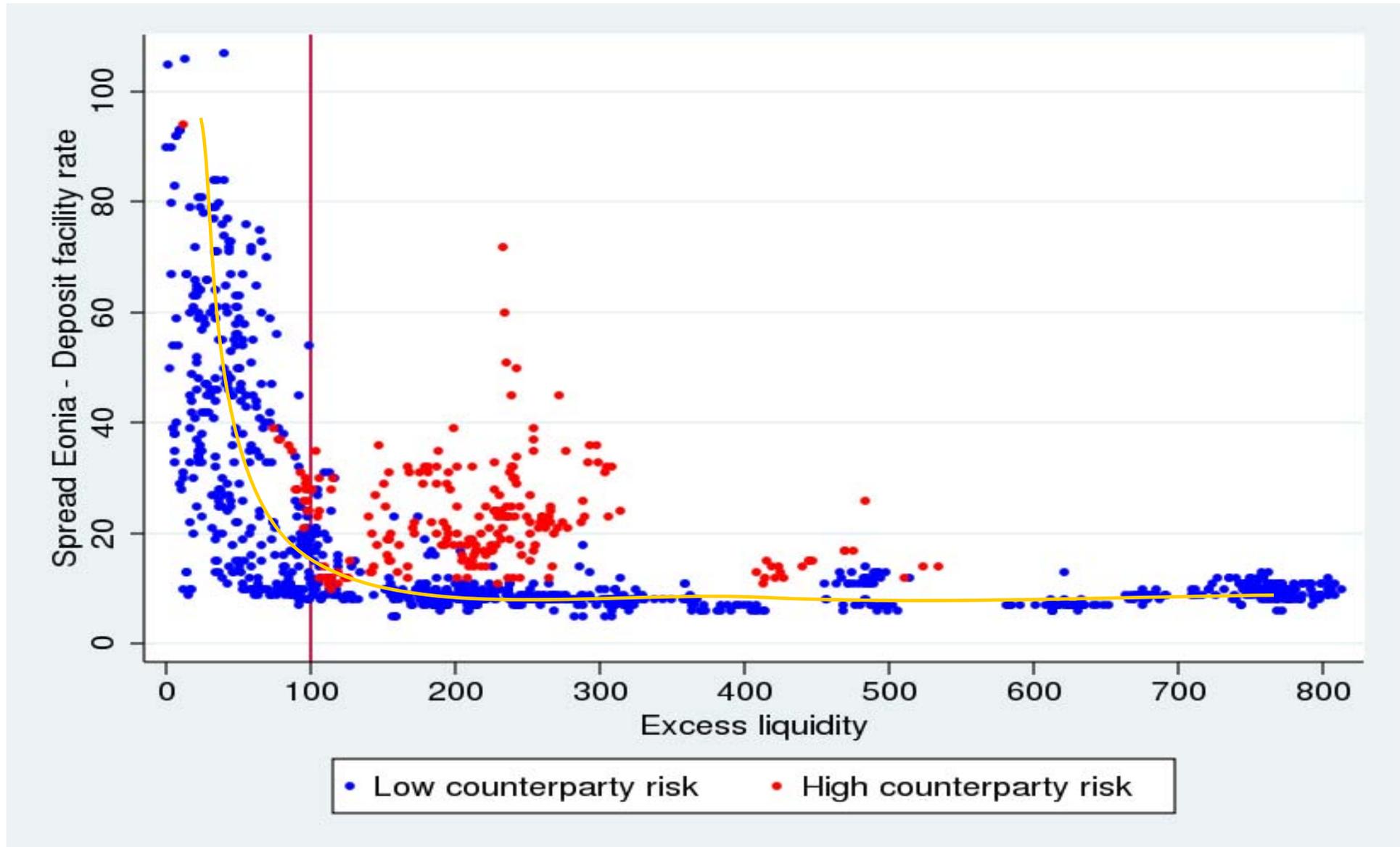
$R^*$ , amount of reserves in equilibrium;  $DD$ , demand of reserves.

## Overnight interest rate in a corridor system

- $r_E < r_o$ : banks **economize on reserves**,
- The amount **demanded** is **interest-inelastic**.
- IF  $R > R_{\min}$ , THEN  $r_o = r_E$  (banks seek to get rid of unwanted balances by lending in the overnight market).
- IF  $R < R_{\min}$ , THEN  $r_o = r_{ML}$  (potential settlement difficulties, but banks can go in marginal lending).
- IF  $R = R_{\min}$ , THEN  $r_o = r_P$ .

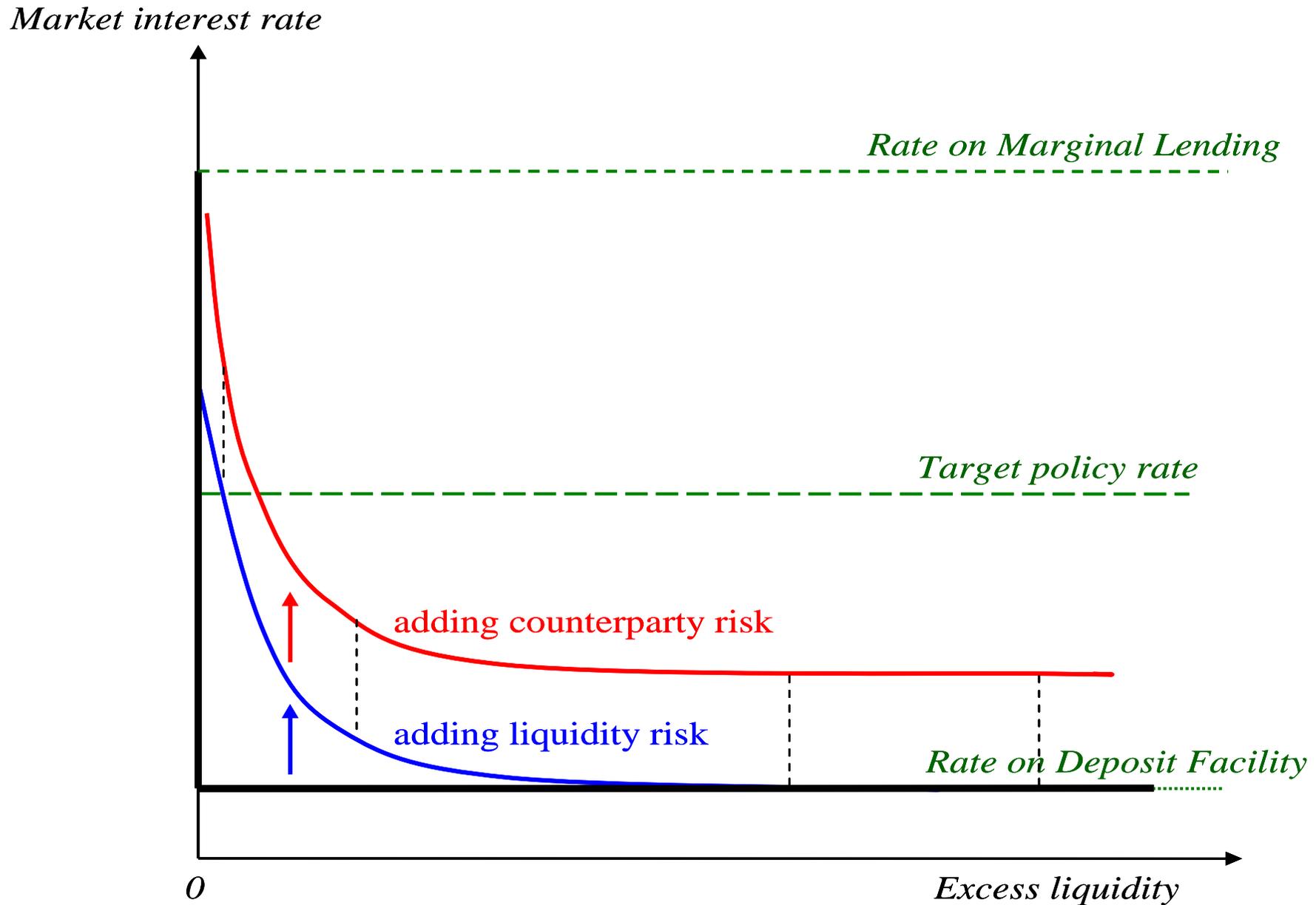
# The Operational Target: **Short-Term Interbank Interest Rate**

## Excess reserves & overnight interest rate (Eurosystem)



# The Operational Target: **Short-Term Interbank Interest Rate**

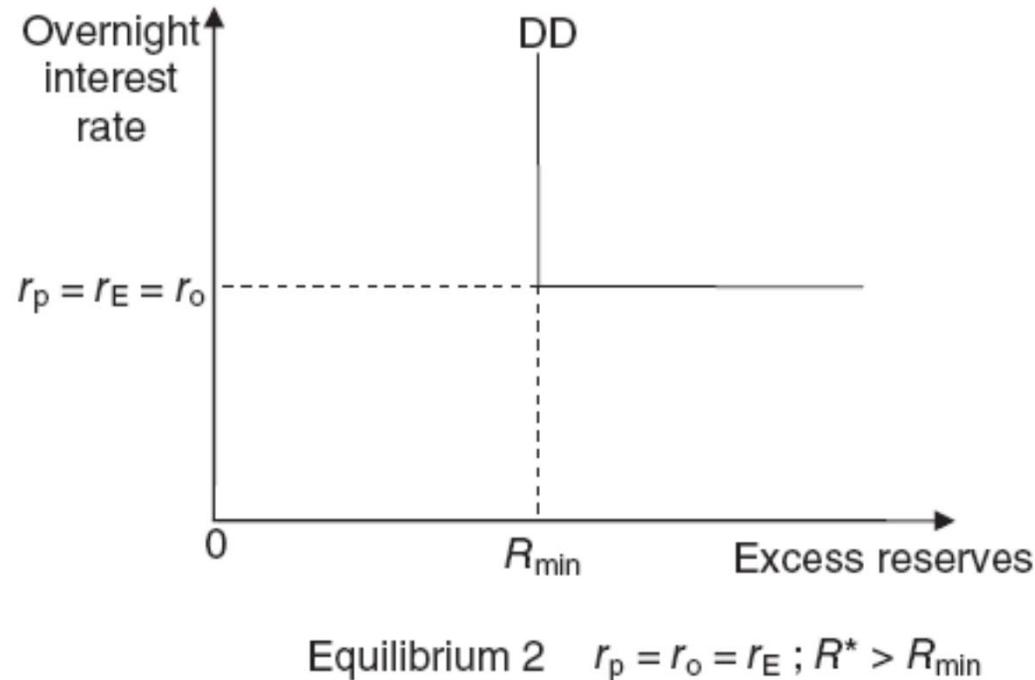
## Counterparty and liquidity risks



# The Operational Target: **Short-Term Interbank Interest Rate**

## Overnight interest rate in a corridor system with “no floor”

Scheme 2



$r_p$ , policy rate (MRO rate);  $r_o$ , overnight rate;  $r_E$ , deposit facility rate (rate on excess reserves);  $r_{ML}$ , rate on marginal lending;

$R_{min}$ , minimum amount of balances required for settlement purposes;

$R^*$ , amount of reserves in equilibrium;  $DD$ , demand of reserves.

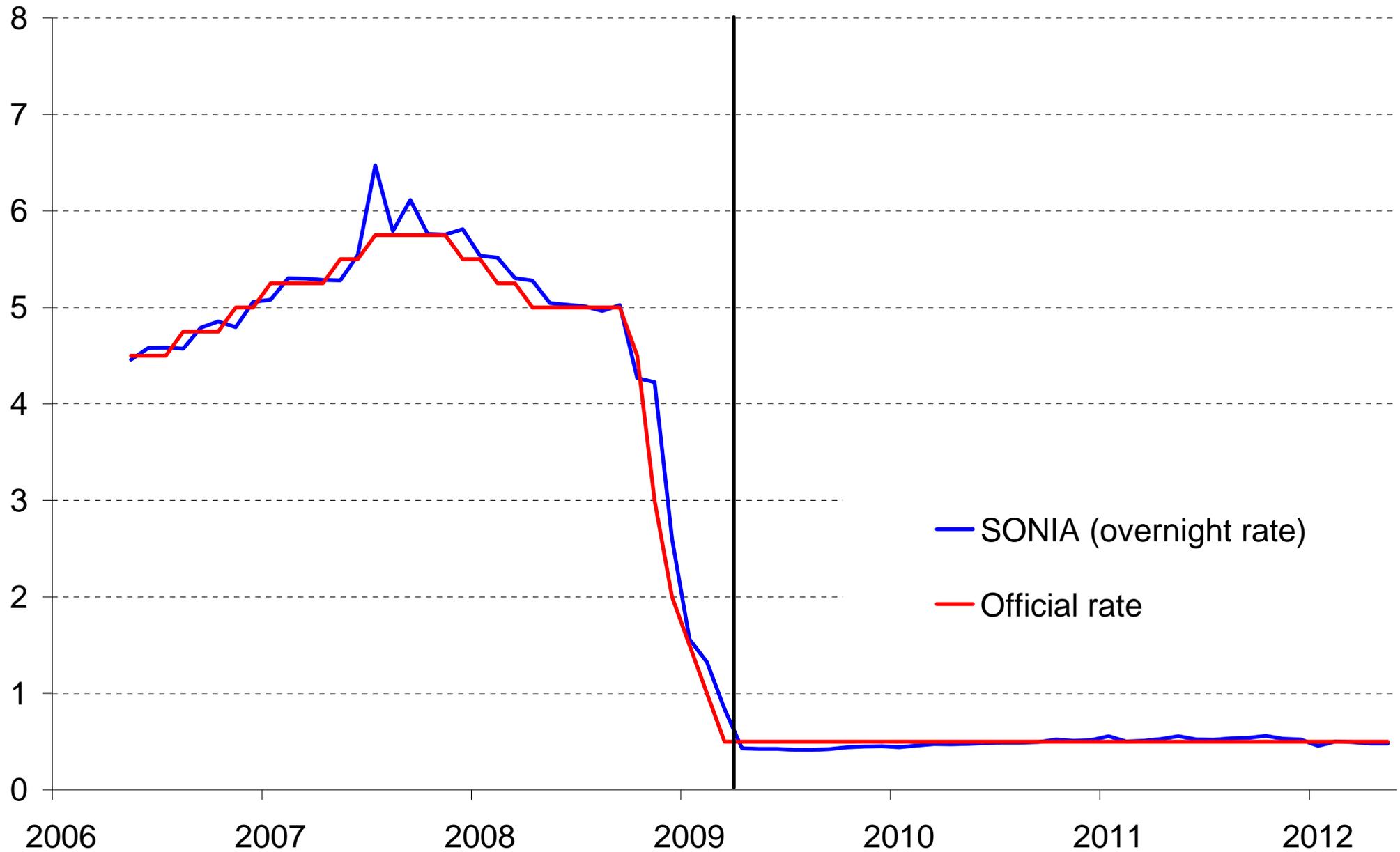
# The Operational Target: **Short-Term Interbank Interest Rate**

## Overnight interest rate in a corridor system with “no floor”

- Central banks may decide to **remunerate excess reserve holdings at the policy rate.**
- This sets the **opportunity cost of holding reserves for banks to zero** so that the demand curve becomes effectively horizontal at the policy rate.
- The central bank can then supply as much as it likes at that rate. Again, the **policy interest rates are delinked from the amount of bank reserves** in the system.

# The Operational Target: **Short-Term Interbank Interest Rate**

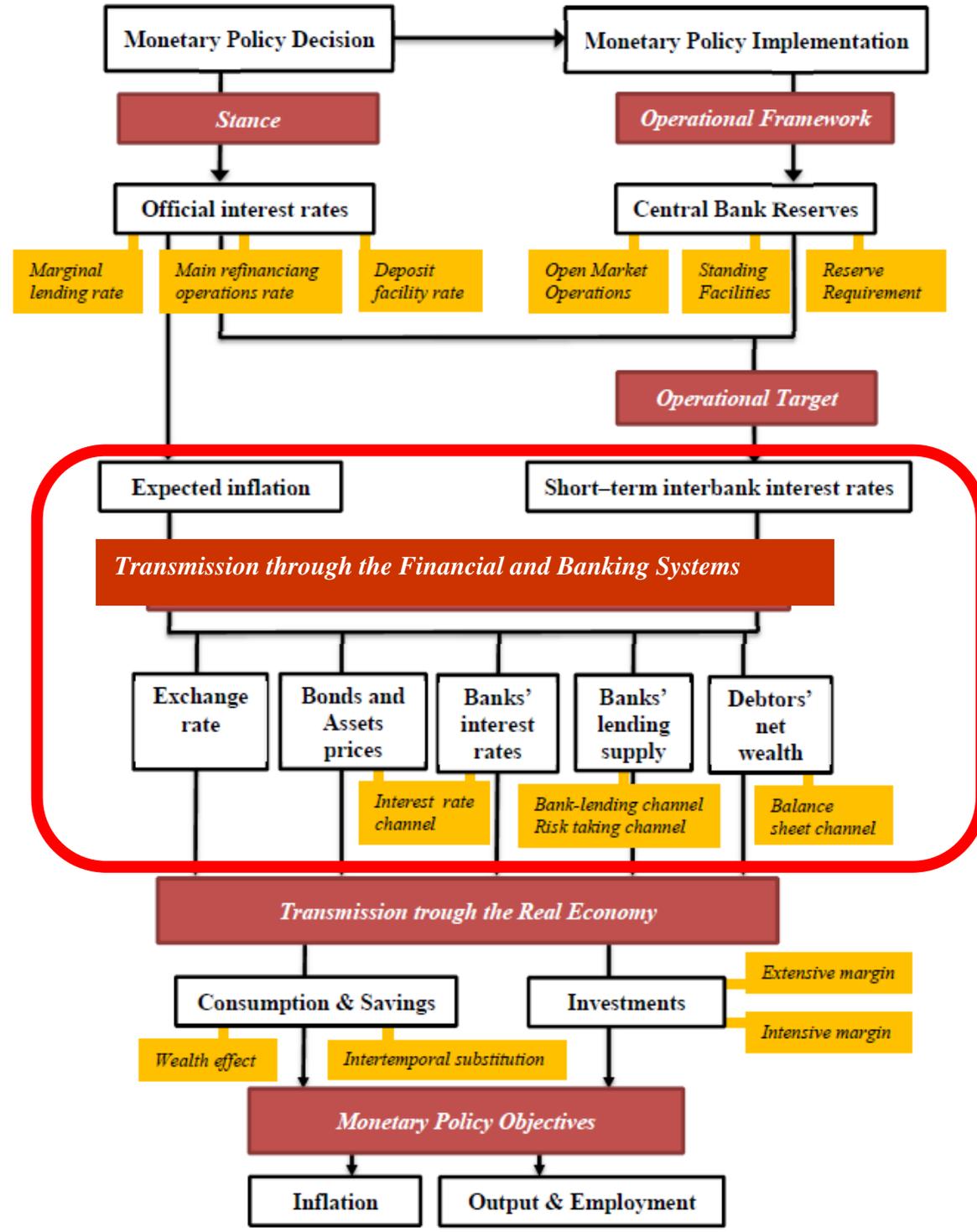
## Policy interest rates and overnight interest rates (UK)



# Monetary Policy: **The Institutional Framework**

	<b>Eurosystem</b>	<b>Fed</b>
<b>Objective</b>	<b>Price stability (*)</b>	(i) <b>Maximum employment</b> (ii) <b>Price stability</b>
<b>Decisions</b>	(i) <b>ML rate</b> (ii) <b>Minimum rate</b> (iii) <b>Dep. Fac. rate</b>	<b>Fed fund rate</b>
<b>Strategy</b>	“Two Pillars”: (i) <b>Economic analysis</b> (ii) <b>Monetary analysis</b>	<b>Economic analysis</b>
<b>Operational Framework</b>	(i) OMO ( <b>REPOs</b> ) (ii) Standing Facilities (ML, dep. fac.,.) (iii) Reserve Requirement	(i) OMO ( <b>outright purchases</b> ) (ii) Standing Facilities (discount window) (iii) Reserve Requirement
<b>Main counterparties</b>	Credit institutions	Primary dealers

# The Transmission through the Financial & Banking System



# The Transmission through the Financial & Banking System

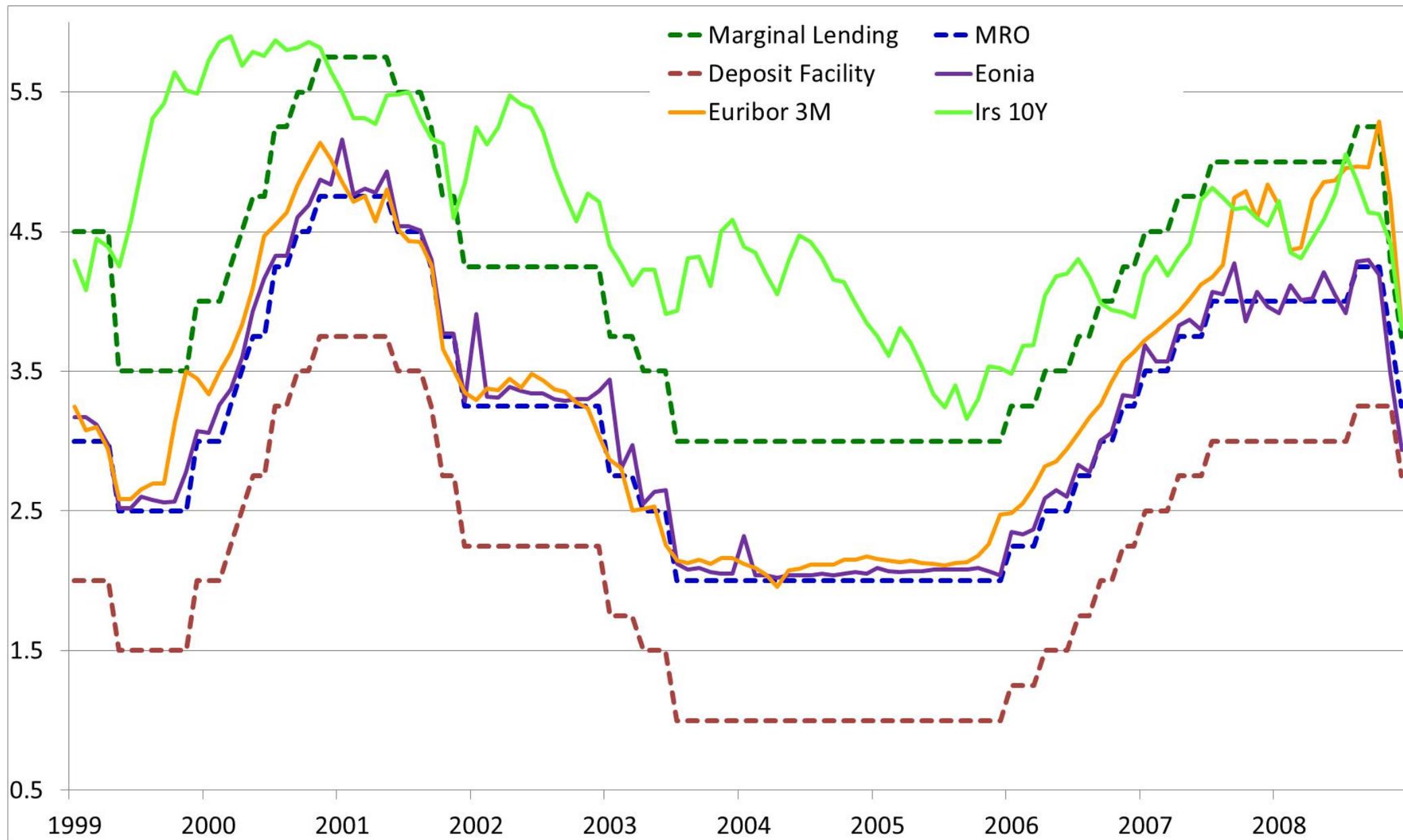
- In a general equilibrium perspective, **price and quantities exchanged** are determined **at the same time** in **all markets** (financial, goods & services, labour markets)
- However, for simplicity, I will present
  - first the **transmission** through the **financial & banking system** and,
  - subsequently, the **transmission** through the **real economy**

# The Transmission through the Financial & Banking System

## The transmission through the financial & banking system

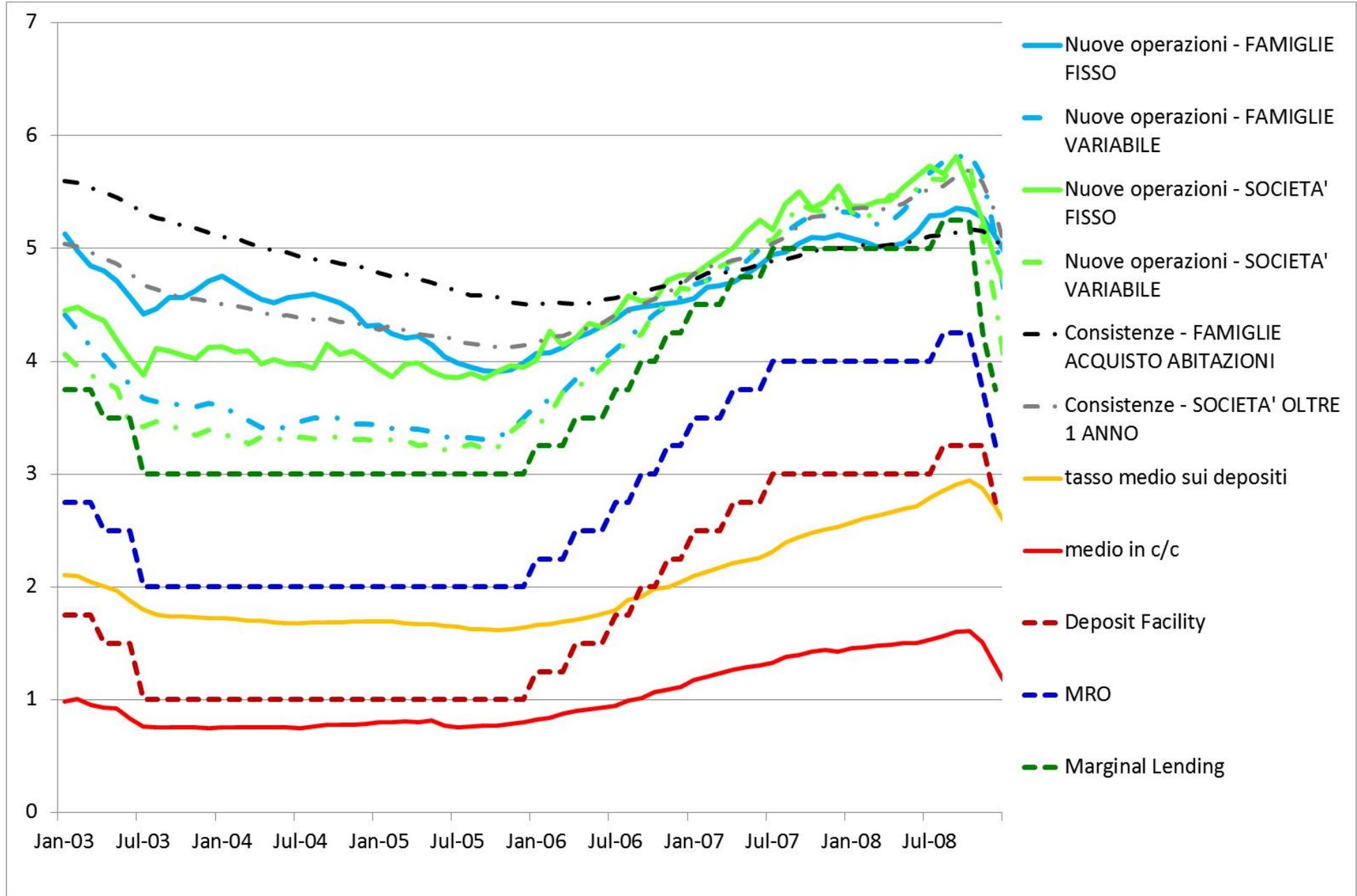
- allows the transmission of the monetary policy stance from the operational target to the **entire matrix of interest rates and quantities** across **maturities** and financial **instruments**;
- it involves
  - the **financial market**: stocks, bonds, derivatives and foreign funds are exchanged.
  - the **credit “market”**: banks provide credit directly to households and firms.

# The Transmission through the Financial & Banking System



Monetary Policy in Normal Times: The Theory

# The Transmission through the Banking System



Monetary Policy in Normal Times: The Theory

# The Transmission through the Banking System

- The key determinant of bank lending and banks' money creation is the **difference** between **return on loans** and the **costs of making a loan**.
- More precisely, the decision about providing an **additional loan** depends on **marginal costs** and **marginal returns** related to that additional loan.
- **Heterogeneity** across banks' **business models** implies that the transmission through the banking sector may be heterogeneous.

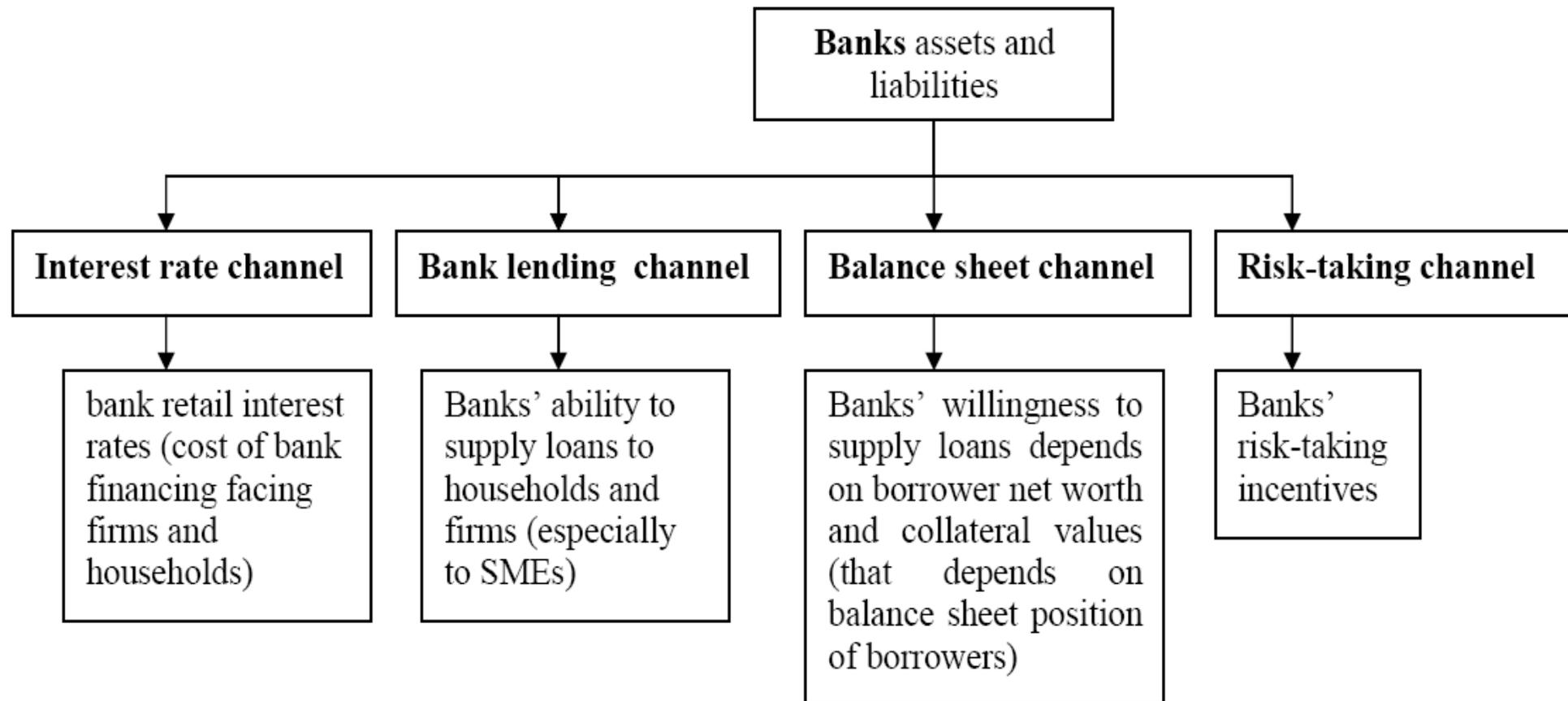
# The Transmission through the Banking System

Marginal costs & returns of an additional loan depend on:

- short and long term **risk-free interest rates**
- **balance sheets' constraints**
- **banks' risk profile**
- **present and future macroeconomic conditions**, that influence the probability of being repaid
- **financial environment**: a more resilient financial environment reduces marginal costs
- **other constraints** to banks decisions; for example, the effective lower bound on nominal interest rates
- **degree of competitiveness** in credit market

# The Transmission through the Banking System

- The key determinant of bank lending is the **difference** between **return on loans** and the **costs of making a loan**.
- More precisely, the decision about providing an **additional loan** depends on **marginal costs** and **marginal returns** related to that additional loan.



# The Transmission through the Banking System

## Interest rate channel

- A change in the short-term interest rate **affects differently** costs and returns of different items in bank's balance sheet and the incentives to modify the amount of those items.
  
- Interest rates and prices of assets and liabilities with
  - **shorter maturities** and **higher liquidity** or **longer maturities with floating returns** are **directly affected** by changes in the short-term interbank interest rate.
  
  - **longer maturities** and **fixed returns** are **less affected** by changes in the short-term interbank interest rate.

# The Transmission through the Banking System

## Bank lending channel

- The incentive to modify the amount of banks' loans depends on the **tightness of balance sheets constraints** faced by the bank.
- The most relevant constraints are usually imposed by **regulatory requirements: capital and liquidity requirements**.
  - A bank that is **less capitalized** and that has a **large amount of low quality illiquid assets** will find **more costly to provide new loans** with respect to a bank that is **more capitalized** or that has already a **large amount of high quality liquid assets**.
  - As a consequence this bank either will **not provide new loans**, or it will apply a **larger interest rate** on new loans to compensate for the **higher probability** of reaching the regulatory limit.

# The Transmission through the Banking System

## Balance sheet channel

- Changes in the short-term interest rate may affect **actual and expected net worth of borrowers** and hence their **ability to obtain external financing** – as reflected in the “external finance premium” measured as the difference between the external financing cost and the opportunity cost of internal funds.
- For example a reduction of short term interest rates may reduce the **cost of debt repayments** and increase the value of the collateral.

# The Transmission through the Banking System

## Risk taking channel

- A reduction of short term interest rates
  - may increase incentives for asset managers to take on more risks in **search for yield** for **contractual, behavioral or institutional reasons** (Rajan, 2005). For example, institutions may increase risk in an attempt to meet the promised nominal returns on long term contracts that were initiated in periods of higher interest rates. This channel is stronger, the longer the period of expansionary monetary policy and the **flatter the yield curve**.
  - may increase profitability of the marginal loan and the future net interest margin of the bank and **risk taking capacity** (Adrian and Shin 2010). This channel is stronger the **steeper the yield curve**.

# The Transmission through the Banking System

## Risk taking channel

- A reduction of short term interest rates
  - may increase incentives for asset managers to take on more risks in **search for yield** for **contractual, behavioral or institutional reasons** (Rajan, 2005). For example, institutions may increase risk in an attempt to meet the promised nominal returns on long term contracts that were initiated in periods of higher interest rates. This channel is stronger, the longer the period of expansionary monetary policy and the **flatter the yield curve**.
  - may increase profitability of the marginal loan and the future net interest margin of the bank and **risk taking capacity** (Adrian and Shin 2010). This channel is stronger the **steeper the yield curve**.

# The Transmission through Financial markets

- A reduction of short term interest rates affects the prices of stocks and other assets by
  - reducing the discounting of future returns
  - increasing the expectations of stronger economic performance (and therefore future cashflows)
  - (increasing the risk-bearing capacity)

*“Financial stability is the absence of financial crises; a financial crisis is defined as a sequence of events, or the risk thereof, that **impairs credit intermediation or capital allocation**.”* Christiansen (2001)

- A **stable financial system** is a **necessary condition** in order to have a correct **transmission** of the monetary policy signal to the real economy.
- Note: **NO** single, widely accepted definition of financial stability.
- Financial stability is an environment where the **supply of financial intermediation** services allows the **real economy to grow** along a **stable path**.

- The supply of financial intermediation services consists in
  - the provision of **means-of-payment** and **store-of-value** services
  - that facilitate **intertemporal resource allocations**
  - by **transforming, pricing, and allocating**
  - economic and financial **uncertainties** and **risks**
- Signals of **financial instability** are
  - a **strong reduction** of financial institutions' **profitability**,
  - a **rise** in **asset-price volatility** or
  - a **sharp correction** in **risk pricing**

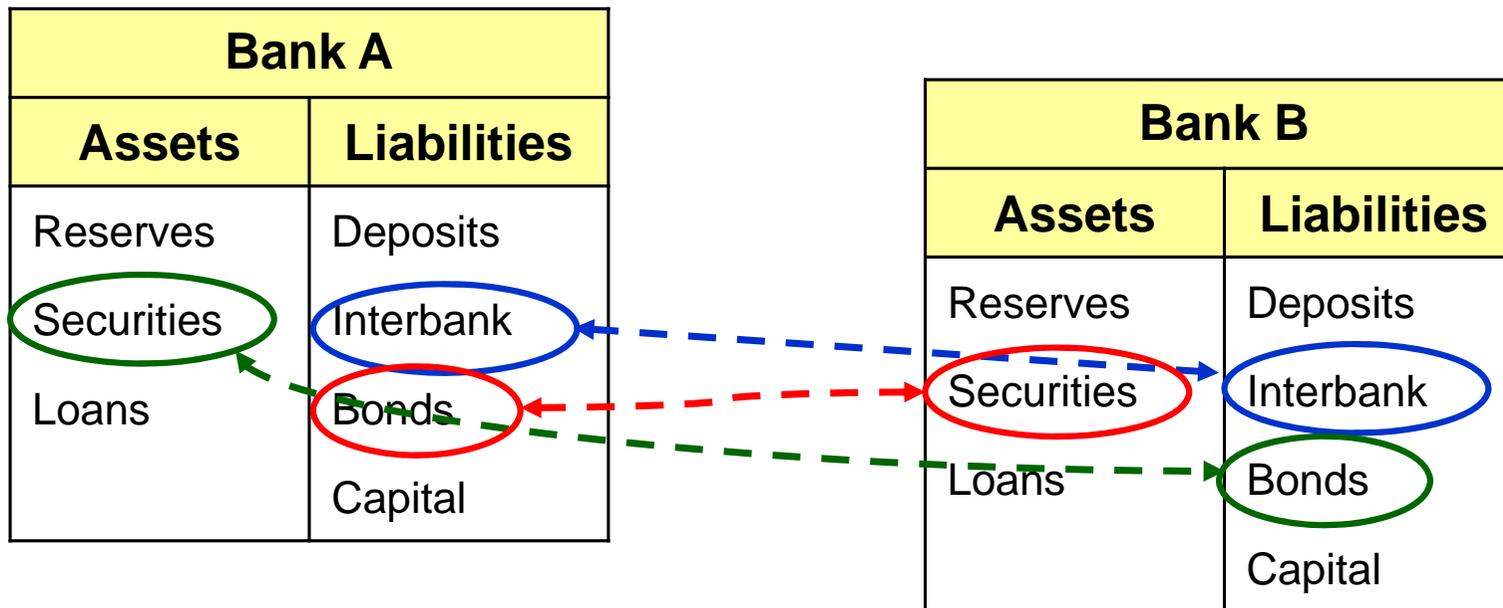
Some considerations:

- First,
  - a **strong reduction** of financial institutions' **profitability**,
  - a **rise** in asset-price **volatility** or
  - a **sharp correction** in **risk pricing**

may generate a significant **impairment** in the supply of financial intermediation services with consequent detrimental impact on real economic activity and aggregate economic welfare (**financial instability**), ...
  
- ... but are not per se synonymous of **financial instability**, as they may be the result of the **efficient working of market forces** or the **efficient incorporation of new information** with no or positive effects on real economic activity.

# The Transmission through the Financial & Banking System: **Financial Stability**

- Second, aggregate shocks are clearly the main potential sources of **financial instabilities**, since they **hit the entire economy** ...
- ... however, given the high degree of **financial system interconnectedness**, also an idiosyncratic shock that **hits one financial institution** can be transmitted to other intermediaries and pose threats to financial stability.



- Third, **strong spillovers** between financial stability and monetary policy:
  - Financial stability is a **necessary condition** for an **efficient transmission** of monetary policy decisions to the real economy.
  - Monetary policy by affecting **funding conditions, profitability** and **risk-taking incentives** of economic agents may also influence financial stability

**Instruments** to reach the **objective** of financial stability:

1. Emergency liquidity assistance by the central bank acting as lender of last resort (LLR). The “classical” doctrine of Bagehot (1873) asserts that the LLR role is to lend to “solvent but illiquid” banks under certain conditions. More precisely,
  - the LLR should lend freely against good collateral,
  - valued at pre-crisis levels,
  - and at a penalty rate.

## 2. Deposit insurance

Main issue with those two measures is **moral hazard**. Need for other measures ...

## 3. Supervision

## 4. Prudential regulation

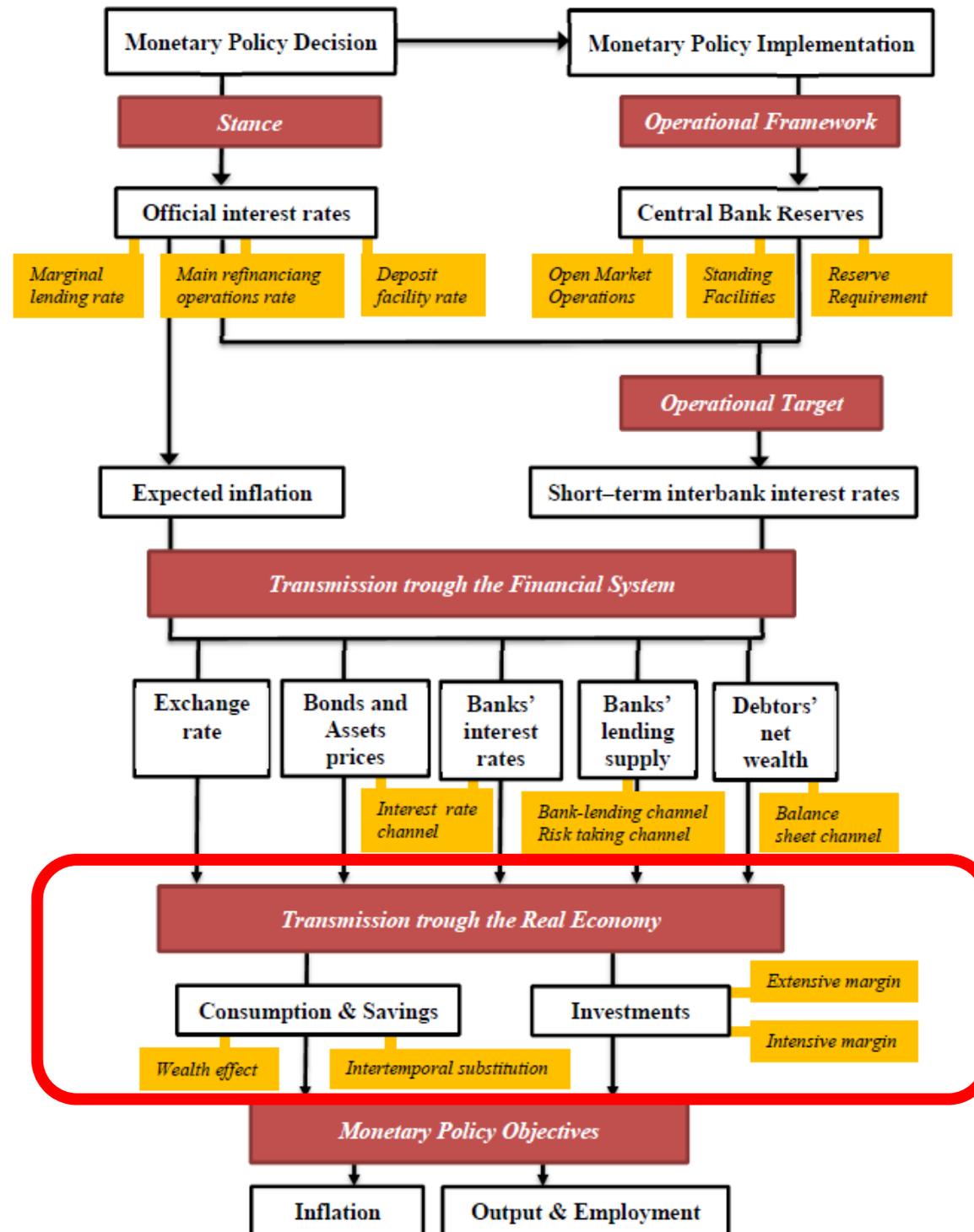
- microprudential policy to protect **depositors**, by limiting the frequency and cost of **individual bank failures**.

*“Contrary to what is often asserted, the need for a microprudential regulation is not a consequence of any “mispricing” of deposit insurance (or other form of government subsidies) but **simply of the existence of deposit insurance**”* Rochet (2007).

- macroprudential policy to protect the **banking system** as a whole, by limiting the frequency and cost of **systemic banking crises**. Macroprudential policy is justified by the (partial) failure of the market to deal with aggregate risks, related to **negative externalities**: *“Each individual (bank or investor) free-rides on the willingness of others to pay for financial stability”* Rochet (2007).

Main issue with those two measures is **time inconsistency**. Need for **independence** and **accountability** of supervisors and regulators

# The Transmission through the real economy



# The Transmission through the real economy

- If **prices do not fully adjust** instantaneously to changes in nominal interest rates, because of:
  - **Nominal rigidities:** menu costs or other exogenous nominal constraints in price formation that makes it costly or impossible for some firms to adjust prices (Calvo, 1983; Rotemberg, 1987);
  - **Informational frictions:** imperfect information about changes in nominal variables due either to geographical dispersion of the available information (Lucas, 1972), infrequent updating of information (Mankiw and Reis, 2002) or rational inattention (Sims, 2003);
  - **Real rigidities:** the presence of endogenous borrowing and liquidity constraints (Kiyotaki and Moore, 2012).
- ... then the Central Bank is able to affect **real interest rates**.

# The Transmission through the real economy

Households: in the first part we have seen that **real interest rates** affect **consumption** and **savings** out of income.

- In general, an **increase (decrease)** of **real interest rates** **increases (decreases)** **savings** and **decreases (increases)** the part of income that is **consumed** today (*intertemporal substitution*).
- But higher (lower) real interest rates may also have a positive (negative) effect on today consumption for **lenders**, since it would imply higher (lower) financial income tomorrow (*wealth effect*) and negative (positive) effect on **borrowers**, since it may increase (decrease) the cost of debt (*wealth effect*).
- The presence of **borrowing constraints**, **uncertainty about future income**, **wealth and income inequality** across households affects the overall response of the economy to changes in the real interest rate.

# The Transmission through the real economy

Firms: the real interest rate affect the demand of new capital (**investment**) and the amount of **output** produced.

- In general, an increase (decrease) of **real interest rates** increases (decreases) the **cost of borrowing**, reduces (increases) the demand for new capital (**investment**) and **reduces** (increases) **output**.
  
- The overall effect on investments and output will depend also on:
  - all factors that characterize the **degree of openness** of the economy (**export and import**);
  
  - the **distribution** of firms in terms of **productivity** (**intensive vs extensive margin**)

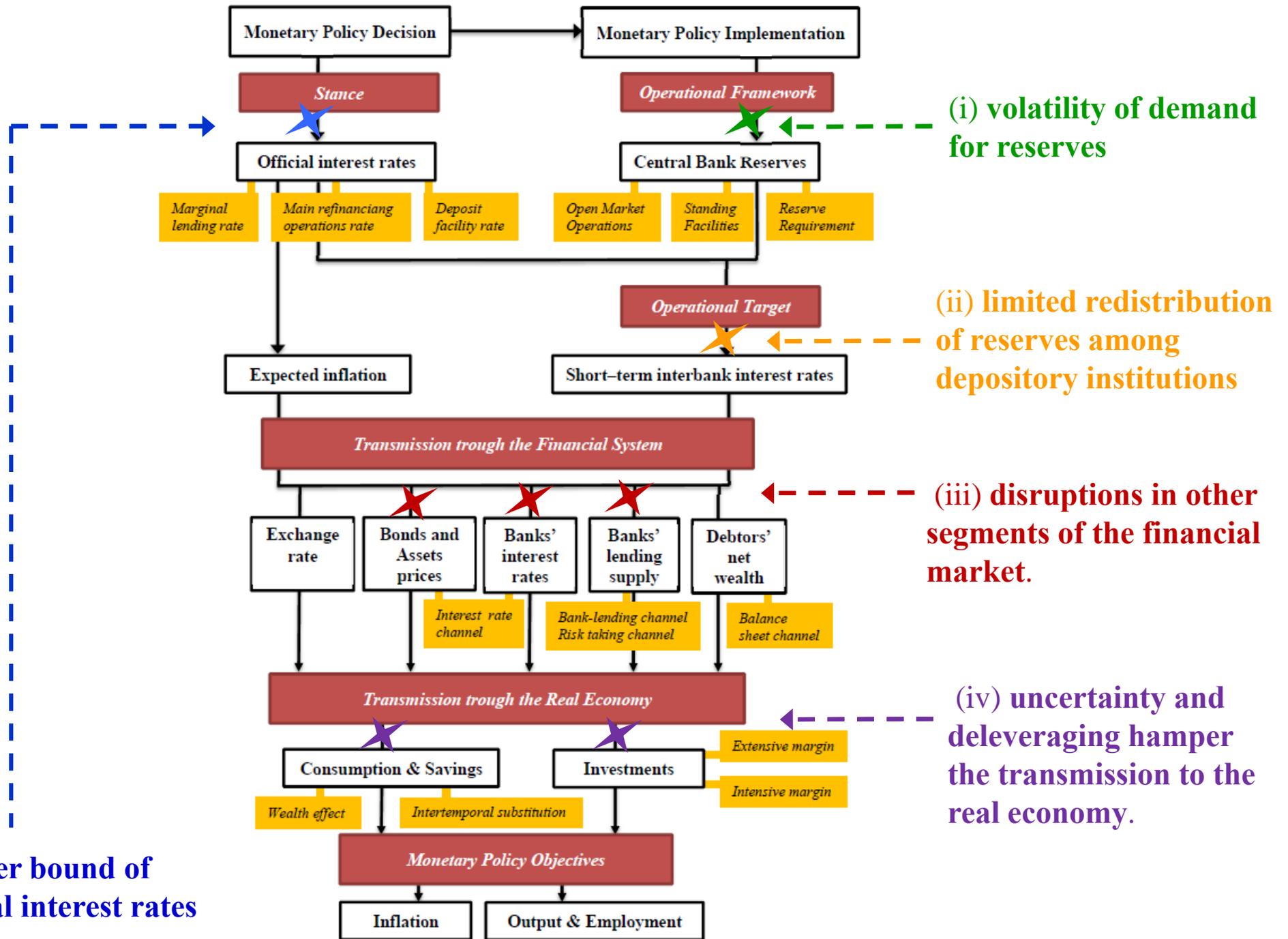
## The Transmission through the real economy: **The Distributional channel**

Coibon, et al. (2014) identifies four channels through which monetary policy may have **distributional effects** inside an economic system:

- **Heterogeneity in income sources** (i.e. **labour income** vs **financial income**): if expansionary monetary policy raises financial income more than labour income, inequality tends to increase.
- **Financial market intermediation**. Since **intermediaries come first** in the transmission mechanism, banks, financiers and high income client are the first to obtain extra income in the short run.
- **Portfolio effects**. Low income households hold **more liquid portfolios** (not insured against inflation) and are more affected by inflation.
- **Borrower vs Savers**. Higher interest rates or lower inflation benefit **high net worth** households (savers) at the expenses of **low net worth** households (borrowers).

# Part III – Monetary Policy during a Financial Crisis

# Monetary policy during a financial crisis



# Monetary policy during a financial crisis

During a financial crisis **implementing monetary policy** is more **complex**.

- The **increase in the volatility of the demand for reserves** makes it very difficult for the CB to estimate the **liquidity needs** of the banking system and **volatile short-term interest rates** in the interbank market.
- The **limited redistribution** of liquidity among depository institutions, increases the short-term interest rate in the money market, toward the top of the corridor.
- **Disruption in other segments** of the financial market hampers the transmission of the monetary impulse across the full spectrum of financial assets.

# Monetary policy during a financial crisis

- When the **effect on the real economy is large**, the CB is unable to send the expansionary impulse by lowering the official interest rates.
  - The possibility of holding cash, whose nominal yield is zero, prevents the **nominal yield** on any financial asset from going **significantly negative**.
  - When this constraint – **the zero lower bound (ZLB)** – binds, real interest rates are determined solely by inflation expectations.
  - In these circumstances there may be a heightened risk of a de-anchoring of inflation expectations and of a further increase of real interest rates. The probability of a **deflationary spiral** or at least of a **prolonged period of low growth** both in economic activity and in prices increases.

# Monetary policy during a financial crisis

- In these situations central banks may need to resort to **Unconventional Monetary Policies (UMP)** to regain control on the economy by
  - rectifying a **malfunctioning** of the **monetary transmission mechanism** and/or
  - **providing further stimulus** to the economy when the official interest rates reach the “**lower bound**”.

# Unconventional Monetary Policies

- The choice of a **classification scheme for unconventional measures** displays a degree of arbitrariness. One possibility is
  - **Credit easing**: provide liquidity to dysfunctional monetary and capital markets in order to restore the transmission mechanism.
  - **Quantitative easing**: purchases of long-term bonds in order to reduce the slope of the yield curve and stimulate further the economy when the short term interest rates are at the zero lower bound.
  - **Forward guidance**: provide information about future interest rates or macroeconomic variables in order to signal future policy stance.

# Unconventional Monetary Policies

- We can identify **two channels** through which “unconventional measures” affect the equilibrium (both prices and quantities):
  - The signaling channel, which enables the central bank to use **communication** to restore confidence in the markets and influence private expectations about **future policy decisions**.
  - The portfolio-balance channel, that operates through **imperfect substitutability** of some financial assets and involves a change in size and composition of balance sheets of central banks and private sectors.

# Unconventional Monetary Policies: **The signaling channel**

- **Central bank's communications** (or actions) inform the public about its intentions regarding
  - the **future evolution of short-term interest rates** (forward guidance),
  - the **purchase of financial assets**,
  - the **implementation of other measures** targeted at counteracting market dysfunctions.
- The **efficacy** of this channel relies on
  - the **credibility** of the central bank and
  - the extent to which **private expectations affect** macroeconomic and financial market conditions.

# Unconventional Monetary Policies: **The signaling channel**

**Two issues** with this type of communication that may severely limit the effectiveness of the signaling channel:

- **«Time inconsistency»** = plans that have been announced as they were ex-ante optimal, turn out to be ex-post not optimal.
  - **A change in the size and composition of CB's balance sheet** may help to overcome this obstacle. For instance, **large purchases of long-term securities may strengthen the promise to keep short-term rates low** for some time owing to the adverse effect that an increase in official interest rates would have on CB's balance sheet (Bernanke, Reinhart and Sack 2004).
  - The central bank could also enforce its commitment by entering into more explicit **contingent contracts**.

# Unconventional Monetary Policies: **The signaling channel**

- «**Delphic vs Odyssean interpretation**» = An announcement by policymakers about future policy decisions (for example, the policy rates will remain low for long) may
  - either reveal **bad news** about the economy (**Delphic signal**) or
  - it may be interpreted as **a deviation** from (or a change in) the policy rule (**Odyssean signal**).
  - The **interpretation** chosen by the market participants could thus **depend** in very subtle ways on the communication itself (Del Negro et al, 2015).

## Unconventional Monetary Policies: **The portfolio-balance channel**

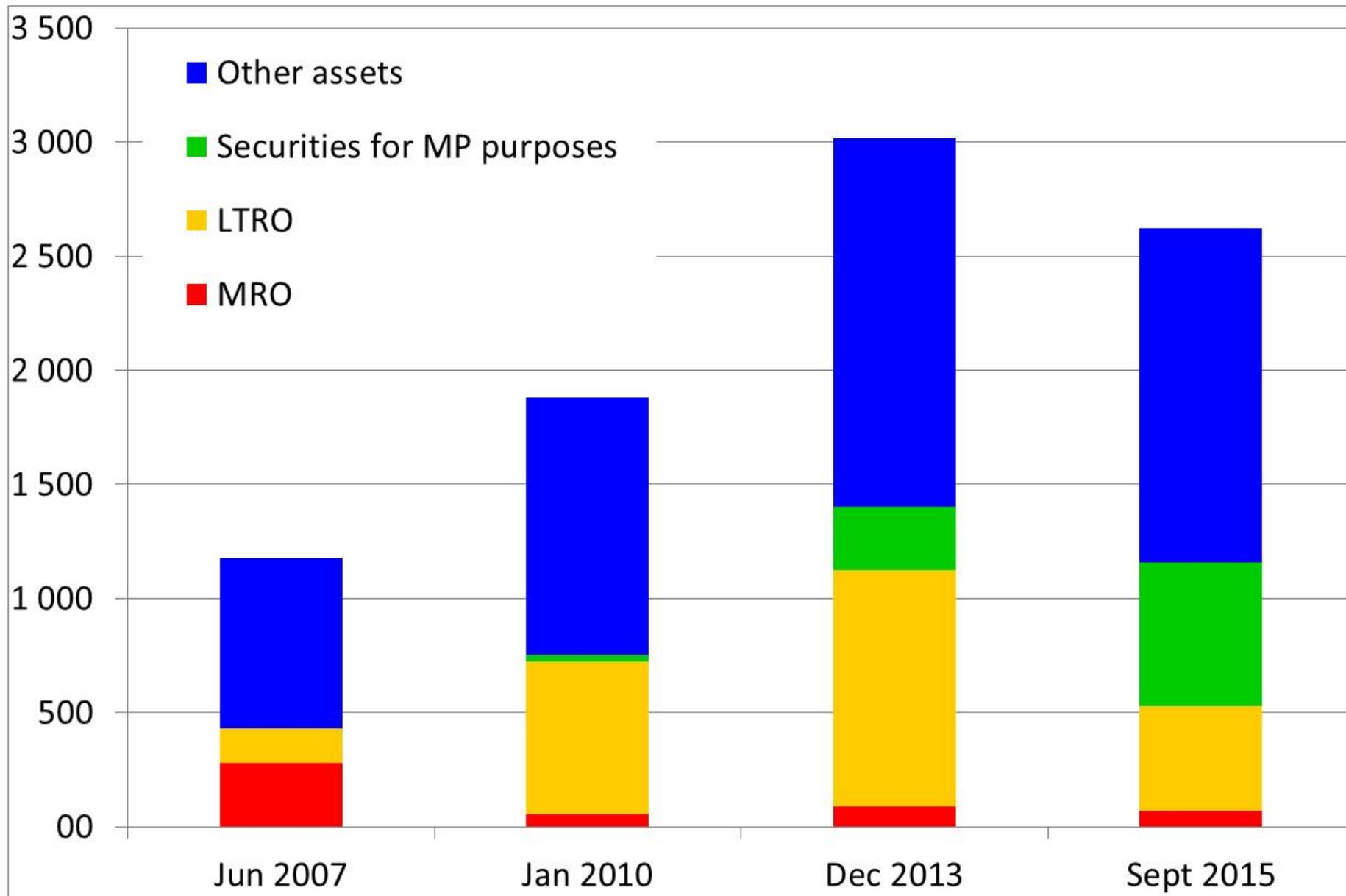
- The **portfolio-balance channel** is activated through central bank operations such as
  - **outright asset purchases,**
  - **asset swaps** and
  - **liquidity injections,**

which modify the **size and the composition of the balance sheet** of both the central bank and the private sector.

- The central bank is the only economic player that can conduct this kind of intervention on a large scale since, in principle, **it can expand its balance sheet indefinitely** owing to its monopolistic power in the provision of monetary base.

# Unconventional Monetary Policies: **The portfolio-balance channel**

## Eurosystem balance sheet: Assets (€ blns)



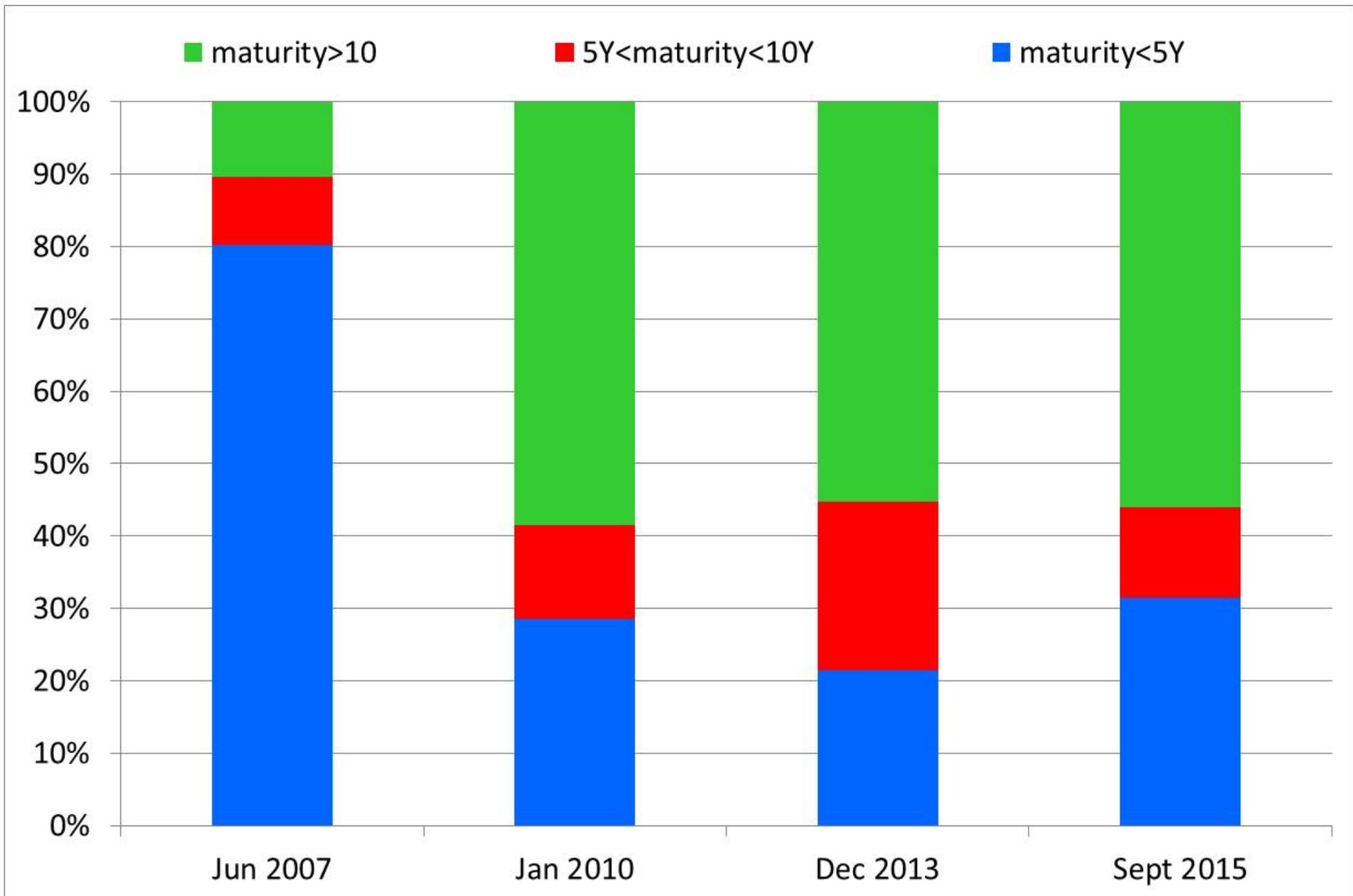
# Unconventional Monetary Policies: **The portfolio-balance channel**

## Federal Reserve balance sheet: Assets (\$ blns)



# Unconventional Monetary Policies: **The portfolio-balance channel**

## Federal Reserve balance sheet: maturities of securities



How does it work?

- When the central bank **purchases asset A**, the **deposit** of the seller is **increased**...
- ... Unless that deposit is regarded as a perfect **substitute** for the asset sold (asset A), ...
- ... the seller will **rebalance his portfolio** by buying asset B that is a **closer substitute** (in terms of **liquidity, maturity and counterparty risk**) for the asset that he has sold (asset A).
- That shifts the **deposit** to the seller of asset B who will, in turn, attempt to **rebalance** his portfolio by buying other assets – and so on.

- The **efficacy** of the portfolio-balance channel hinges
  - on the **imperfect substitutability** among private sector's balance sheet items, which arises in the presence of **economic frictions** (e.g. asymmetric information, limited commitment and limited participation) or **balance sheet's constraints**, and ...
  - ... on the impact that **changes in the supply of private assets and liabilities have on individual decisions ...**
  - ... which implies that net **relative amount** of securities in the market is a **determinant of their relative yields....**
  - ... and **heterogeneity** of economic agents is an important factor.

- In the literature agents are **heterogeneous** due to:
  - **preferences** for long-term securities (Vayanos and Vila, 2009)
  - **borrowing constrained** (Gertler and Karadi, 2010)
  - **different degrees of risk-aversion** (Ashcraft et al 2010)
  - **different impatience to consume** (Curdia and Woodford 2010)
  - **information asymmetries** or **limited commitment** (Cúrdia and Woodford (2011), Demirel (2009), Gertler and Karadi (2011), Gertler and Kiyotaki (2010)).

- **One issue** that may severely limit the effectiveness of the **portfolio-balance channel** is the **“liquidity trap”**
  - A situation where **deposits** and the **asset** purchased by the central bank become **perfect substitute ...**
  - ... that is, when the **yield on the asset purchased** is **equal** to the **interest rate on the deposits**.

# Quantitative Easing: **How does it work?**

- By purchasing financial assets, the central bank
  - mechanically expands **its balance sheet** and
  - mechanically alters the **composition of its balance sheet**
  - may expand the **balance sheet of other agents**
  - mechanically alters the **composition of the portfolio of some agent**

# Quantitative Easing: **How does it work?**

- The expansion of the **central bank's balance sheet** involves,
  - on the **asset side**, the increase of securities purchased,
  - on the **liability side**, the increase of reserve balances held by financial institutions at the central bank (current accounts covering the minimum reserves and the deposit facility).
- The expansion of **balance sheet of other agents** in the economy is not necessary. **It depends on who sells the asset to the central bank.**
  - If CB buys directly **from banks**, no effect on size of balance sheet of private sector
  - If CB buys **from non-banking sector**, size of balance sheet of private sector **may change**, but not mechanically

# Quantitative Easing: **How does it work?**

- The change in portfolio's composition of some agent in the economy is a mechanic consequence of
  - the **reduced availability** of those assets that have been purchased – which generally feature low credit risk and relatively long maturity – and
  - the **increased volume** of other high liquid assets, i.e. **central bank reserves**.

# Quantitative Easing: The direct effects on balance sheets

Central bank (CB) buys securities directly from banking sector (BS)

Central Bank	
Assets	Liabilities
Securities +	Reserves +

Banking sector	
Assets	Liabilities
Reserves +	Deposits
Securities -	BS bonds
Loans	Capital

NFPS	
Assets	Liabilities
Deposits	Loans
Securities	
BS bonds	

- BS sells securities to the CB in exchange of reserves.
- In BS's balance sheets, securities decrease and reserves increase.
- **Size of BS' balance sheet** remains unchanged.
- **Size of NFPS' balance sheet** remains unchanged

# Quantitative Easing: The direct effects on balance sheets

CB buys securities from non-financial private sector (NFPS); NFPS buys securities from BS

Central Bank	
Assets	Liabilities
Securities +	Reserves +

Banking sector	
Assets	Liabilities
Reserves +	Deposits =
Securities -	BS bonds
Loans	Capital

NFPS	
Assets	Liabilities
Deposits =	Loans
Securities =	
BS bonds	

- NFPS sells securities to the CB. Deposits increase.
- NFPS uses deposits to buy new securities from BS.
- **Size of NFPS' balance sheet** remains unchanged.
- **Size of BS' balance sheet** remains unchanged, as the increase on reserves is compensated by a decrease of securities.

# Quantitative Easing: The direct effects on balance sheets

CB buys securities from NFPS; NFPS reduces debt

Central Bank	
Assets	Liabilities
Securities +	Reserves +

Banking sector	
Assets	Liabilities
Reserves +	Deposits =
Securities	BS bonds
Loans -	Capital

NFPS	
Assets	Liabilities
Deposits =	Loans -
Securities -	
BS bonds	

- NFPS sells securities to the CB. Deposits increase.
- NFPS uses deposits to reduce debt with the BS.
- **Size of NFPS' balance sheet shrinks.**
- **Size of BS' balance sheet remains unchanged,** as the increase on reserves is compensated by a reduction of loans to NFPS.

# Quantitative Easing: The direct effects on balance sheets

CB buys securities from NFPS; NFPS expands deposits for expenditure

Central Bank		Banking sector		NFPS	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Securities +	Reserves +	Reserves +	Deposits +	Deposits +	Loans
		Securities	BS bonds	Securities -	
		Loans	Capital	BS bonds	

- NFPS sells securities to the CB. Deposits increase.
- NFPS doesn't re-invest liquidity (deposit) obtained in exchange for its security holdings, but increases consumption (households) or investments (firms).
- **Size of NFPS' balance sheet** remains unchanged
- **Size of BS' balance sheet** increases, as deposits of NFPS increase and BS receives also reserves issued by the CB.

## Two direct effects on **interest rates**

- on **assets purchased**; in particular,
  - on the **term-premia** (scarcity channel)
  - on the **risk-free component** (signaling channel)
- on **money markets**;
  - the replacement of financial assets with central bank reserves leads to an increase in excess reserves and, ...
  - ... in a ‘corridor’ system, money market interest rates tend to converge on the deposit facility rate.

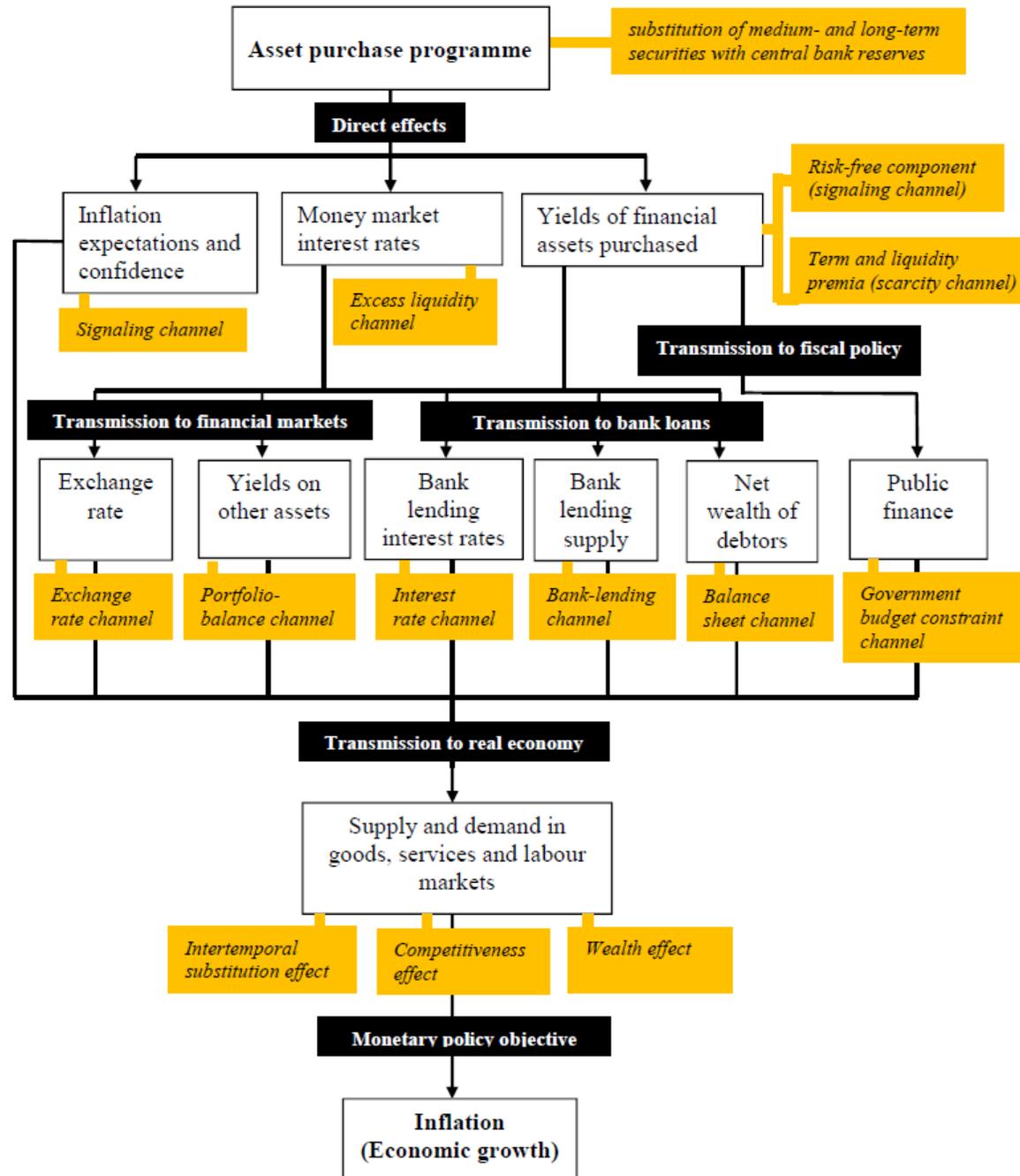
# Quantitative Easing: **The direct effects on expectations**

- Direct effect on **inflation expectations** (and confidence).
  - **Announcing** that it will employ a monetary policy measure to bring back inflation to target, **agents' expectations** will move in the direction of the target...
  - ... (i) the more **credible** the announcement, (ii) the more **resolute** the measures, (iii) the greater the public's **confidence** in the CB's ability to attain the objective, and the larger the impact on **inflation expectations** (confidence channel).

# Quantitative Easing: **The indirect effects**

- The three direct effects affect **aggregate demand** and **price dynamics** through a series of indirect channels:
  - by altering the **yields on other** financial assets (portfolio balance channel);
  - by **lowering the cost** of bank loans (bank lending, interest rate channels);
  - by **increasing net wealth (capital gain)** of asset holders (balance sheet channel);
  - by causing a **depreciation** of the domestic **currency** (exchange rate channel);
  - and by **easing** the terms of **public financing** (government budget constraint channel).

# Quantitative Easing: The transmission channels



## **Part IV – Monetary Policy in Practice**

**2008-2018: from the Global financial crisis to  
the New normal**

# The Global Financial Crisis: Pre-Lehman phase

## Causes of the crisis

- The crisis emerged in the **housing market** in the US in mid-2007.
- Borrowers with low credit ratings (“*sub prime*”) had been allowed to take out mortgages as a result of
  - **weakened regulatory framework** and
  - **unreliable assessments by lenders.**
- Losses from sub-prime mortgages determined large weaknesses in other financial markets;
  - severe **impairments in the money market**;
  - high **volatility** of banks’ **demand of reserves**;
  - preference for **long-term liquidity**;

# The Global Financial Crisis: Pre-Lehman phase

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  - preference for **long-term liquidity**;

# The Global Financial Crisis: Pre-Lehman phase

## Monetary policy measures

### ■ Objectives:

- **preventing disorders in money markets** and in the monetary policy transmission mechanism,
- **sterilization of the impact** on the monetary base in order to keep **overnight interest rates in line with their targets.**

### ■ In the US, where reserves are normally channeled to the banking system through a **small group of primary dealers**, the Fed implemented a series of measures to

- extend the availability of **emergency and long-term funding** to both **primary dealers** and **depository institutions.**

# The Global Financial Crisis: Pre-Lehman phase

- In the euro area, the ECB was able to counteract shocks to the distribution of reserves in the banking system **within its standard operational framework**, by
  - increasing the **frequency and the liquidity allotted** in LTROs
  - using **more fine tuning** operations.
- Two reasons:
  - the ECB, before the crisis, was managing its balance sheet so as to keep a **large liquidity deficit**;
  - **all depository institutions** of the euro area had direct access to central bank's liquidity.

# The Global Financial crisis: **Post-Lehman phase**

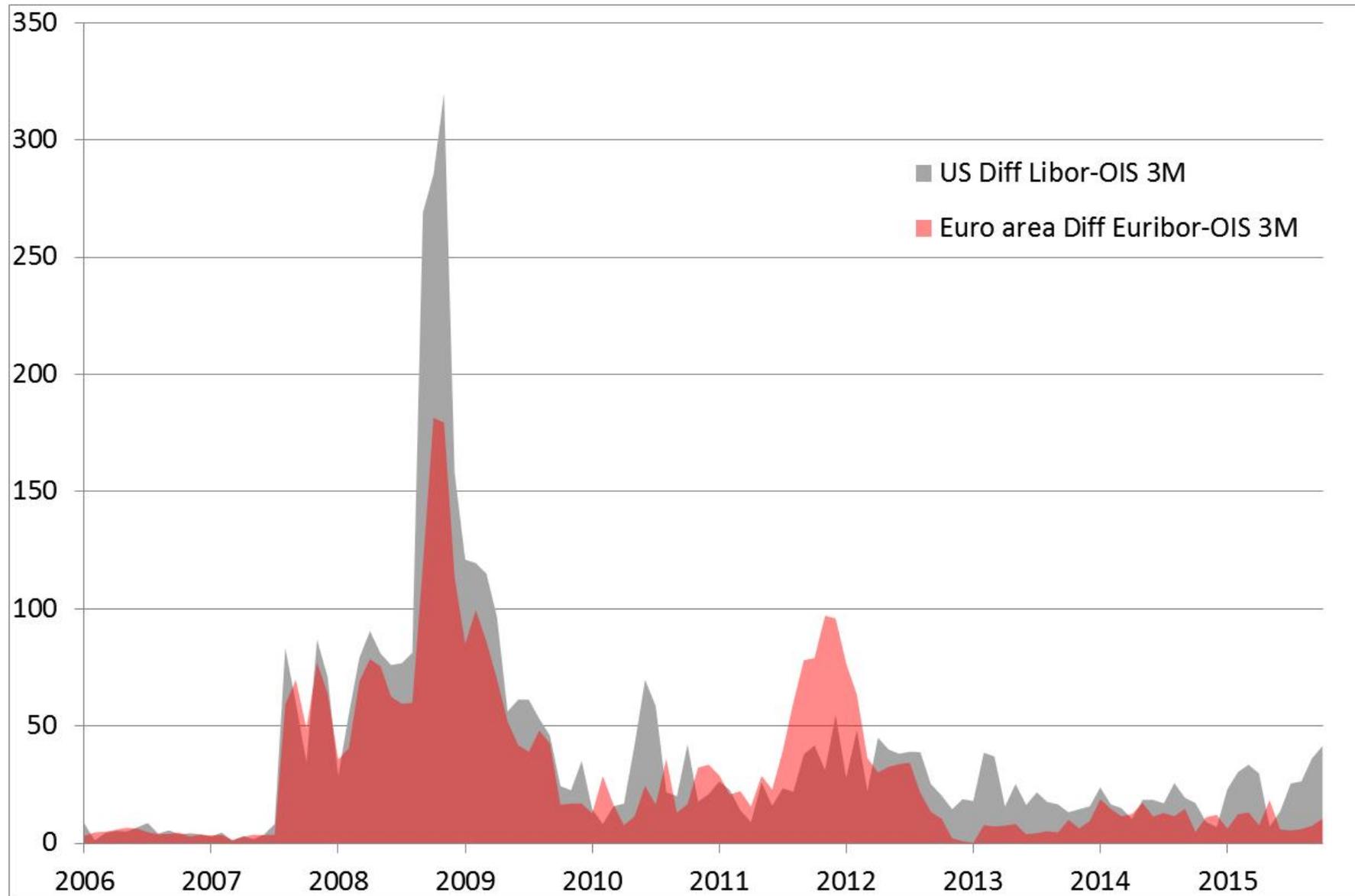
- After the bankruptcy of Lehman Brothers in **September 2008** the financial crisis became more severe and **spread to the shadow banking system**.
- This alternative banking system is populated by a very heterogeneous group of financial institutions that
  - are **strictly interconnected and conduct maturity, risk and liquidity transformation through a wide range of secured funding techniques** such as asset backed commercial papers (ABCP), asset-backed securities (ABS), collateralized debt obligations (CDO) and repos;
  - have **neither deposit guarantees nor direct access to central bank liquidity**.

# The Global Financial crisis: **Post-Lehman phase**

- The existence of liquidity provision **agreements between the banking system** and the **shadow banking system** suddenly also exposed the former to a **strong liquidity shortage**.
- In the US it quickly became clear that the provision of funds and high-quality securities to depository institutions and primary dealers **would not be sufficient to avert a collapse of the financial system**.
- The **liquidity in critical nonbank markets evaporated** and financial spreads reached unprecedented levels.

# The Global Financial crisis: **Post-Lehman phase**

**Spread between unsecured and overnight indexed swaps (OIS) - US and Euro area**  
(basis points)

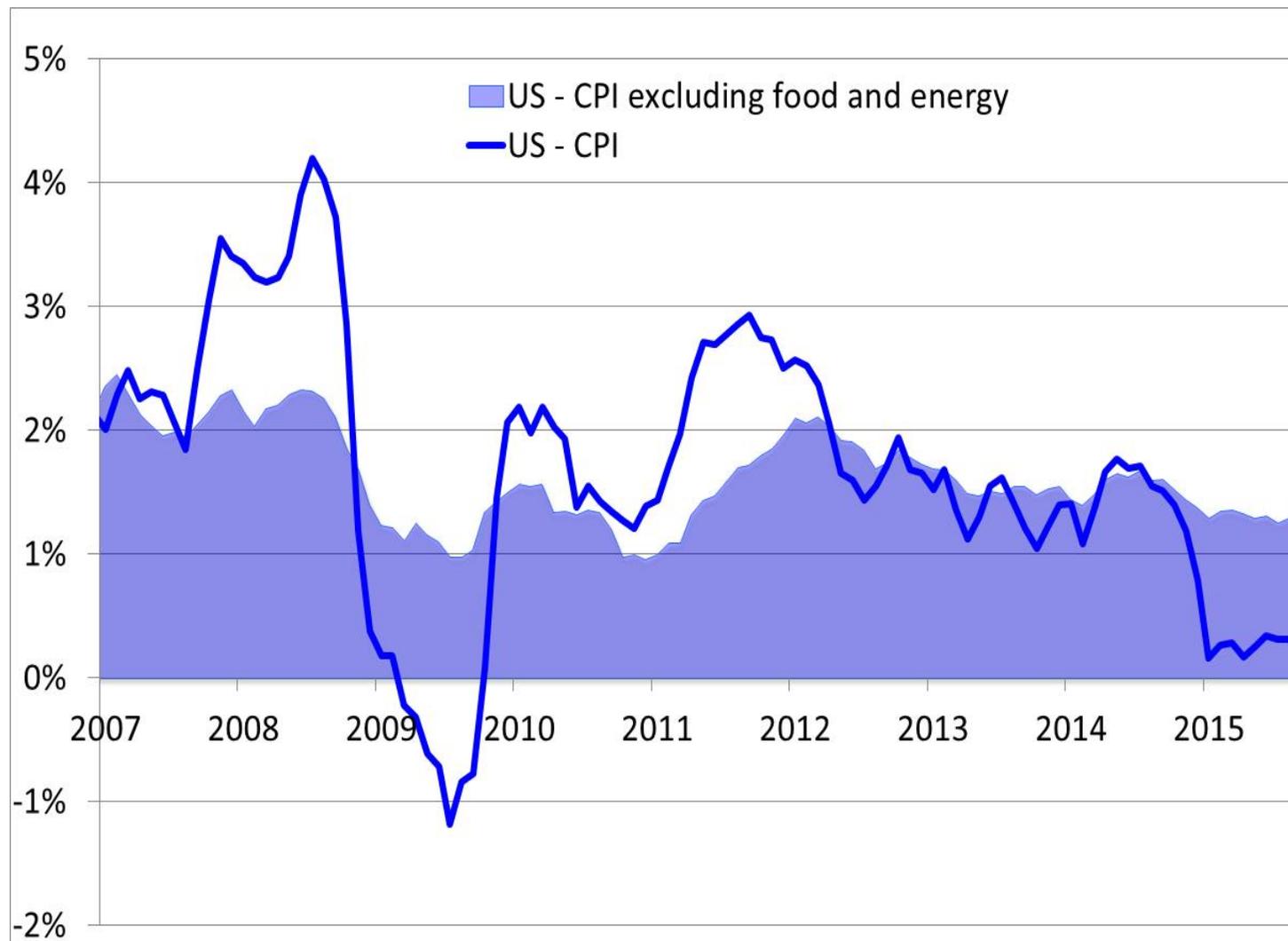


# The Global Financial crisis: **Credit Easing in the US**

- With the unconventional measures adopted since **mid-September 2008** the Fed **greatly extend the provision of temporary liquidity** to the most important part of the **shadow banking system**, ...
- ... and in order to reduce the cost and increase the availability of **credit for house purchases** the Fed launches also a **programme of asset purchases**
  - of up to \$100 billion in **agency debt** and up to \$500 billion in **agency MBS**, ...
  - ... in the **first part of 2009**, faced with a further weakening of the economy, the Fed decides to **expand** by \$200 billion and \$1.25 trillion respectively.

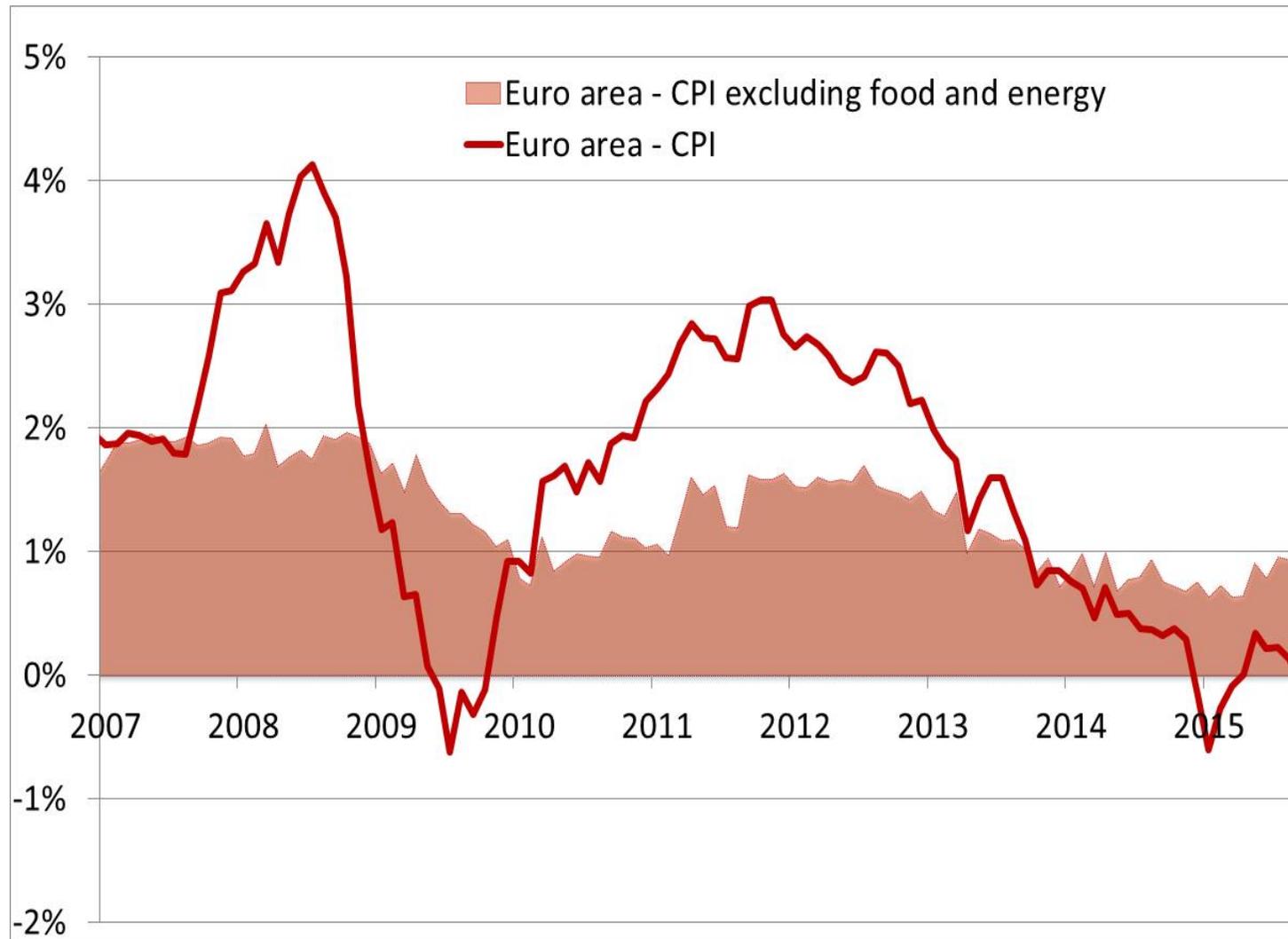
# The Global Financial crisis: **Deflationary Risks**

- At the same time, in order to counteract the **strong reduction in inflation** in US ...



# The Global Financial crisis: **Deflationary Risks**

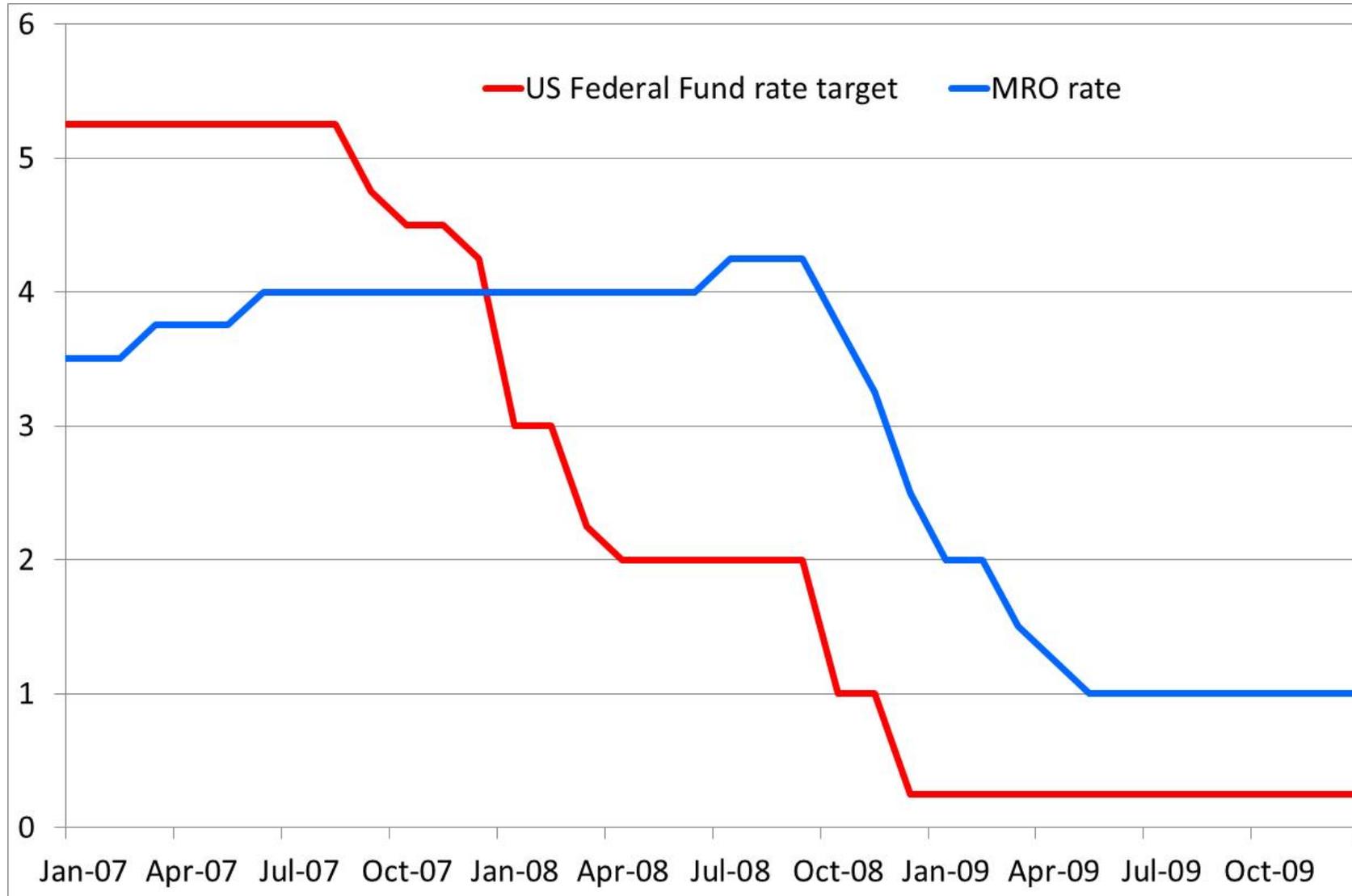
- ... and in the Euro area, ...



# The Global Financial crisis: **Conventional monetary policies**

- ... central banks **drastically reduce official interest rates** ...

## Official interest rates – Euro area and US

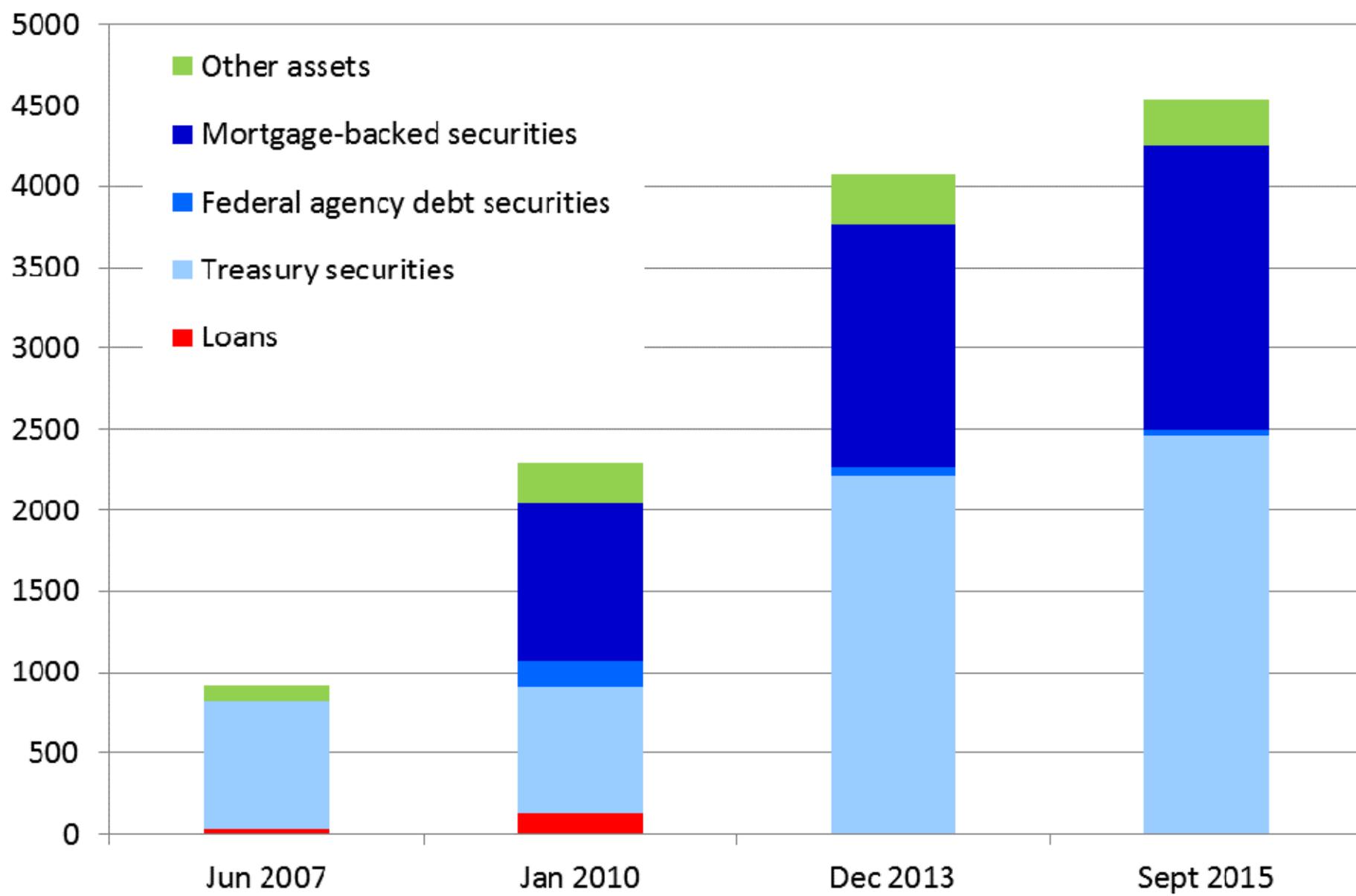


# The Global Financial crisis: **Quantitative Easing in the US**

- ... but the Fed quickly reached its effective **lower bound of policy rates**.
- In order to provide more stimulus the **Federal Reserve**
  - In **December 2008**, to support the economic recovery, the Fed launches a program of \$300 billion **purchases of long-term Treasury securities** (the so-called **QE1**).
  - In **November 2010** the Fed decides a **further extension of \$600 billion** of long-term Treasury securities (the **QE2**).
  - A **third round of quantitative easing (QE3)** is announced on **September 2012**, involving \$40 billion per month, open-ended bond purchases of agency mortgage-backed securities (and from **December 2012** also \$45 billion per month of longer-term Treasury securities).

# The Global Financial crisis: Quantitative Easing in the US

## Federal Reserve Balance Sheet – Assets



# The Global Financial crisis: **Forward Guidance in the US**

- In order to reduce long term interest rates in **December 2008** the Fed also starts providing **forward guidance about the likely path of the Federal funds rate**, by stating that “*economic conditions are likely to warrant an exceptionally low level of the federal funds rate for some times*”.
- Since **March 2009** the expression “*for some time*” is replaced with “*for an extended period*”;
- in **August 2011** the Fed announces that “*economic conditions are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013*”; successively it is extended to “*at least through late 2014*” and “*at least through mid-2015.*”

# The Global Financial crisis: **Forward Guidance in the US**

- In **December 2012** the Fed decides to **set numeric thresholds**, saying rates will remain low “*at least as long as*
  - *the unemployment rate remains above 6.5%*
  - *inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee’s 2 percent longer-run goal, and*
  - *longer-term inflation expectations continue to be well anchored”.*

# The Global Financial crisis: **Forward Guidance in the US**

- In **March 2014**, after the unemployment rate has fallen in February to 6.7%, the Fed goes back to **more qualitative guidance**, stating that in deciding how long to hold rates near zero, she “*will assess progress—both realized and expected—toward its objectives of maximum employment and 2% inflation*”.
- In **December 2014**, the Fed decides to modify again the communication strategy with the announcement that the Fed “*can be patient in beginning to normalize the stance of monetary policy.*”

# The Global Financial crisis: **Credit easing in the Euro area**

- While in the first phase the ECB was able to intervene mainly within its standard operational framework, in this phase **unconventional measures increased in size and scope** (while continuing to **operate mainly through the banking sector**):
  - **Fixed-rate Full-allotment** liquidity provision
  - **Expansion of list of assets eligible** as collateral
  - **Increase frequency and maturity of LTROs** (1-year LTRO in June, September and December 2009)
  - **Covered bond purchase programme** (May 2009)
  - Increase **liquidity provision in USD**.

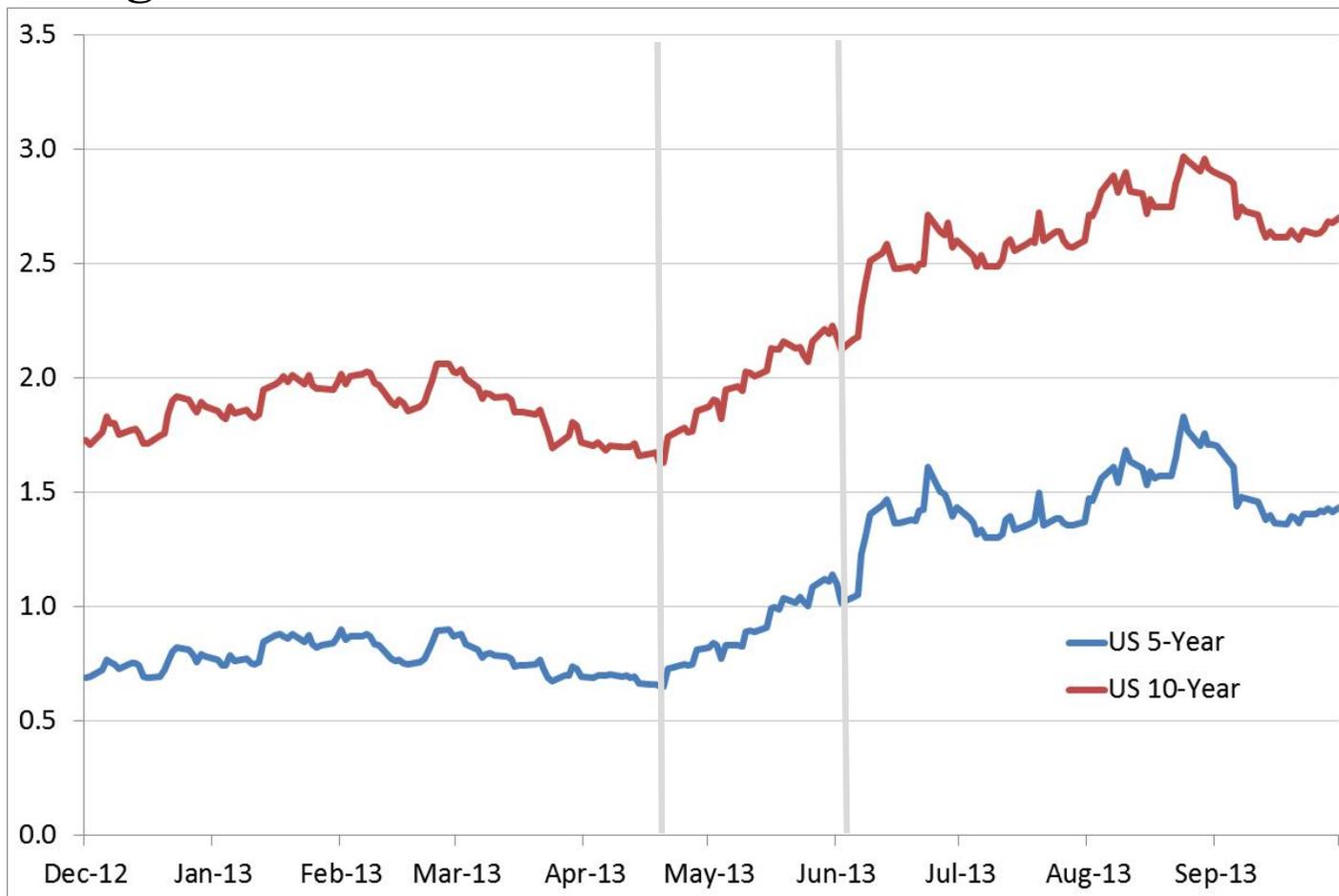
# The Global Financial crisis: **Phasing out in the US**

- In 2013 the Fed start the **phasing out** from QE:
  - *May 2013*: Bernanke first mentioned the idea of gradually reducing or “**tapering**” the Federal Reserve Board’s monetary expansion.
  - *June 2013*: Bernanke announces that Federal Open Market Committee “*currently anticipates that **it would be appropriate to moderate the pace** of purchases later this year. And if the subsequent data remain broadly aligned with our current expectations for the economy, we will **continue to reduce the pace** of purchases in measured steps through the first half of next year, **ending purchases around mid-year.**”*
  - *December 2013*: **Tapering of \$10 bn** per month is announced

# The Global Financial crisis: **Phasing out in the US**

- **Strong impact** on financial markets of first two announcements: long-term interest rates increase by around 25 bp after *May 2013* announcement and by 35 bp after *June 2013*.

## Long term interest rates on Government bonds - US



# The Global Financial crisis: **Phasing out Euro area**

- During 2009 there are clear **signals of improvements in financial markets**:
  - spreads between secured and unsecured interest rates strongly decreases;
  - demand of central bank liquidity reduces.
- In the early months of 2010, the progressive improvement in the conditions of the money, financial and credit markets had made it possible for some of the unconventional monetary policy measures introduced in the preceding years to **be phased out**.

# The Global Financial crisis: **Phasing out Euro area**

## The Money market spread

(Euribor-Eurepo, 3-monnth)



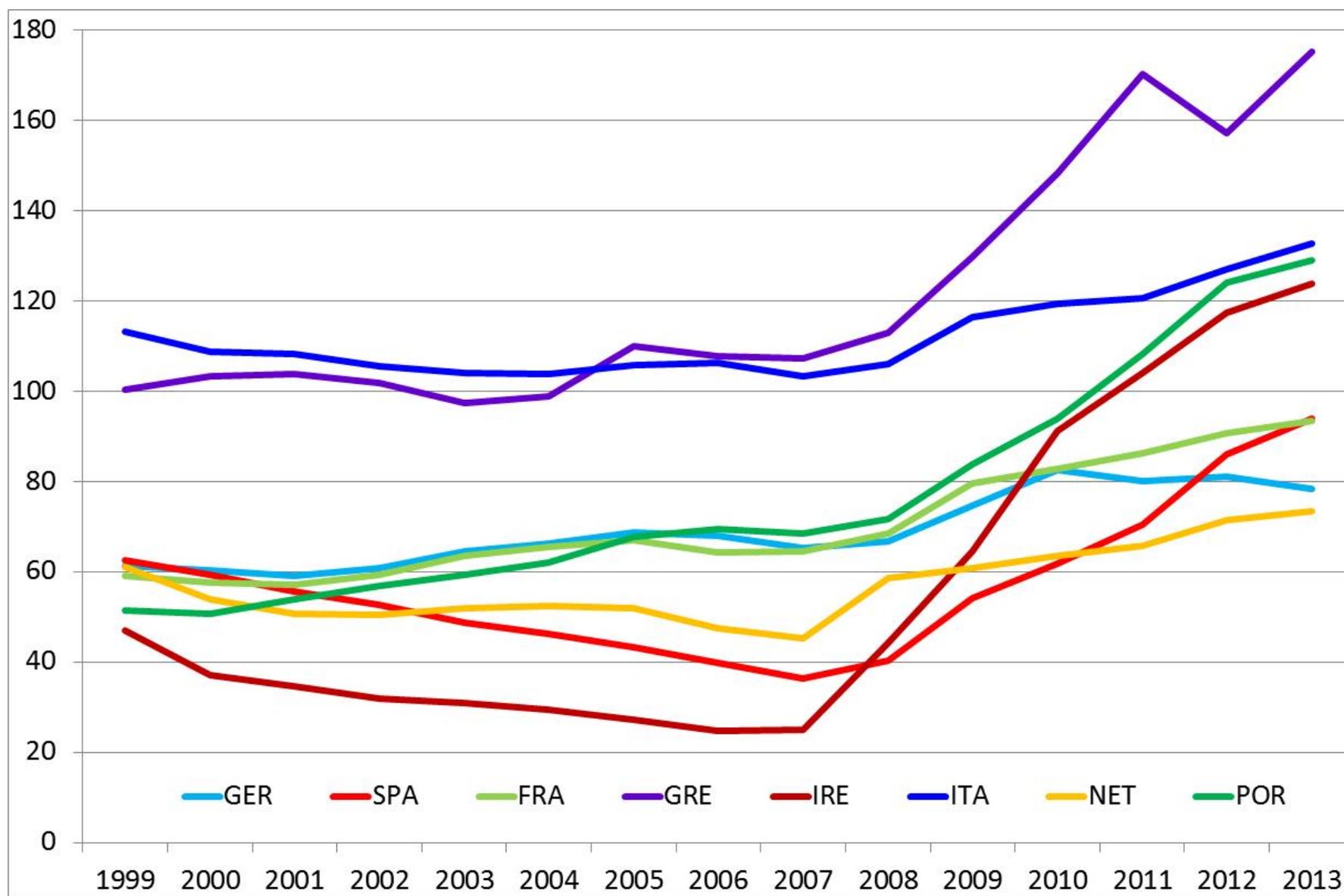
# The Sovereign debt crisis: **Macroeconomic imbalances**

- Before the start of the global financial crisis some countries inside the euro area were already experiencing large **macroeconomic imbalances**:
  - large **differentials in relative wages, prices and competitiveness** inside the euro area;
  - large **imbalances in current accounts** of the balance of payments and **large flows of foreign capital**.
  - strong **increase in credit for house purchases and in house prices** (between 1998 and 2007 bank lending for house purchases increased by more than 400% in Spain, 500% in Ireland and 800% in Greece);

- The global financial crisis added a considerable and persistent **effect on public deficits and debts**
  - partly as the direct effect of the **fall in output**,
  - partly due to **countercyclical fiscal measures** to support output and employment and
  - partly due to measures to **support the financial system**

# The Sovereign debt crisis: The effects of the global financial crisis on public debt

## Government debt/ GDP

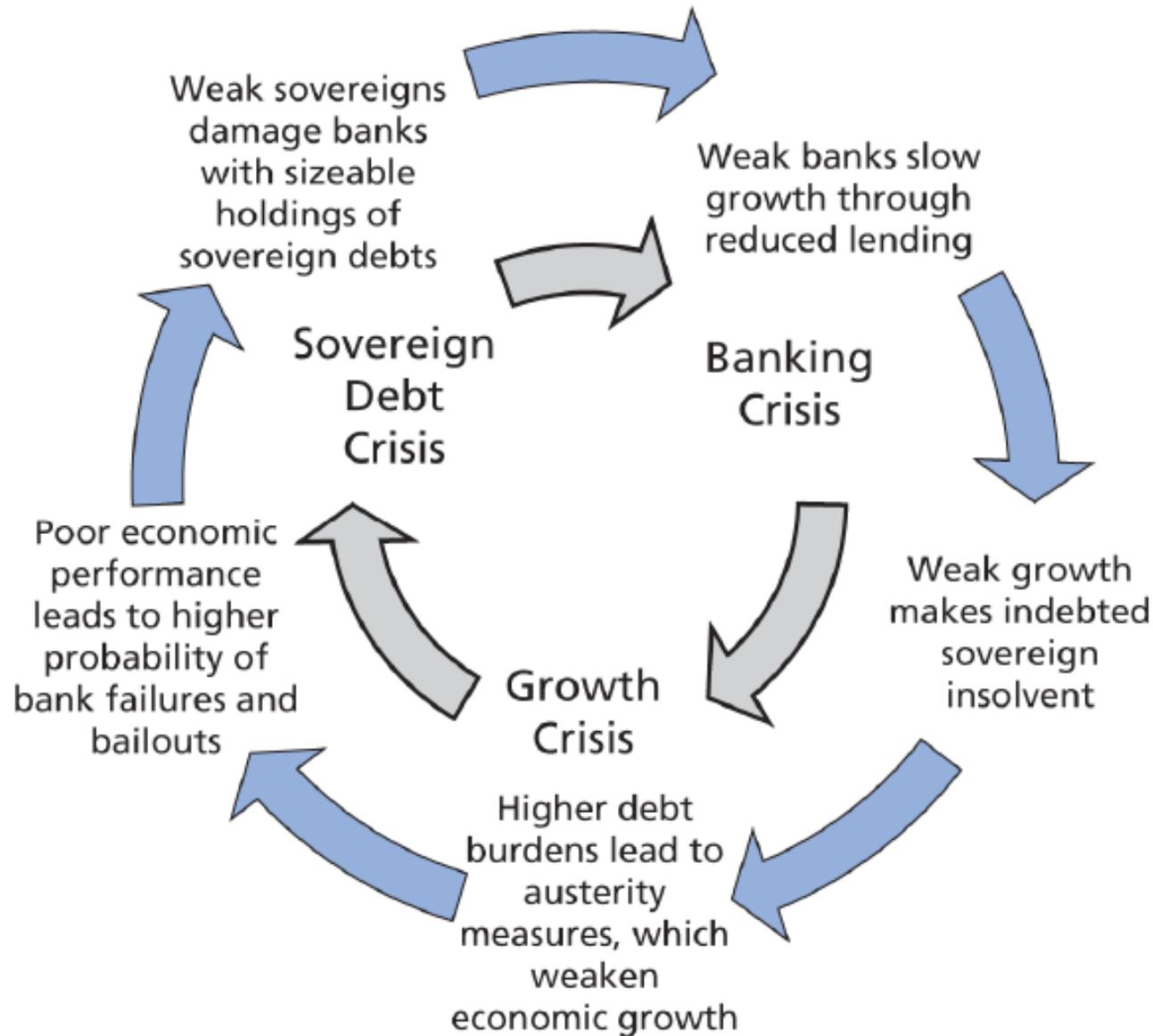


Source: European Commission. NOTE: General government gross debt as a percentage of GDP.

## The Sovereign debt crisis: **Vulnerabilities in the euro area governance**

- Finally, **limits in the governance of the European Union** created uncertainty about the ability of European institutions to manage a systemic crisis:
  - **absence of firewalls;**
  - **insufficient monitoring** of fiscal policies;
  - **no procedures for managing** sovereign debt crisis.

# The Sovereign debt crisis: A Multilevel crisis



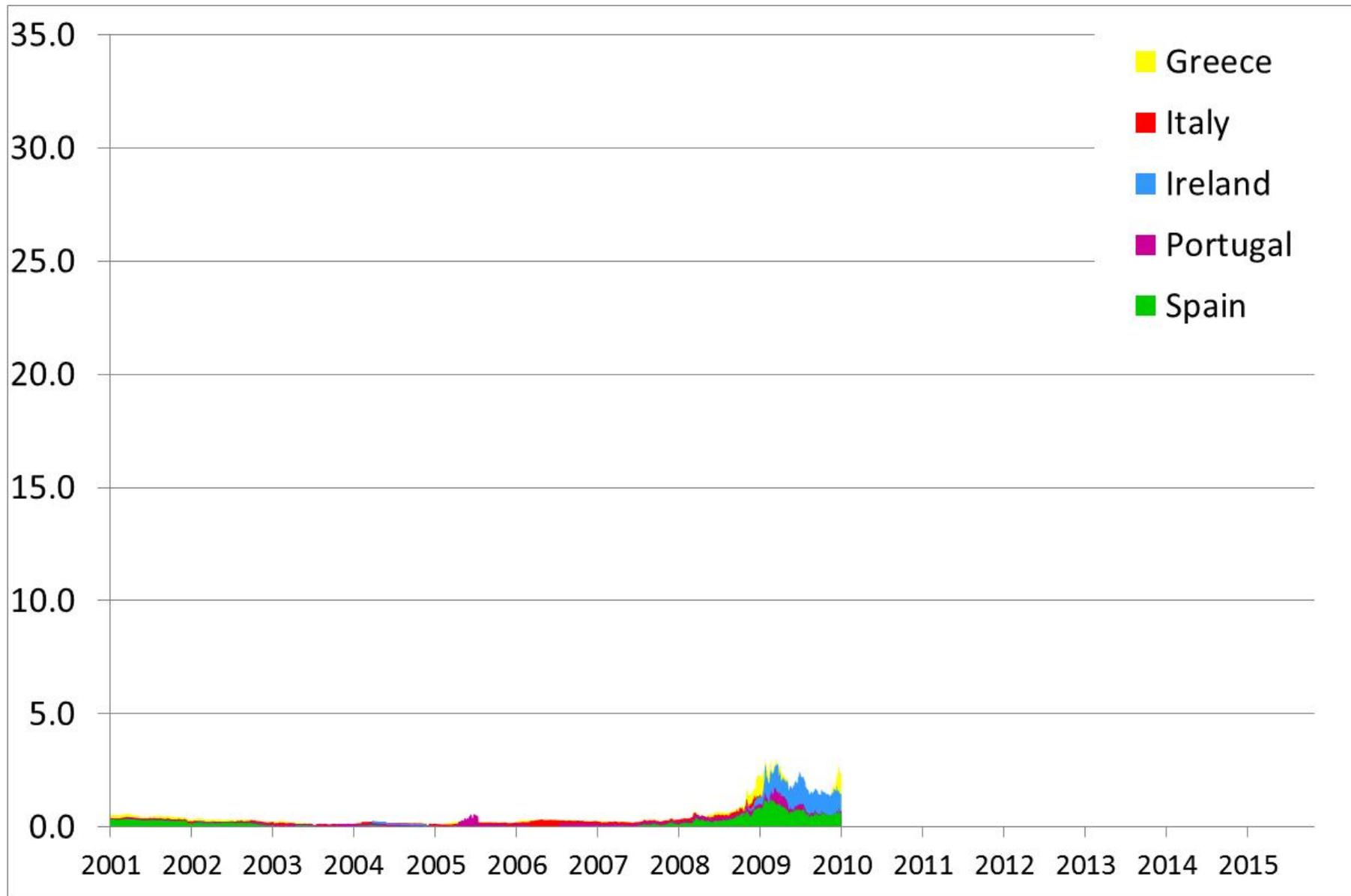
Source: Carletti (2017)

# The Sovereign debt crisis: **The Timeline**

- Before the 2007-2008 crisis financial markets **underestimated the risks linked to sovereign debts**
  - for all countries **interest rates differentials with German bunds were near zero.**

# The Sovereign debt crisis: **The Timeline**

Yield spreads between 10-year government bond and the corresponding German Bund (%)

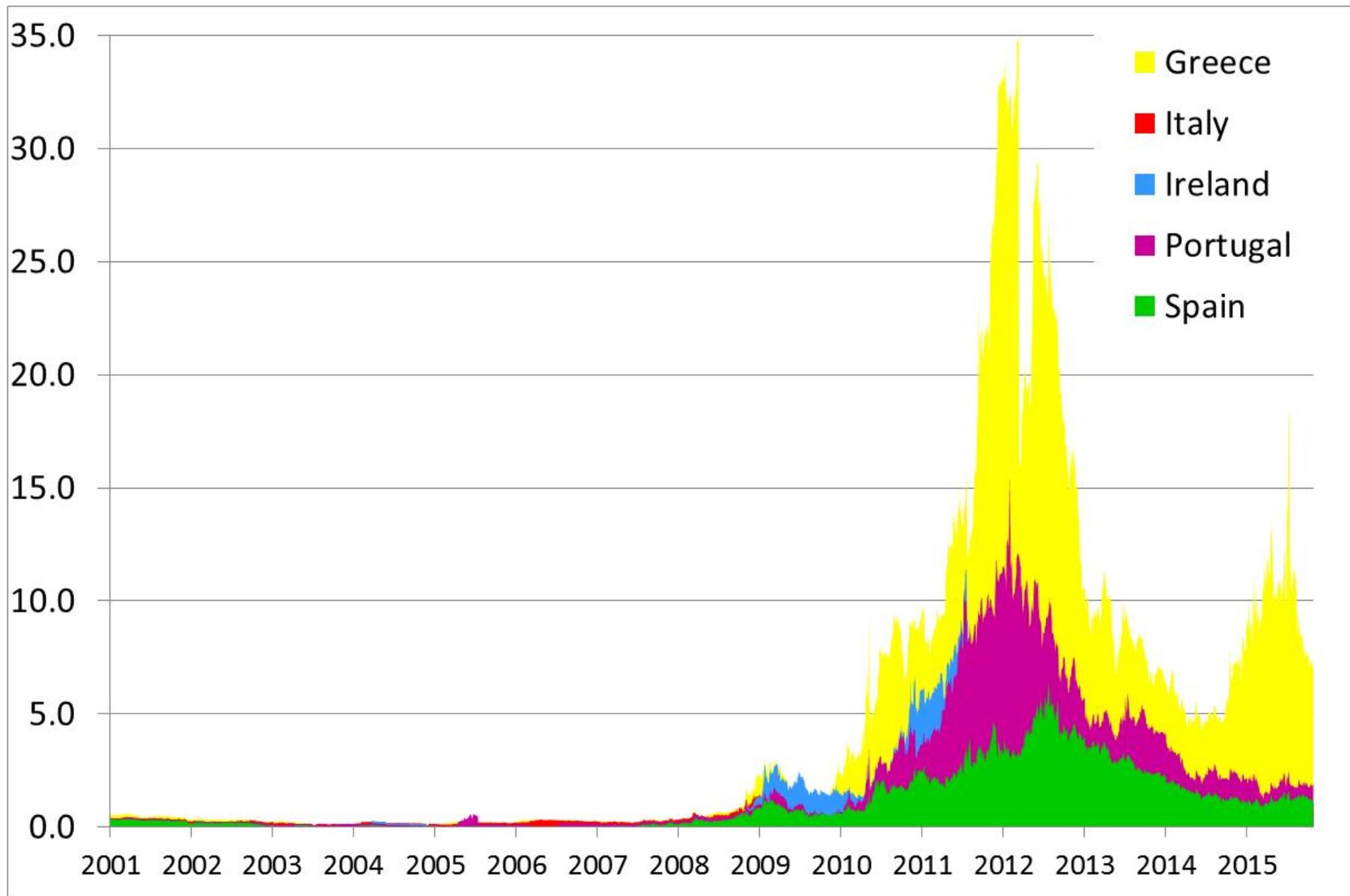


# The Sovereign debt crisis: **The Timeline**

- Before the 2007-2008 crisis financial markets **underestimated the risks linked to sovereign debts**
  - for all countries **interest rates differentials with German bunds were near zero.**
- Later on, financial markets **overestimated risks,**
  - leading to yields on government securities **only partly related to economic fundamentals.**

# The Sovereign debt crisis: **The Timeline**

Yield spreads between 10-year government bond and the corresponding German Bund (%)



# The Sovereign debt crisis: **The Timeline**

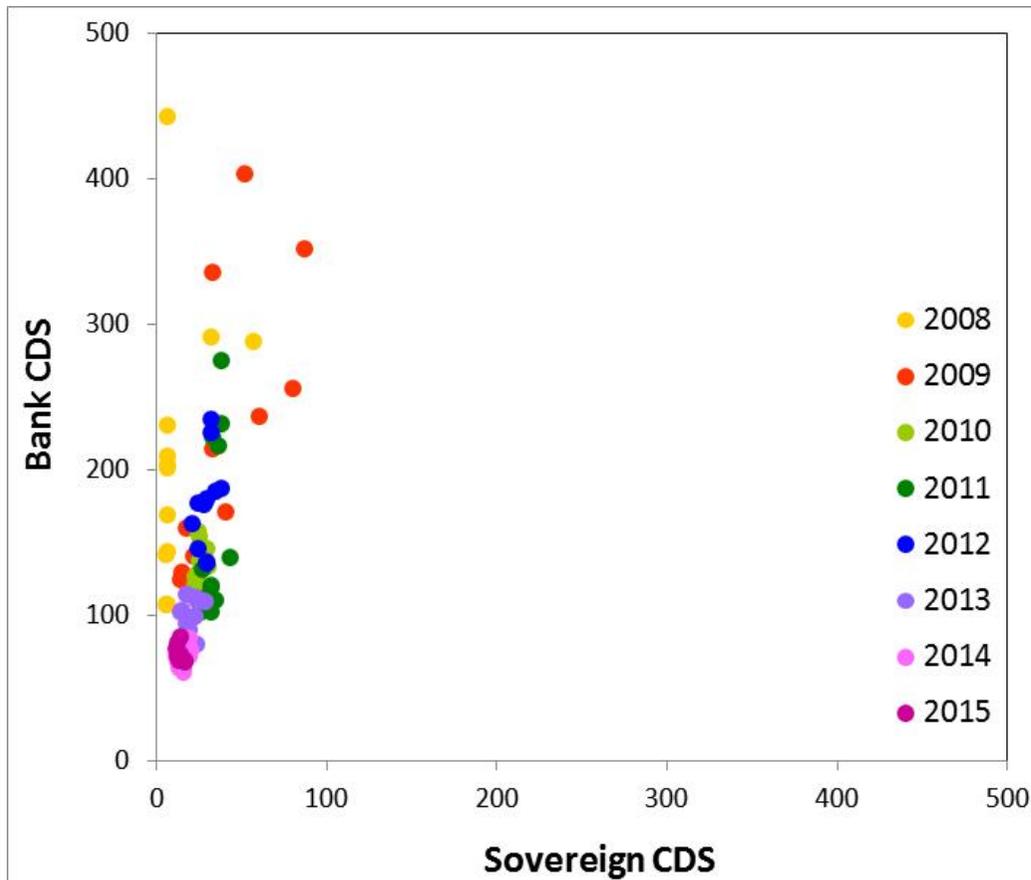
- ... In the **spring of 2010** the **sustainability of the public finance** of some euro area countries caught the attention of investors.
- Between **May 2010** and **April 2011**, **Greece**, **Ireland** and **Portugal** ask for **international financial support**.
- In the **summer of 2011** the sovereign debt crisis reached **Spain** and **Italy**...

# The Sovereign debt crisis: **from sovereign to banks**

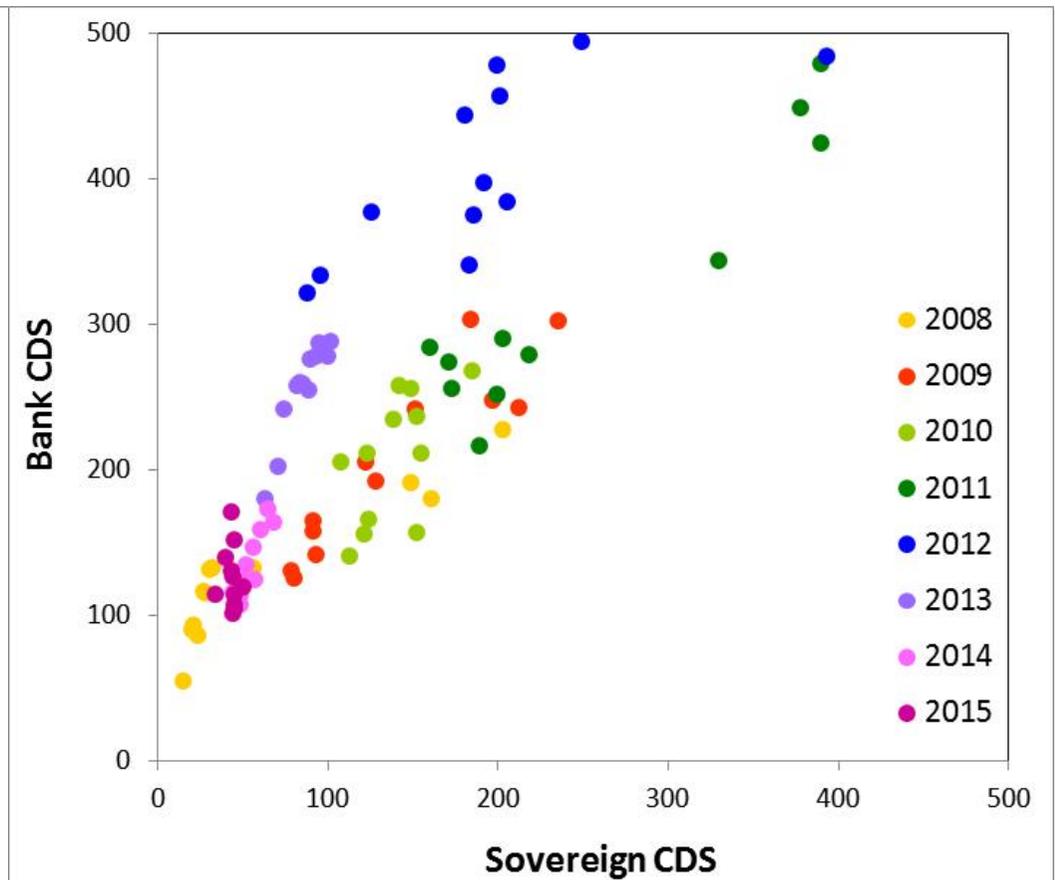
- ... The effects quickly **extended to the banking sector** ...

## Banks / Sovereign nexus

US



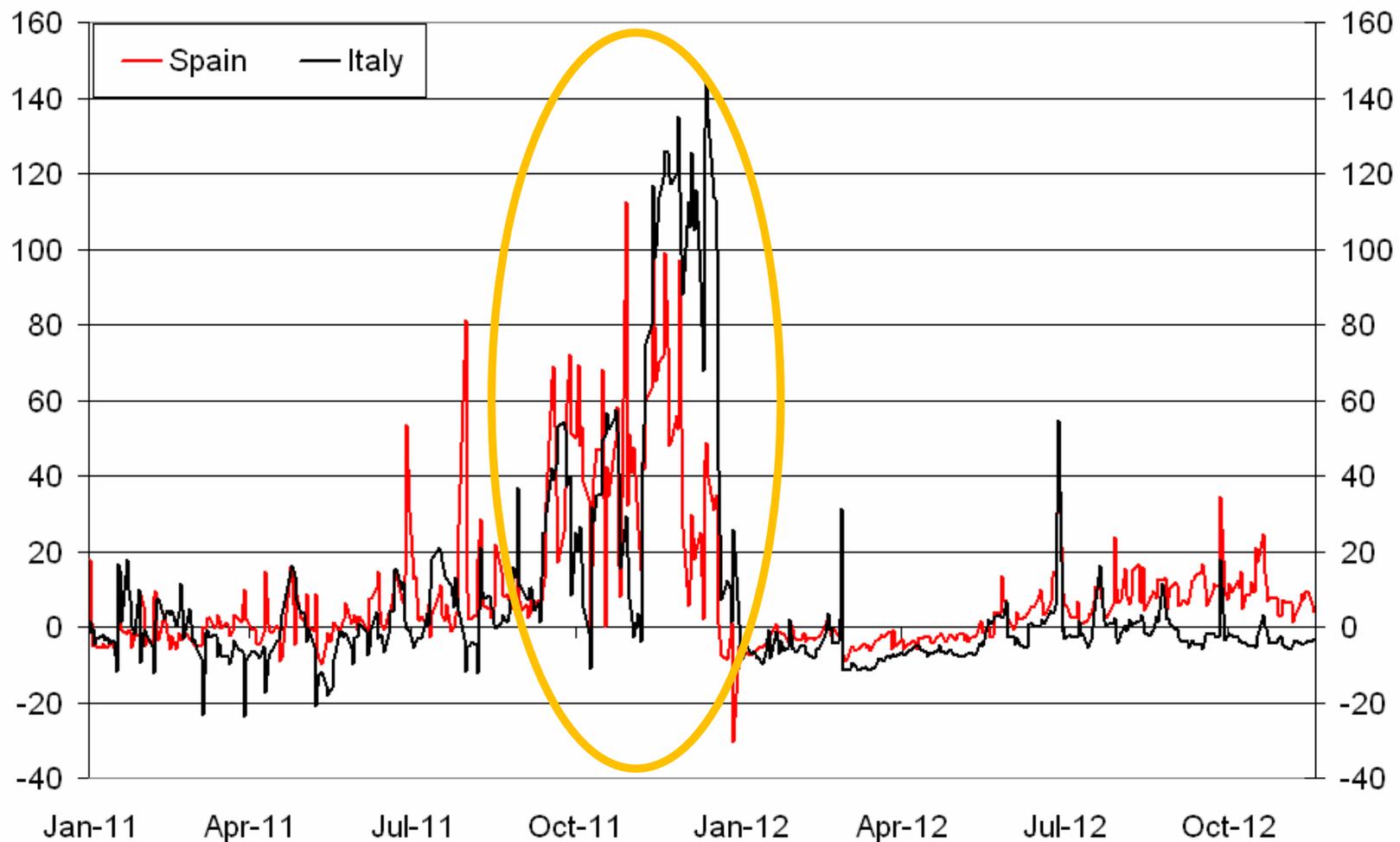
Euro area



# The Sovereign debt crisis: **from sovereign to banks**

- ... banks' **funding** becomes more costly in some countries and quickly dries up.

Interbank spread by country - overnight maturity (basis points)



# The Sovereign debt crisis: **from sovereign to banks**

- ... with increasing risks for the **correct and uniform functioning** of the **main channels of the monetary policy transmission**, through the banking sector ...
  - **Interest rate channel.** If interest rates on sovereign debt rise, the same must eventually happen to all interest rates, including the rates banks charge on loans. This impacts on the cost of loans and hence on aggregate demand.
  - **Profitability and capitalization channel.** Losses due to fall in the price of securities held by banks erode bank's own capital and induces banks to **deleverage** (i.e., to reduce the loans they extend to the private sector).

# The Sovereign debt crisis: **from sovereign to banks**

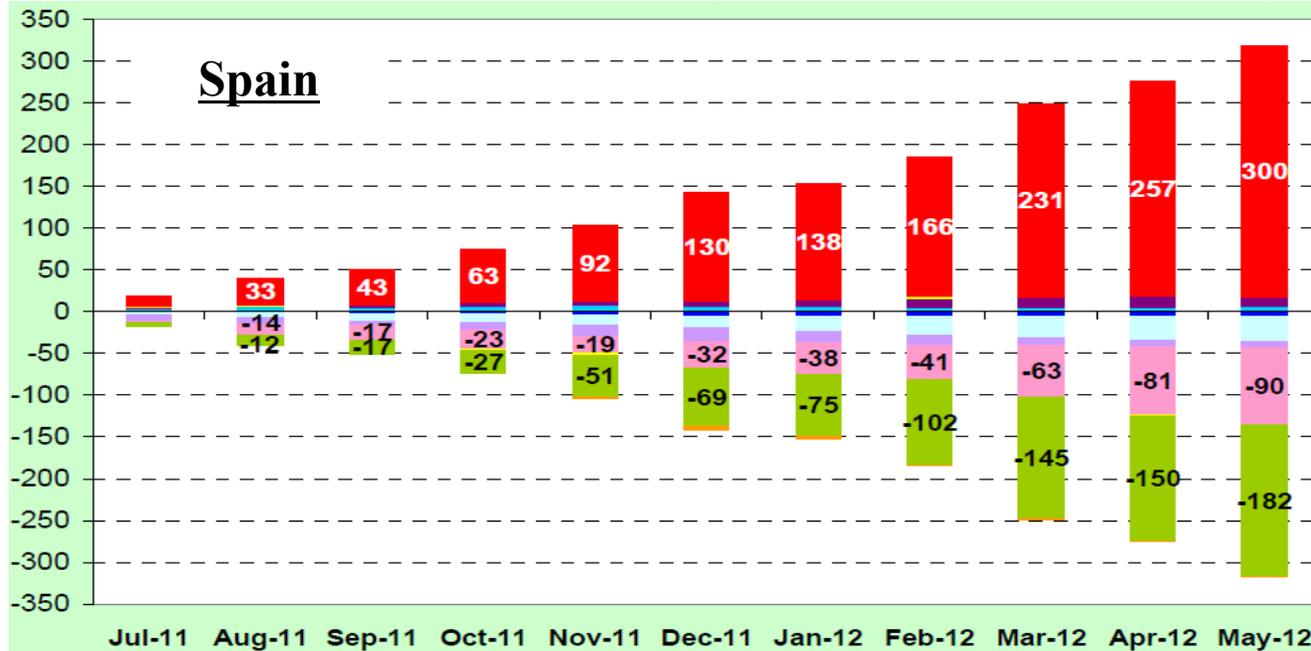
- **Collateral channel:** in order to satisfy the liquidity needs banks, may need to borrow reserves by posting collateral (i.e. an asset that the borrower pledges to the lender as a guarantee); when the value of the assets held by banks declines, less collateral is available to borrow reserves. This may impact negatively on the ability of the bank to satisfy liquidity needs, to settle payments and, therefore, also on the ability to extend loans to the private sector.

# The Sovereign debt crisis: **from sovereign to the payment system**

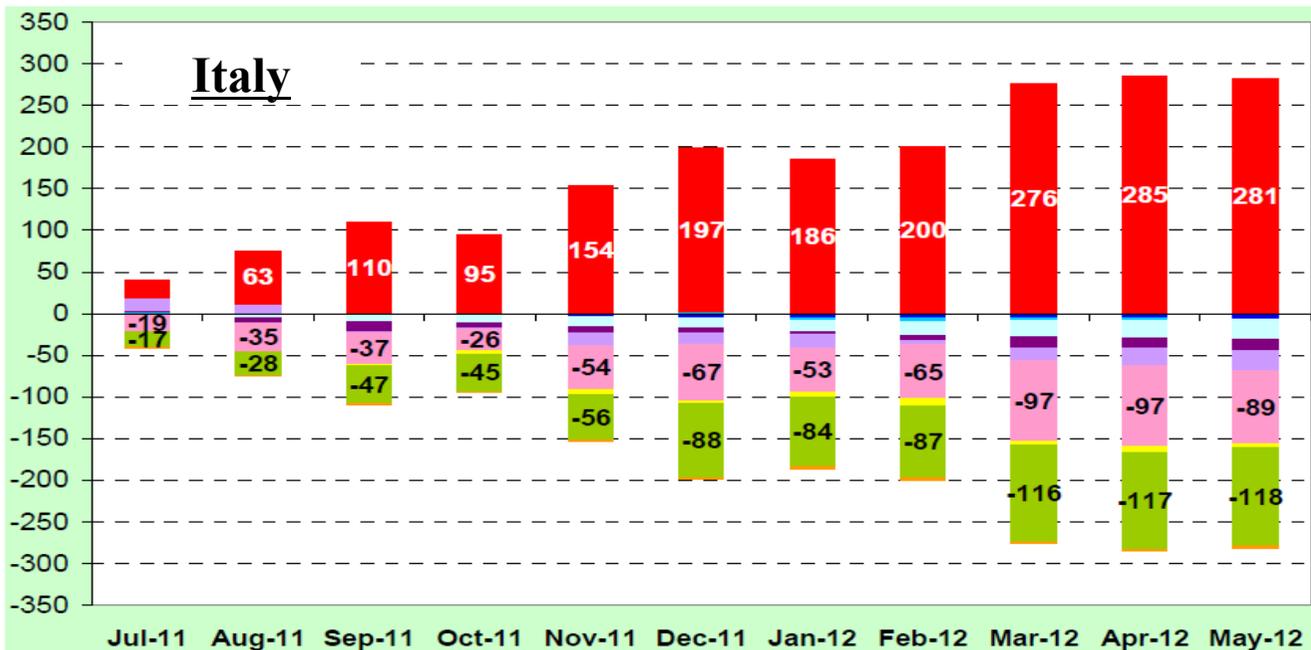
- ... and for the **correct functioning of the payment system**
  - **TARGET2 (T2)**: real-time gross settlement system used to settle payments both between domestic banks and between banks operating in different countries of the Euro area.
  - A bank that **transfers funds** to a counterparty located in another country of the area records **a reduction in its reserve account** with the national central bank (NCB), the accounts of which in turn record a **T2 liability** towards the ECB.
  - Conversely, a bank that **receives funds** records an **increase in its reserve account** with the NCB, the accounts of which record a **T2 claim** toward the ECB.

# The Sovereign debt crisis: from sovereign to the payment system

**Balance of payments** (cumulated monthly net flows; €billions)



- CA - Trade Balance, rest of the World
- FA - Direct Investments
- FA - Portfolio Investments
- FA - Other investment (MFIs)
- FA - Other Investments (TARGET2)
- CA - Trade balance intra area
- CA - Income and Transfers, World
- Other items in FA, Capital Account & Net Errors
- FA - Other investment (Other sectors)
- FA - Other investment (General government)



# The Sovereign debt crisis: **from sovereign to the payment system**

- Without monetary policy interventions (that we will analyze), it would have been impossible to maintain the **“smooth” functioning of the payment system, ...**
- ... which is a **necessary condition for the uniform transmission** of the common monetary policy and ...
- ... therefore, for pursuing the main objective of **price stability**.

# The Sovereign debt crisis: **The monetary policy responses**

- To counteract the effects of the crisis the **ECB implemented unconventional measures, ...**
- ... some finalized at supporting the appropriate **functioning of the monetary transmission mechanism, ...**
  - Security Market Program (SMP)
  - Very Long Term Refinancing Operations (V-LTROs)
  - Outright Monetary Transactions (OMTs)
  - Targeted Long Term Refinancing Operations (T-LTROs),
  - Covered bonds and ABS purchase programmes.
- ... others to counteract the **risks of deflation.**
  - Negative interest rate on deposit facility
  - Asset Purchase Programme (APP)

# The Sovereign debt crisis: **The SMP**

- In May 2010 the ECB decides to implement a **program of purchase of euro area private and public securities (Securities Markets Programme, SMP)**, focused on those **market segments that were particularly dysfunctional**:
  - The objective: to support an **appropriate functioning of the monetary transmission** mechanism;
  - the programme is **temporary** and its **amount limited**;
  - and its effects on the monetary base are **neutralized** through liquidity-absorbing operations.

# The Sovereign debt crisis: **The SMP**

- How SMP supports an **appropriate functioning of the monetary transmission** mechanism?
  - By announcing and implementing a large program of purchases of illiquid assets with highly volatile prices ...
  - ... the ECB objective was to **restore confidence** in the sovereign bond markets of several euro area countries ...
  - ... and, therefore, to **reduce volatility** and **increase liquidity** of those markets ...
  - ... and support an **homogeneous transmission** of monetary policy decisions.

# The Sovereign debt crisis: **The SMP**

- Why SMP is **temporary** and its amount **limited**?
  - Mainly to **reduce moral hazard** and excessive risk taking by the issuers and to **avoid issues related to monetary financing of governments**.
- Why the effects on the monetary base are **neutralized** through liquidity-absorbing operations?
  - Because the Eurosystem in that context did not want to expand its balance sheet ...
  - ... other measures were finalized at increasing the role of intermediation of the central banks by providing more reserves to the banking system.

# The Sovereign debt crisis: **The SMP**

- *May 2010:* The SMP started on **Greek** securities; successively it was extended to government securities of **Ireland** and **Portugal**.
- *August 2011:* the program was extended to **Italian** and **Spanish** government bonds.
- *January 2012:* ECB's holdings of euro area securities reached their peak, €220 billion.
- *September 2012:* The **program was formally terminated**.
- *December 2016:* the amount of securities holding under the SMP program is around €100 billion.

# The Sovereign debt crisis: OMT

- From March 2012 some segments of the sovereign debt market worsen again, due to investors' **fear of the reversibility** of the euro.
- The spread with the Bund remained well above the fundamentals for many countries.

# The Sovereign debt crisis: OMT

- *July 2012*: Draghi says that policy makers will do “**whatever it takes**” to preserve the euro.
- *September 2012*: the ECB decides on the modalities for undertaking **Outright Monetary Transactions (OMTs)**.
  - What are OMTs? OMTs are **purchases in secondary markets for sovereign bonds** in the euro area.
  - Why? In order to (i) **address severe distortions** in government bond markets which **originate from unfounded fears** on the part of investors of the **reversibility** of the euro, (ii) to preserve the **singleness of the monetary policy** and (iii) to **ensure the proper transmission** of the policy stance to the real economy.

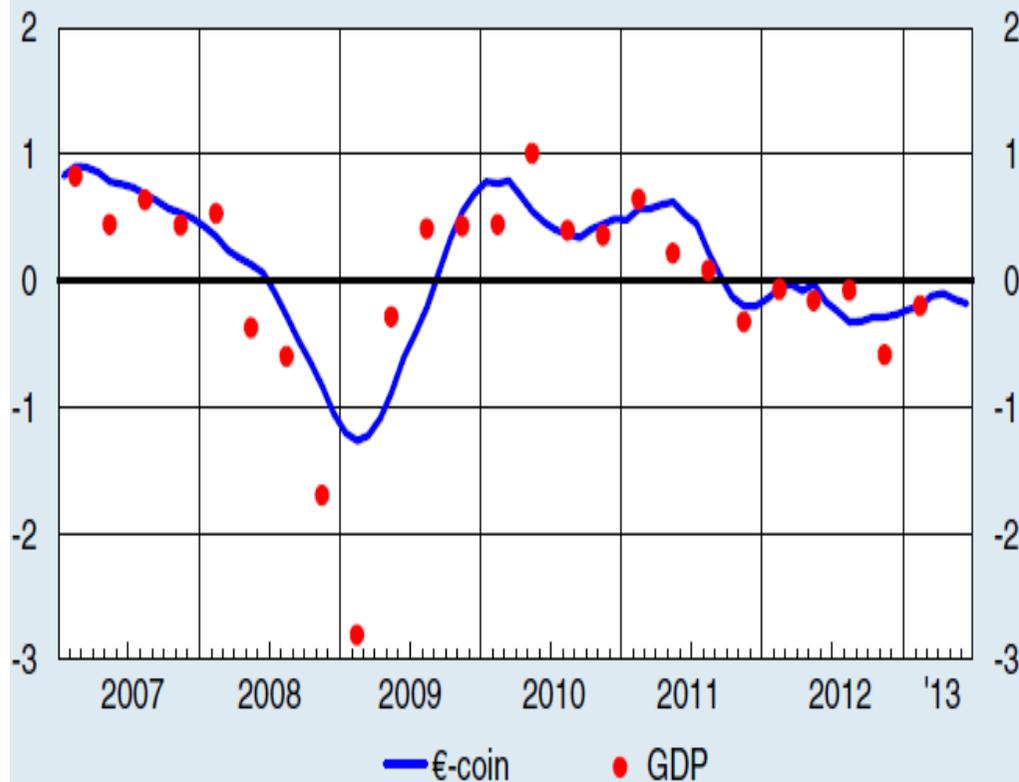
# The Sovereign debt crisis: OMT

- **Similarities** with the SMP :
  - Objective: support an appropriate functioning of the **monetary transmission mechanism**;
  - Effects on the monetary base: **neutralized** through liquidity-absorbing operations.
- Main **differences** with SMP:
  - strict and effective **conditionality**;
  - **No ex-ante quantitative limits** on their size and duration;
  - **pari passu treatment** of the Eurosystem as private creditors;
  - **transparency** on the main characteristics of the operations.

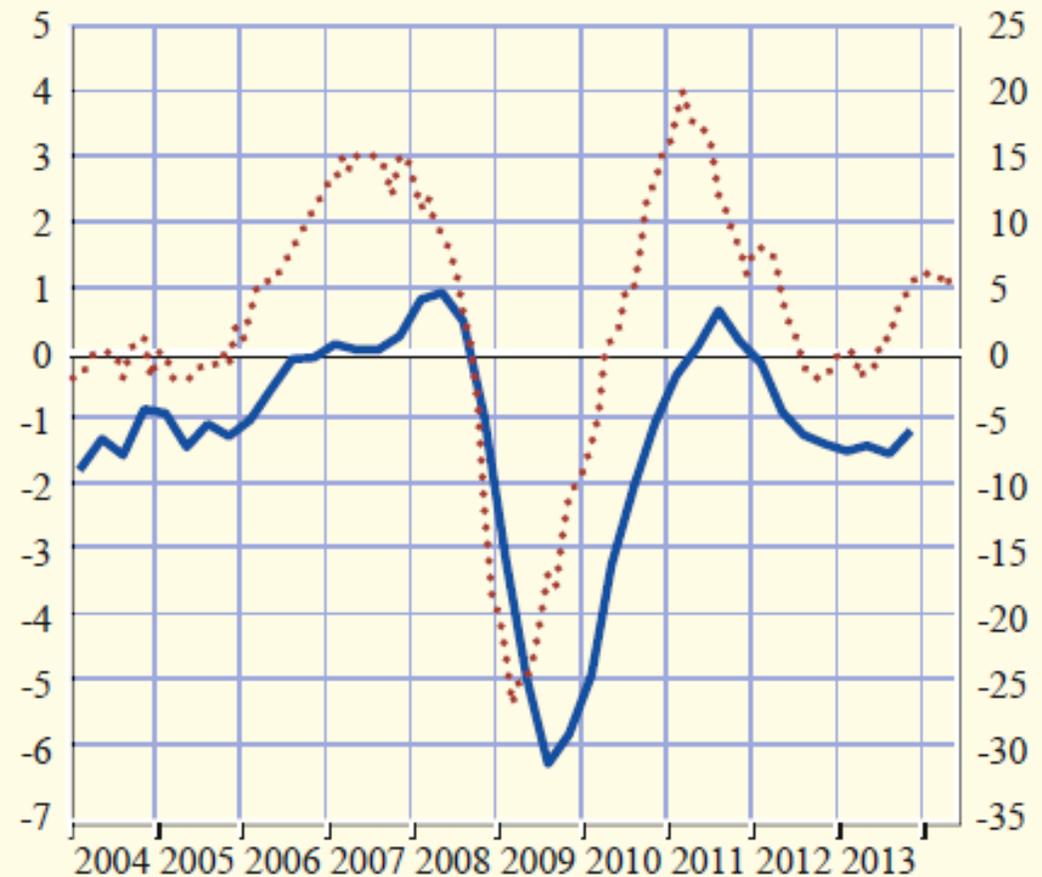
# The Sovereign debt crisis: **Forward guidance**

- In the first half of 2013, **economic activity** remains very weak ...

€-coin coincident cyclical indicator  
and GDP in the euro area (1)  
(percentage changes)



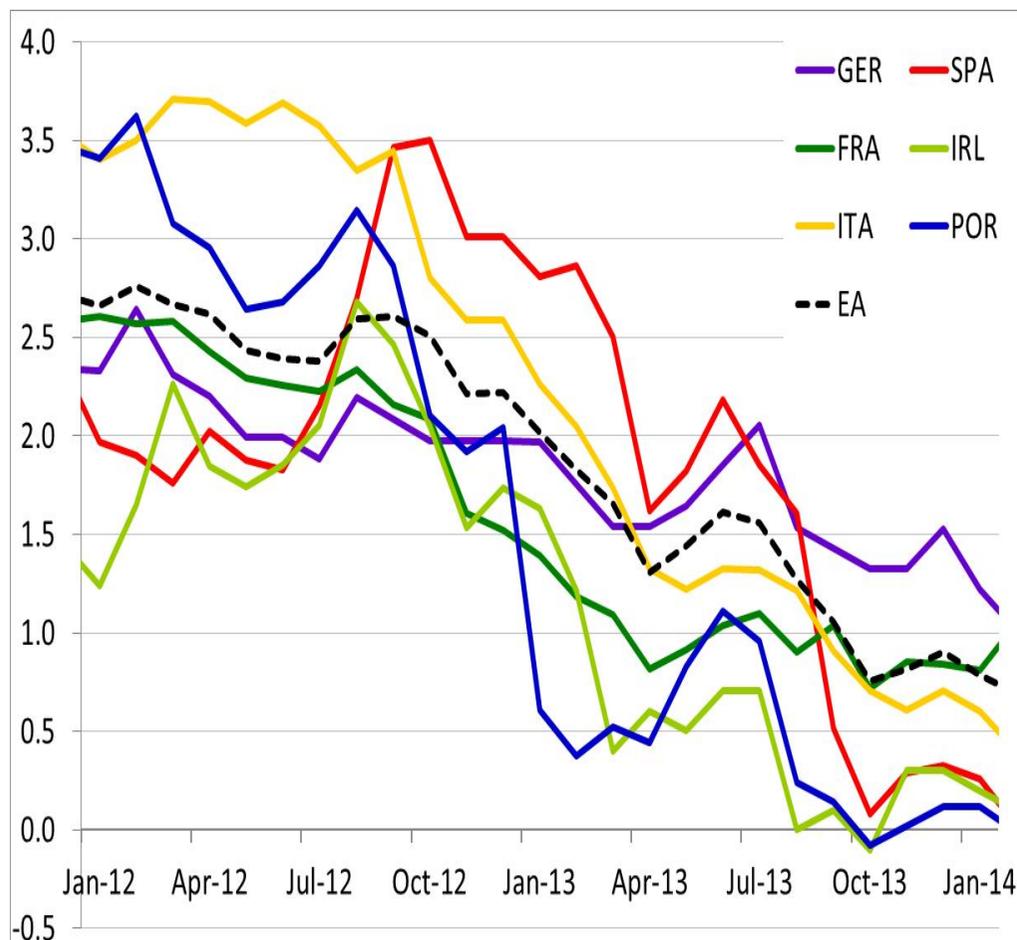
— employment growth in industry  
(excluding construction; left-hand scale)  
..... employment expectations in manufacturing  
(right-hand scale)



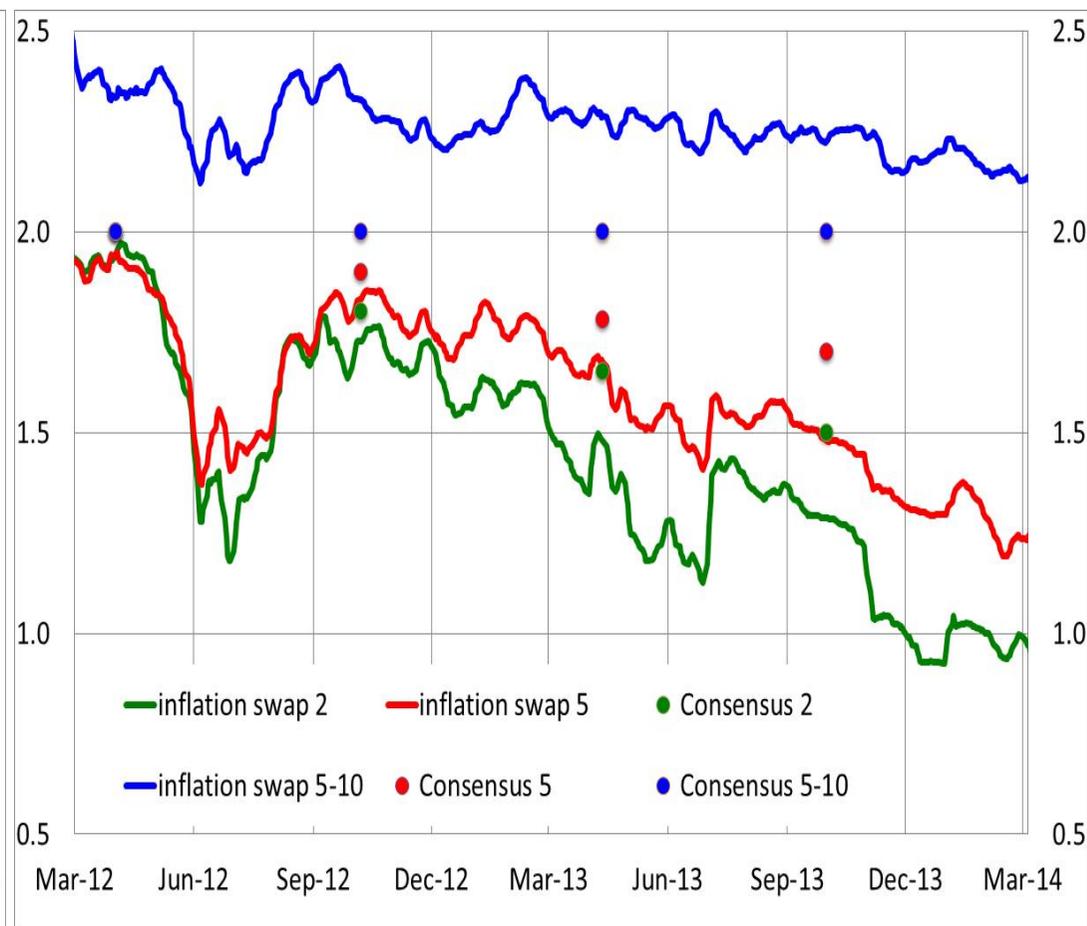
# The Sovereign debt crisis: **Forward guidance**

- ... **actual and expected inflation** (short and medium-term) **decrease**, reaching levels well below the definition of price stability

## HICP inflation



## Inflation expectations

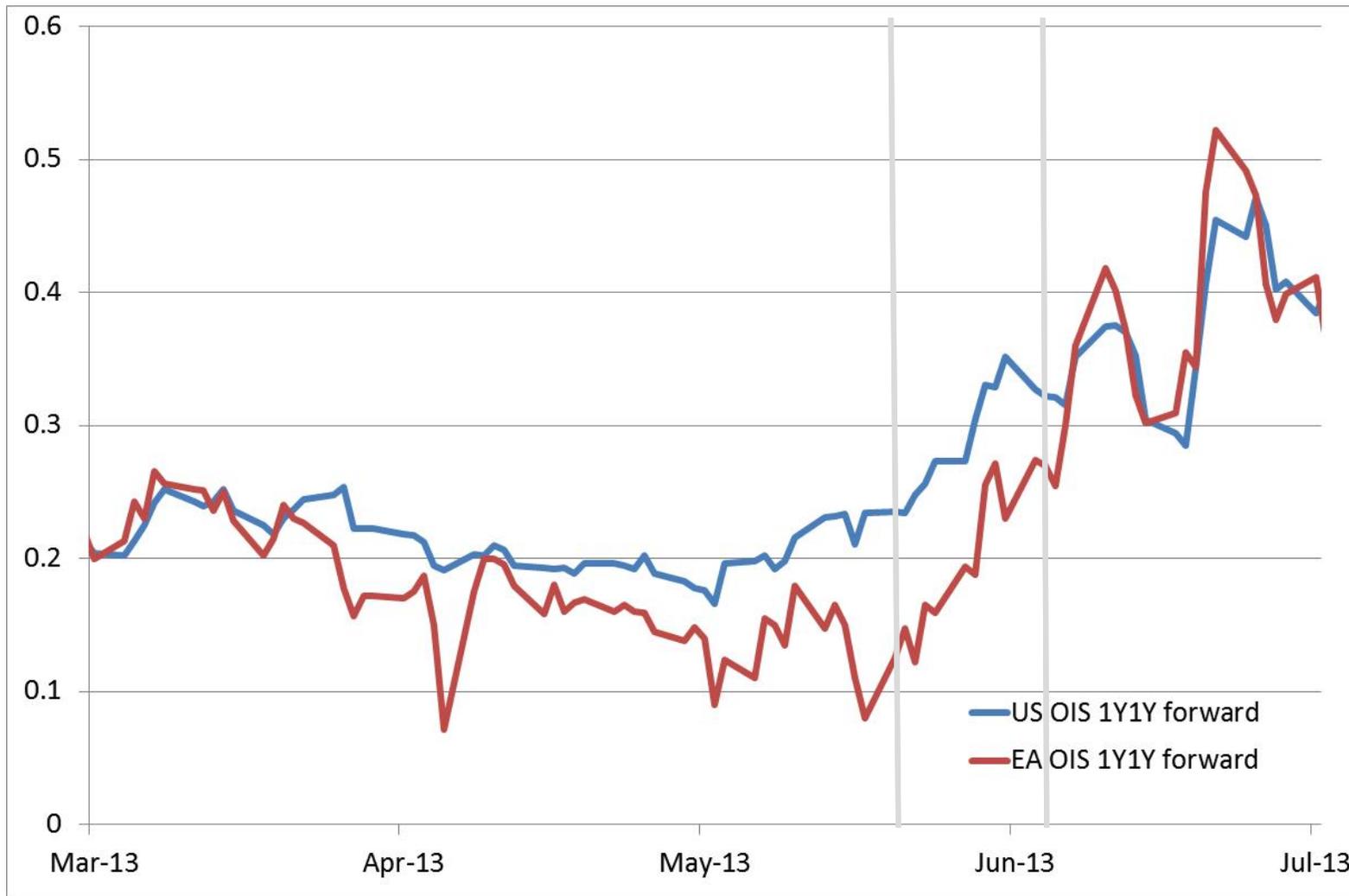




# The Sovereign debt crisis: **Forward guidance**

- ... **interest rates increase** also as a consequence of the «tapering tantrum» of the Federal Reserve

Expected interest rates (1-year 1-year ahead rates, %)



# The Sovereign debt crisis: **Forward guidance**

- *May 2013*: the ECB lower **official interest rates**. The **deposit facility rate is lowered to 0%**.
- *July 2013*: the ECB provides **forward guidance** on the future path of policy interest rates.
- **Objectives**, by providing more explicit information on the future path of policy interest rates, **conditional** on the state of the economy, the ECB aimed at
  - **preventing market volatility** from influencing the monetary policy stance in undesired directions and hampering the transmission of the monetary accommodation
  - **introducing greater monetary policy accommodation** and therefore favouring a solid anchoring of inflation expectations

# The Sovereign debt crisis: **Forward guidance**

- Characteristics. **Qualitative** guidance on its future use of the instrument, **conditional** on a narrative that refers to its **objective** and **strategy**
  - Qualitative: it communicates the **likely policy orientation** through a qualitative statement **without explicit** relation to an **end date** or **numerical thresholds**,
  - Conditionality: when it describes the **macroeconomic conditions** under which the monetary policy orientation is expected to prevail, it **explicitly refers** to its **inflation projections** and its **two-pillar strategy**.

# The Sovereign debt crisis: **Forward guidance**

- July 2013 the ECB “*expects the <sup>A</sup>key interest rates to remain at present or lower levels for an extended period of time. This expectation is based on the overall subdued outlook for <sup>B</sup>inflation extending into the medium term, given the broad-based weakness of the <sup>C</sup>economy and subdued <sup>C</sup>monetary dynamics.*”

A. **Key interest rates** → MP instrument

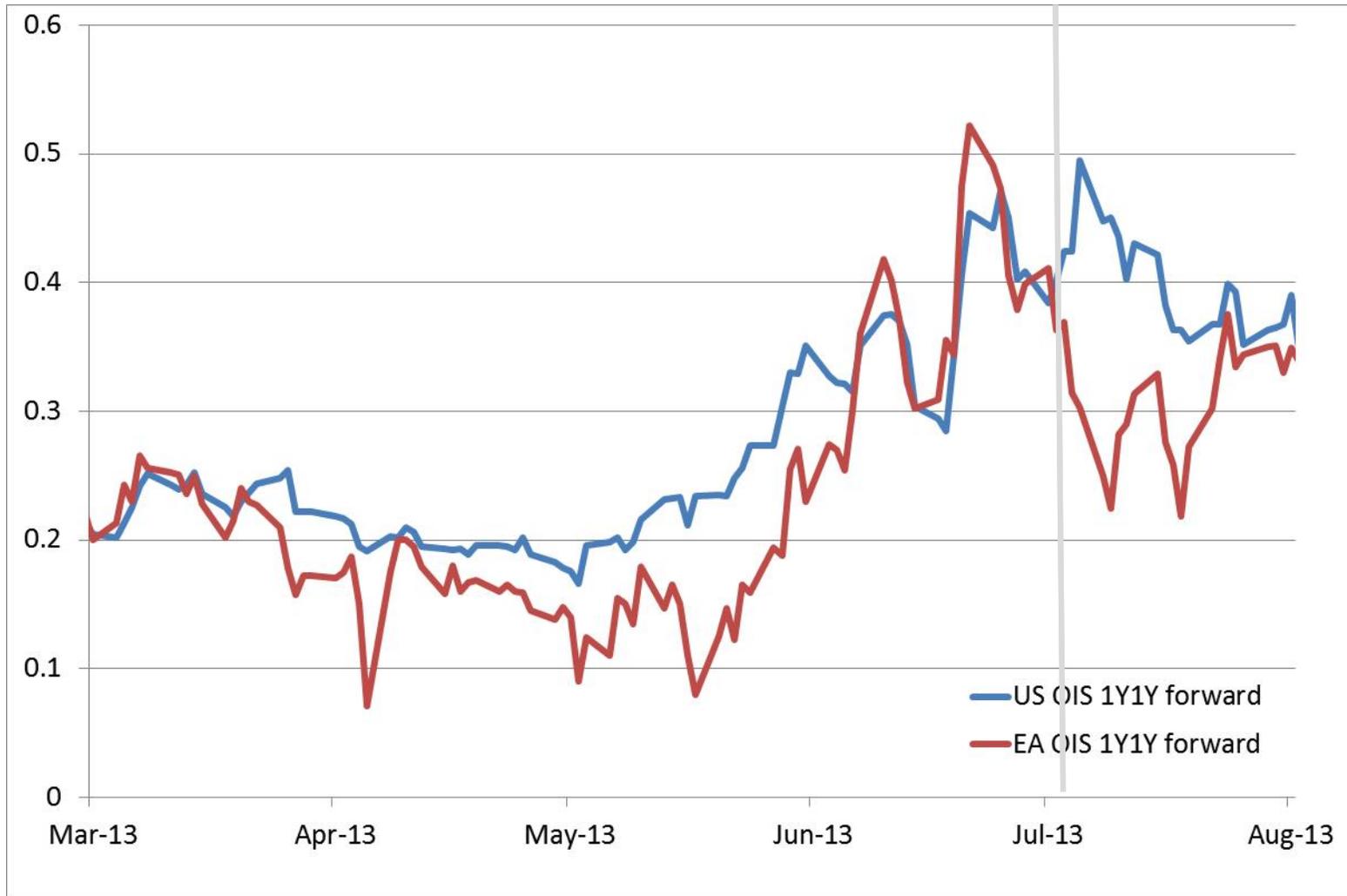
B. **Inflation** → MP objective

C. **Economy and Monetary dynamics** → MP framework

# The Sovereign debt crisis: **Forward guidance**

- Effects: **Sensitivity** of euro area interest rates to US rates **decreases**

Expected interest rates (1-year 1-year ahead rates, %)

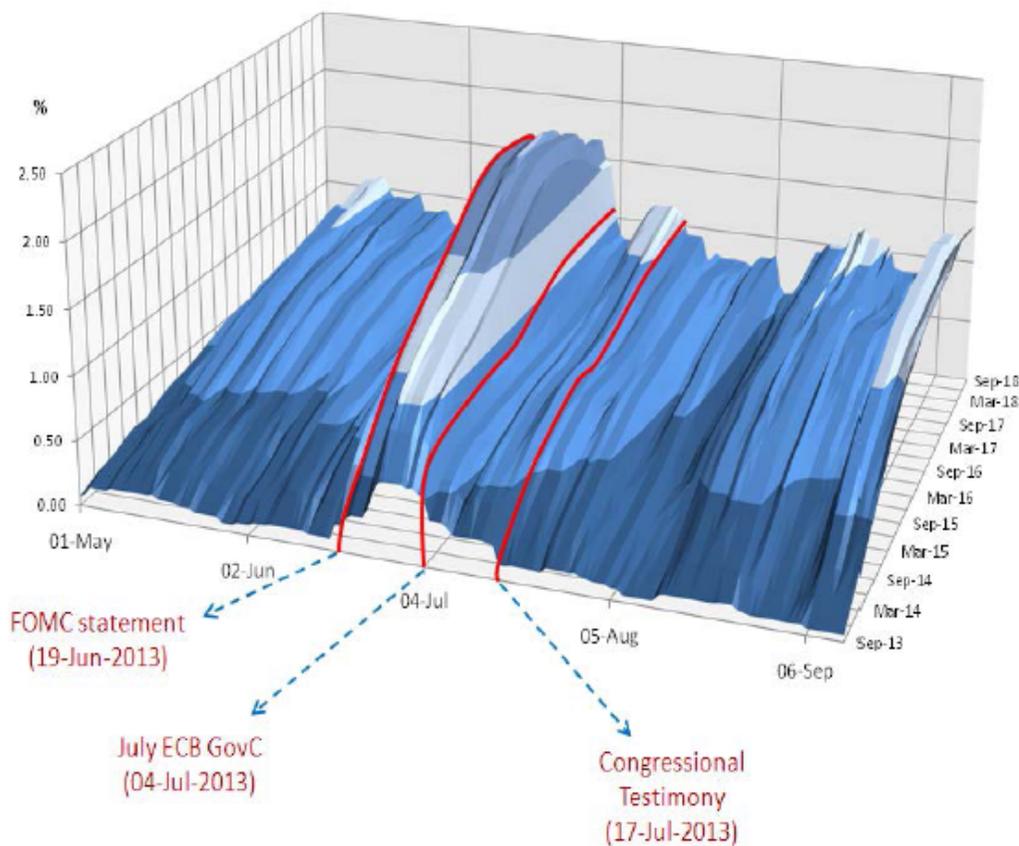


# The Sovereign debt crisis: **Forward guidance**

- Effects: **Volatility** of expected short-term interest rates in the euro area decreases

## Uncertainty about future short-term market interest rates

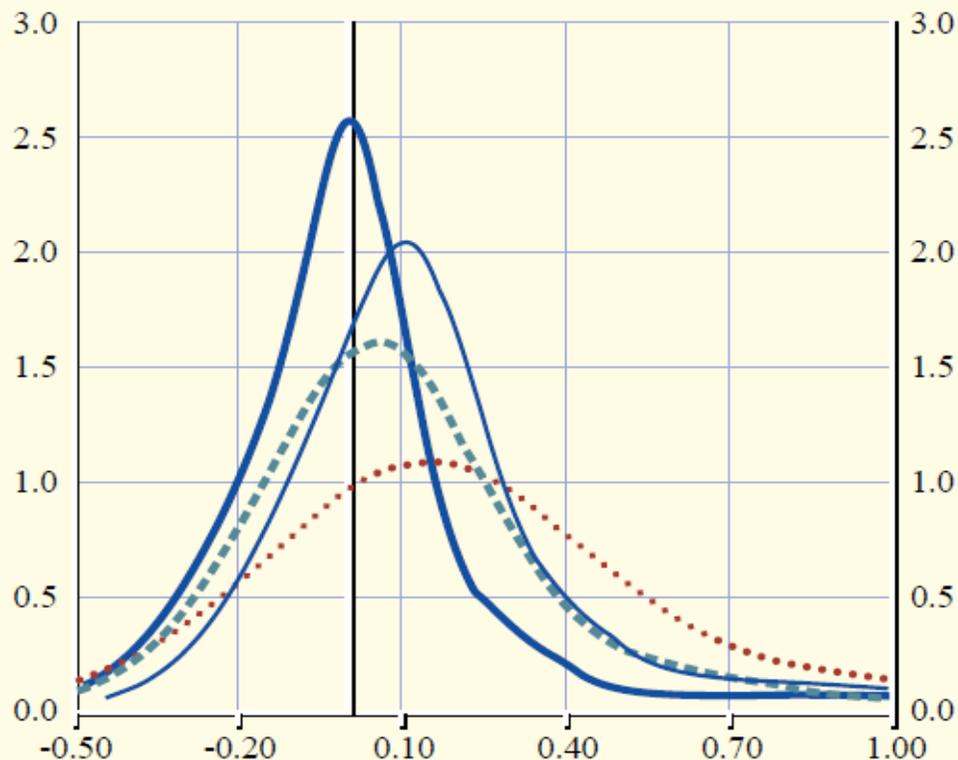
Euro area – Futures 10-days realised volatility



x-axis: interest rate

y-axis: density

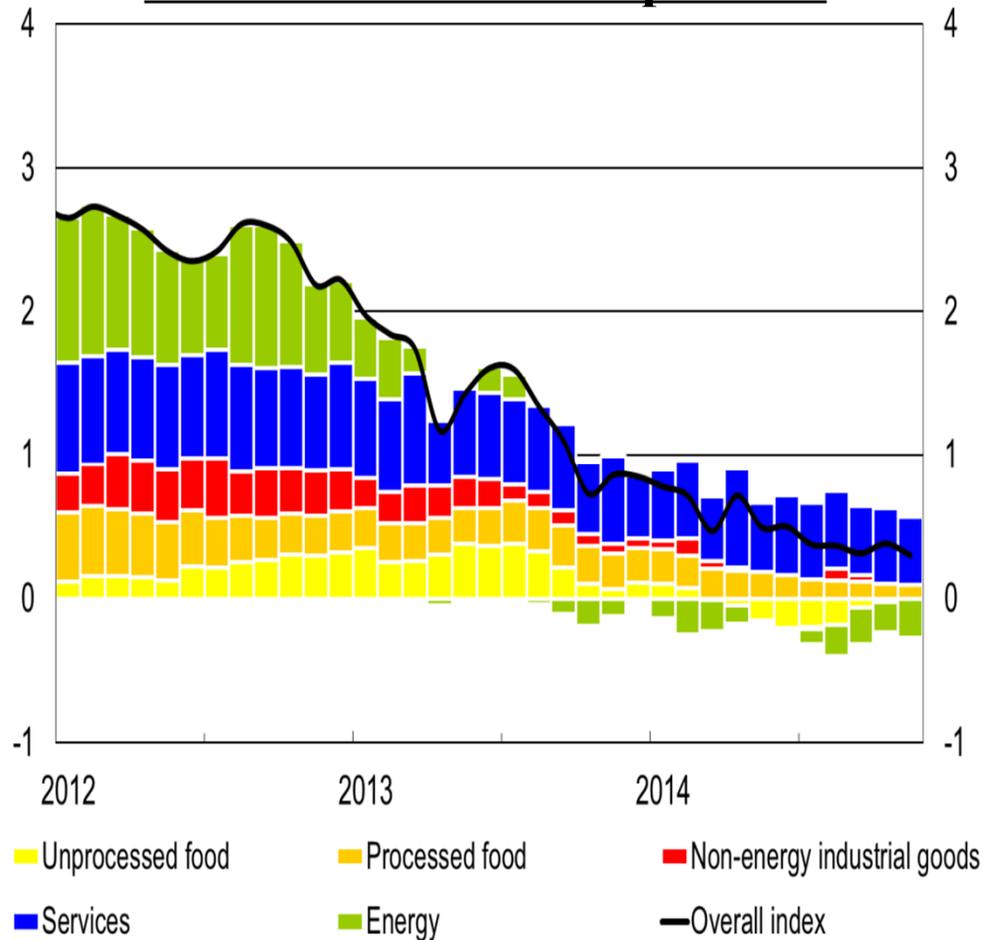
- 2 May 2013 (after interest rate cut)
- ..... 24 June 2013 (after Governing Council meeting)
- - - 4 July 2013
- 17 March 2014



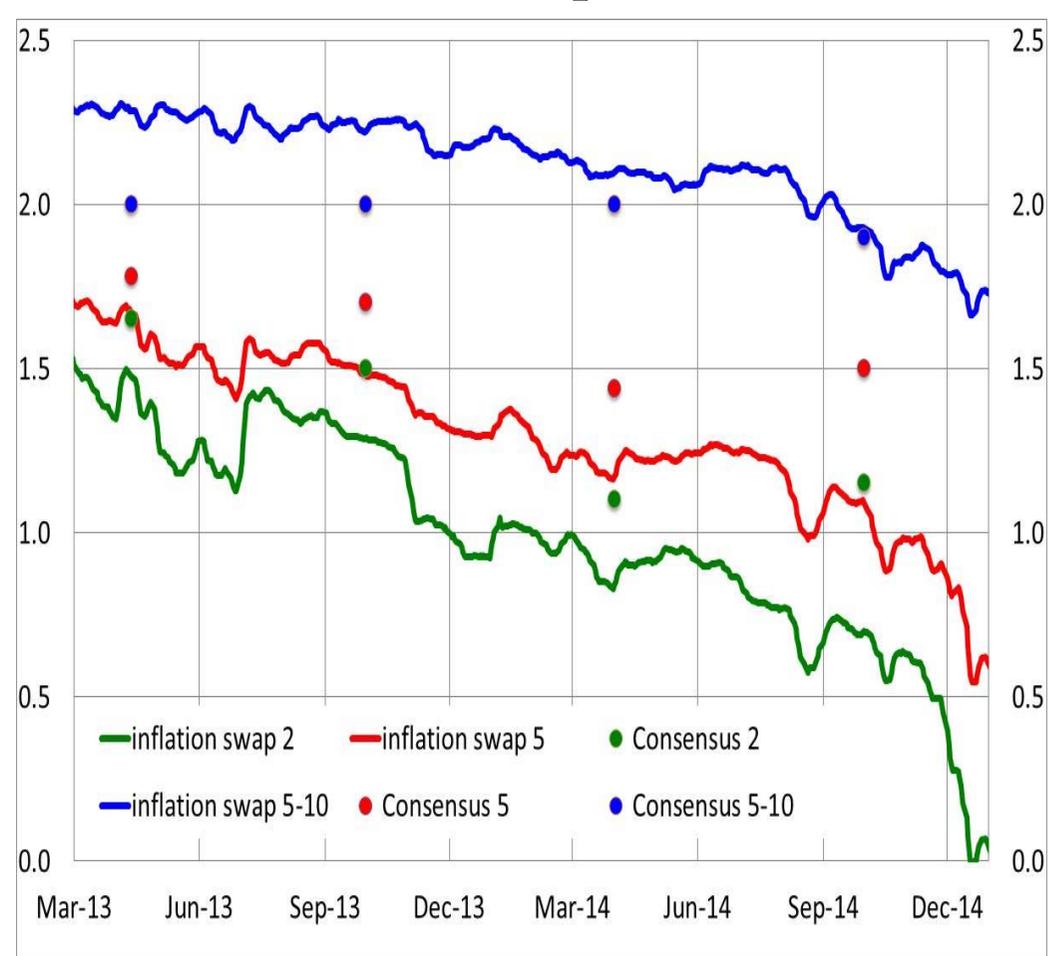
# The Sovereign debt crisis: **Negative interest rates and T-LTROs**

- *2014* is still characterized by **slack economic activity**, **subdued money and credit dynamics** and **exceptionally low actual and expected inflation**

## Inflation and its components



## Inflation expectations



# The Sovereign debt crisis: **Negative interest rates**

- *June 2014*: the ECB lower **official interest rates**. The **deposit facility rate is lowered to -0.1%**. It is the first time for the ECB that (one of) the **official interest rate is negative**.
- **Characteristics**: The negative interest rate on overnight deposits held by banks at the Eurosystem applies to **reserves in excess** of the reserve requirement.
- **Objectives**. The main objectives are:
  - a) to **reduce** short-term **market interest rates**;
  - b) to **counteract** the **upward pressure** on the **euro**;
  - c) by “taxing” excess liquidity held by banks at the central bank, to facilitate the circulation of liquidity and, therefore, to **reduce fragmentation** between financial systems along national lines (in conjunction with the decision to stop the sterilization of the SMP)?

# The Sovereign debt crisis: **Negative interest rates**

- Does the negative interest rate facilitate the circulation of liquidity and, therefore, contribute to **reduce fragmentation** between financial systems along national lines?
- It depends on how the return from investing in a peripheral country changes in response to the reduction in the deposit facility rate and on the (subjective) valuation of risk of investors in core countries.

*Suppose a German bank, at time  $t$  has excess reserves  $R$  and it can either buy a short-term Italian government bond with a return,  $r_{IT,t}$ , or deposit  $R$  in the deposit facility at a rate  $r_{DF,t}$ . If his risk valuation, is larger than the market risk premia  $r_{IT,t} - r_{DF,t}$*

$$VR_t > r_{IT,t} - r_{DF,t}$$

*the German bank will not invest in the Italian Government bond.*

# The Sovereign debt crisis: T-LTROs

- June 2014: “*In order to support bank lending to households and non-financial corporations, excluding loans to households for house purchase, we will be conducting a series of **targeted longer-term refinancing operations** (TLTROs)*”.
- March 2016: “*We decided to launch **a new series of four targeted longer-term refinancing operations** (TLTRO II), starting in June 2016, each with a maturity of four years.*”

# The Sovereign debt crisis: T-LTROs

## Characteristics

- **Conditionality:** subject to the expansion of lending (excluding loans for house purchase) in excess of a bank-specific benchmark.
- **Number of operations and maturity.**
  - **TLTRO-I:** 8 operations (every quarter) with maturity Sept. 2018;
  - **TLTRO-II:** 4 operations (every quarter) with maturity 4-year.
- **Interest rate.** Fixed for the duration of each operation.
  - **TLTRO-I:** MRO rate prevailing at the take-up + a spread of 10 bp (only for the first 2 operations).
  - **TLTRO-II:** MRO rate prevailing at the take-up. The rate can be reduced, depending on each counterparty's net lending, down to the rate applied on the Eurosystem's deposit facility.

# The Sovereign debt crisis: T-LTROs

## Characteristics

### ■ *Allotment*

- **TLTRO-I:** 7% of outstanding amount of loans as at 30 April 2014 (about €400 bn banking system in the euro area, €70 bn in Italy) + up to 3 times net lending in excess of the benchmark.
- **TLTRO-II:** up to 30% of outstanding loans as at 31 January 2016, (excluding any still outstanding amount borrowed under the first two TLTRO-I).

### ■ *“Punishment”*.

- **TLTRO-I:** banks whose increase in lending in the period between May 2014 and April 2016 does not exceed the benchmark have to repay the amounts borrowed early (in September 2016).
- **TLTRO-II:** Counterparties will not be subject to mandatory early repayments.

# The Sovereign debt crisis: T-LTROs

Objective: **Support lending** through several channels

- **Reduce the cost of funding and lending:**
  - **Direct effect on banks funding's costs:** by guaranteeing funds at an extremely **advantageous cost** and for an **extended period of time**, these operations enable banks to replace their most costly liabilities;
  - **Indirect effect on banks funding costs:** the **contraction in the supply** of bank bonds may determine a fall in their yields (scarcity effect).
  - **Indirect effect on funding costs of firms and households:** The reduction in banks' funding costs favours a reduction of banks' lending rates.

# The Sovereign debt crisis: T-LTROs

- **Increase credit supply:**
  - The certainty that funds will be available should **attenuate the potential negative impact** of an **increase in market volatility** on the **supply of credit** to the real economy.
  - Since the rate actually applied to the TLTRO-II series decreases as the volume of loans to the private sector increases, these operations provide an **incentive to expand lending**.
- **Indirect effect on a broader class of financial assets:** lower funding costs could be transmitted to a broader class of assets.

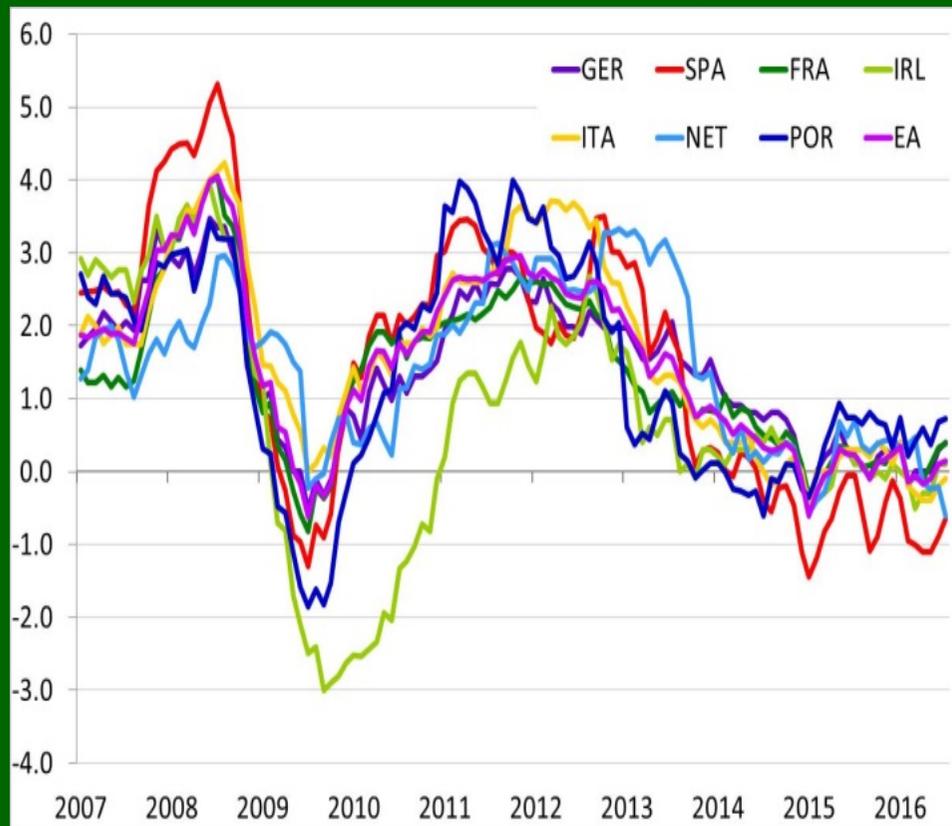
# The Risk of Deflation

- In the *second part of 2014*, growing awareness on
  - deviation of **inflation** from definition of price stability was more **persistent and generalized across countries and items** than in past downturns;
  - **fall in inflation** also determined by trends in **aggregate demand**
  - **high risk of de-anchoring inflation expectations**
  - **cost of deflation** or persistently low inflation may be **very high**.

# The Risk of Deflation

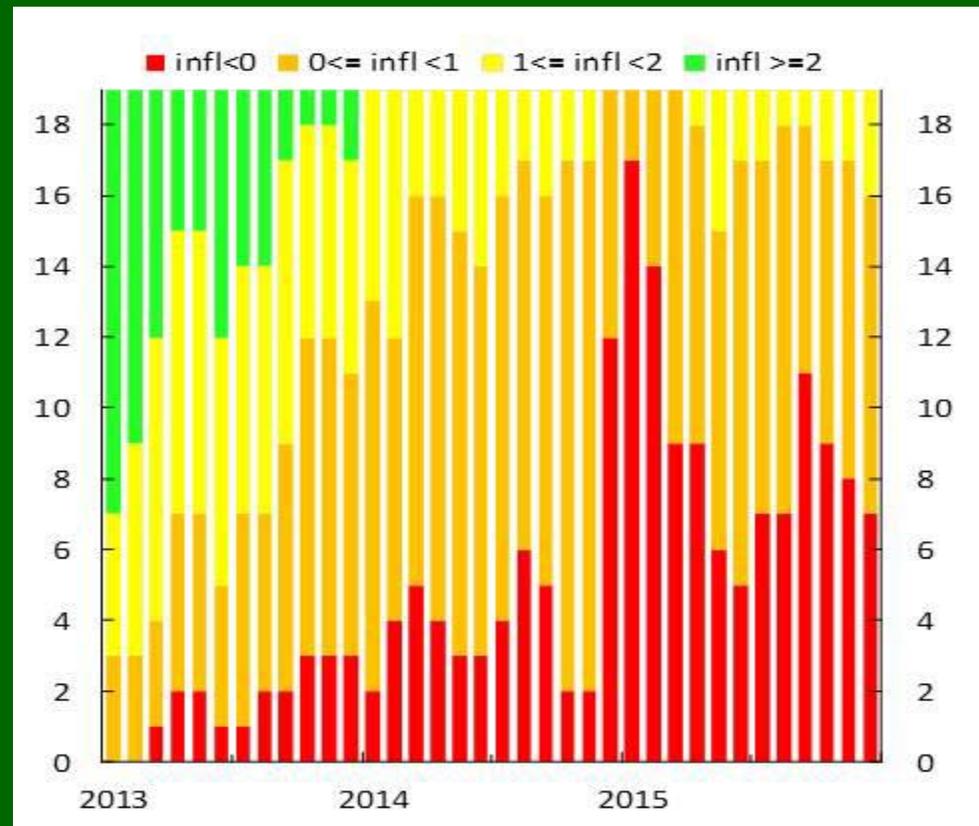
- **Fall in inflation** is generalized across countries

HICP inflation – euro area  
(annual percentage changes)



Source: Eurostat

Number of countries with annual HICP changes  
within given bounds

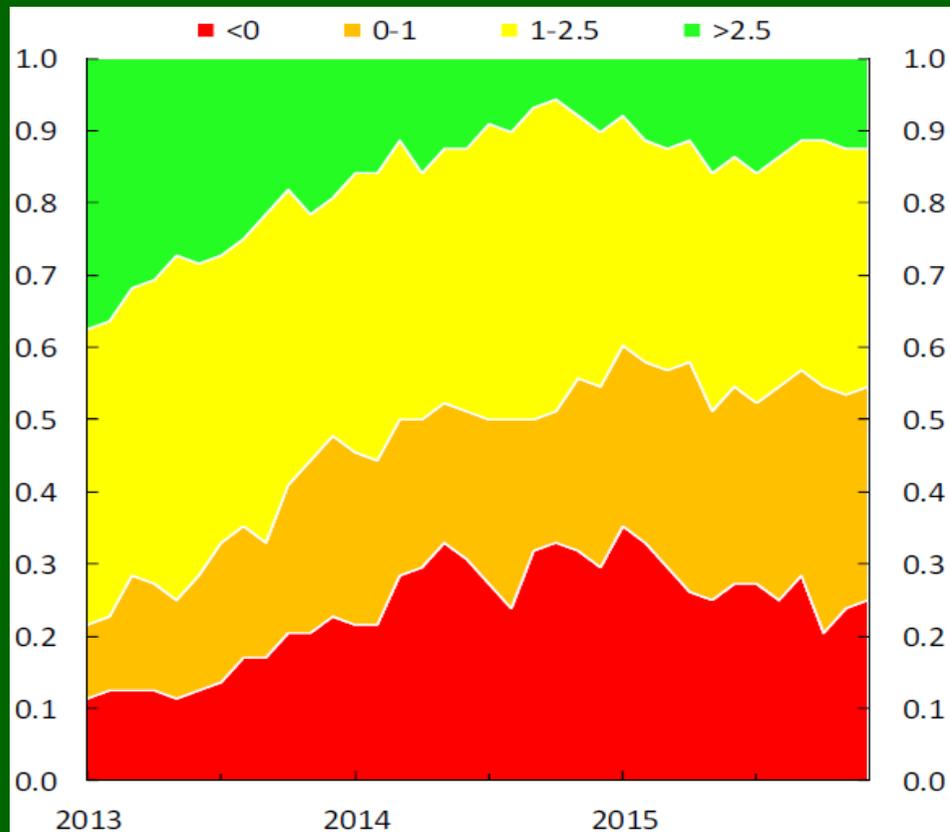


Source: Eurostat and Banca d'Italia calculations.

# The Risk of Deflation

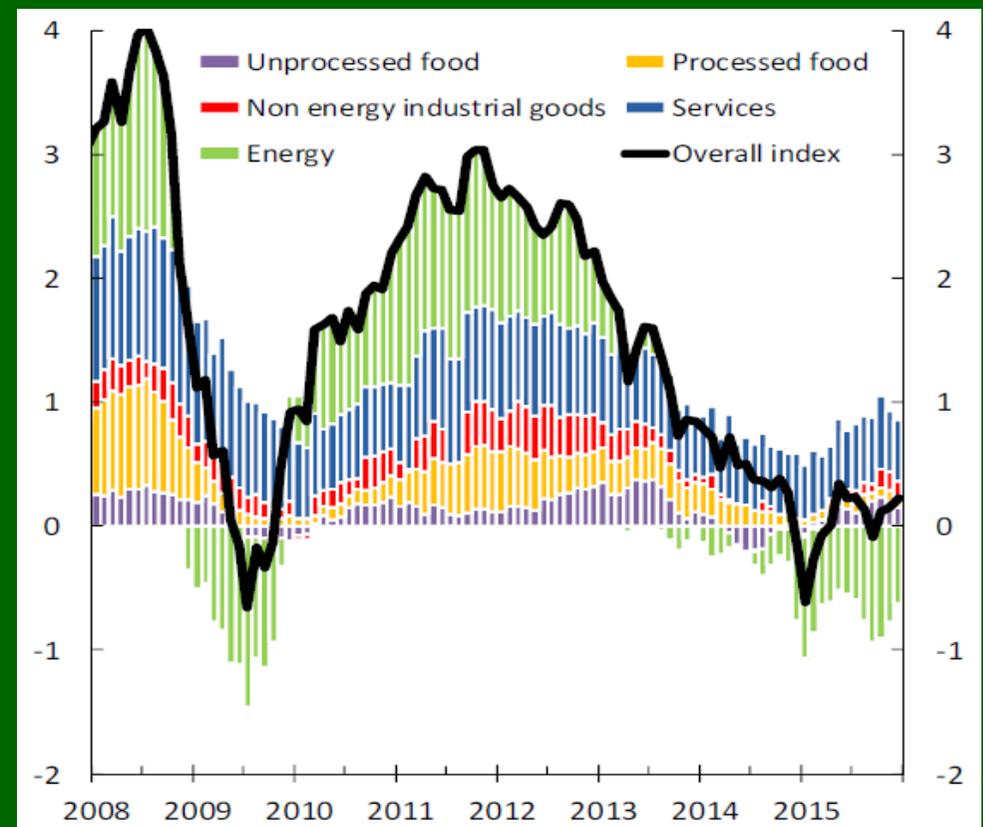
- ... and category of goods.

Share of items in HICP index within given bounds of annual percentage change



Source: European Commission

HICP inflation – euro area  
(annual percentage changes)

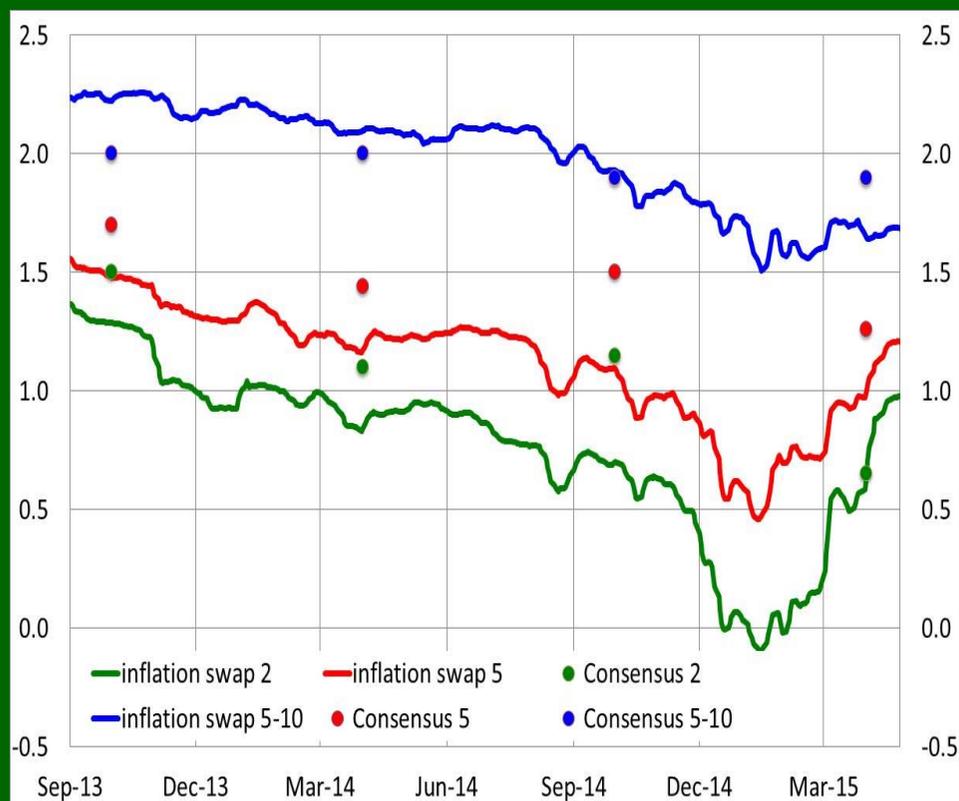


Source: Eurostat and Banca d'Italia calculations.

# The Risk of Deflation

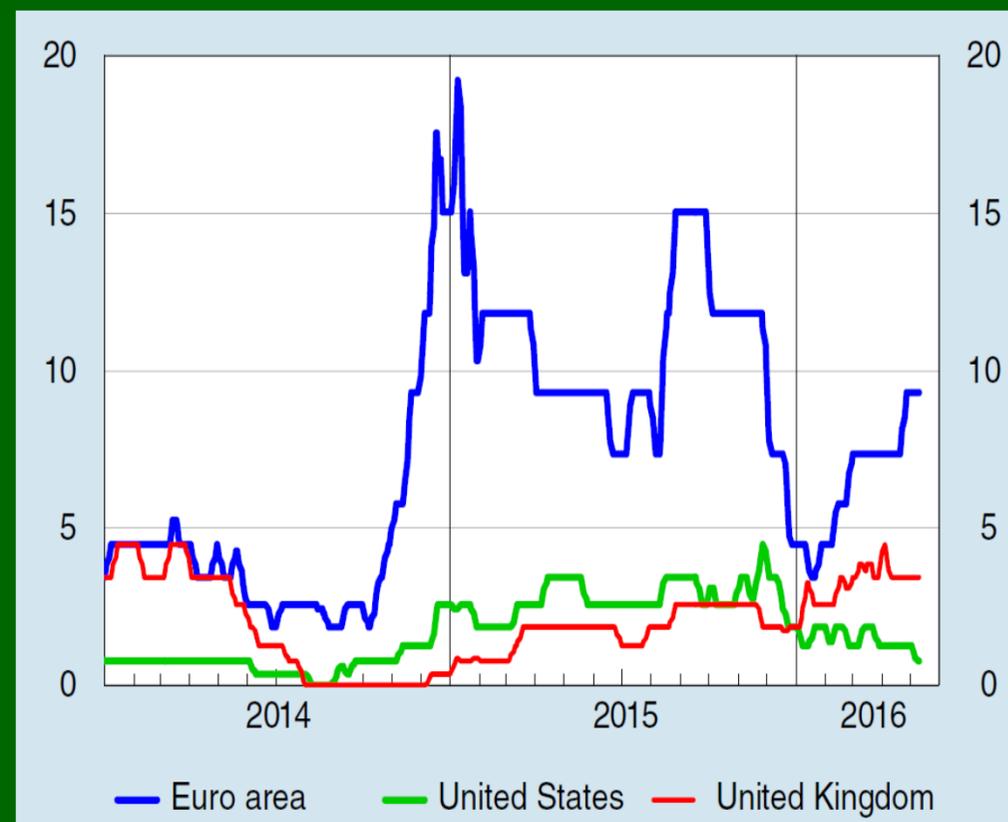
- In the last part of 2014 the pace of **decline** in market-based **expectations intensified** and **risk of de-anchoring** strongly **increased**

Inflation expectations in the euro area  
(Consensus survey and Inflation swaps)



Source: Bloomberg and Consensus Economics.

Co-movements of short and long-term inflation expectations



Source: Bloomberg and Consensus Economics.

# The Risk of Deflation: **APP**

- *November 2014: the Governing Council “has tasked ECB staff and the relevant Eurosystem committees with ensuring the **timely preparation of further measures** to be implemented if needed”*
- *December 2014: “... to further address risks of **too prolonged a period of low inflation**, the Governing Council remains unanimous in its commitment to using additional unconventional instruments within its mandate. This would imply **altering early next year the size, pace and composition of our measures**”.*
- *January 2015: In accordance with its mandate to maintain price stability, the Governing Council announced the **Expanded Asset Purchase Programme (APP)** which includes **ABSPP, CBPP3** and
  - **Public sector purchase programme (PSPP)**. Securities issued by euro-area central governments, certain public agencies in the euro area, and some European institutions.*

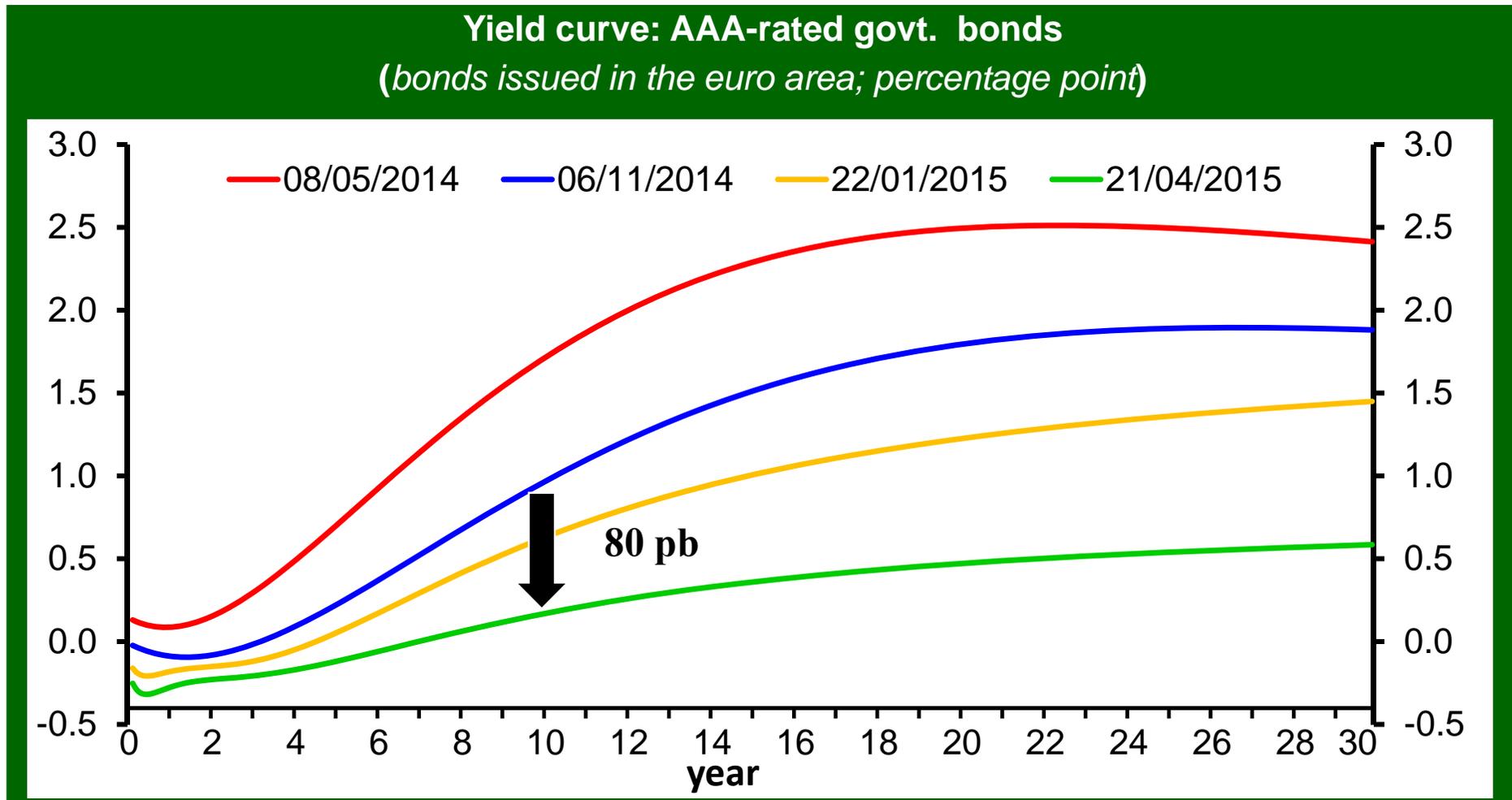
# The Risk of Deflation: APP

- Size: €60 billion per month.
- Duration: until Sept. 2016, and in any case **until a sustained adjustment in path of inflation towards objective** is achieved.
- Loss-sharing: **20% of purchases** will be subject to loss sharing
  - purchases of securities of European institutions (12%)
  - ECB's share (8%) of national central banks' (NCB) purchases
- Main channels:
  - **signalling channel**: lower expectations of future policy rates
  - **direct channel**: prices and yields of assets purchased; money market interest rates; inflation expectations and confidence
  - **portfolio balance channel**: exchange rate; cost and supply of bank loans

# The Risk of Deflation: APP

- Impact on financial markets: Long-term interest rates decreased,

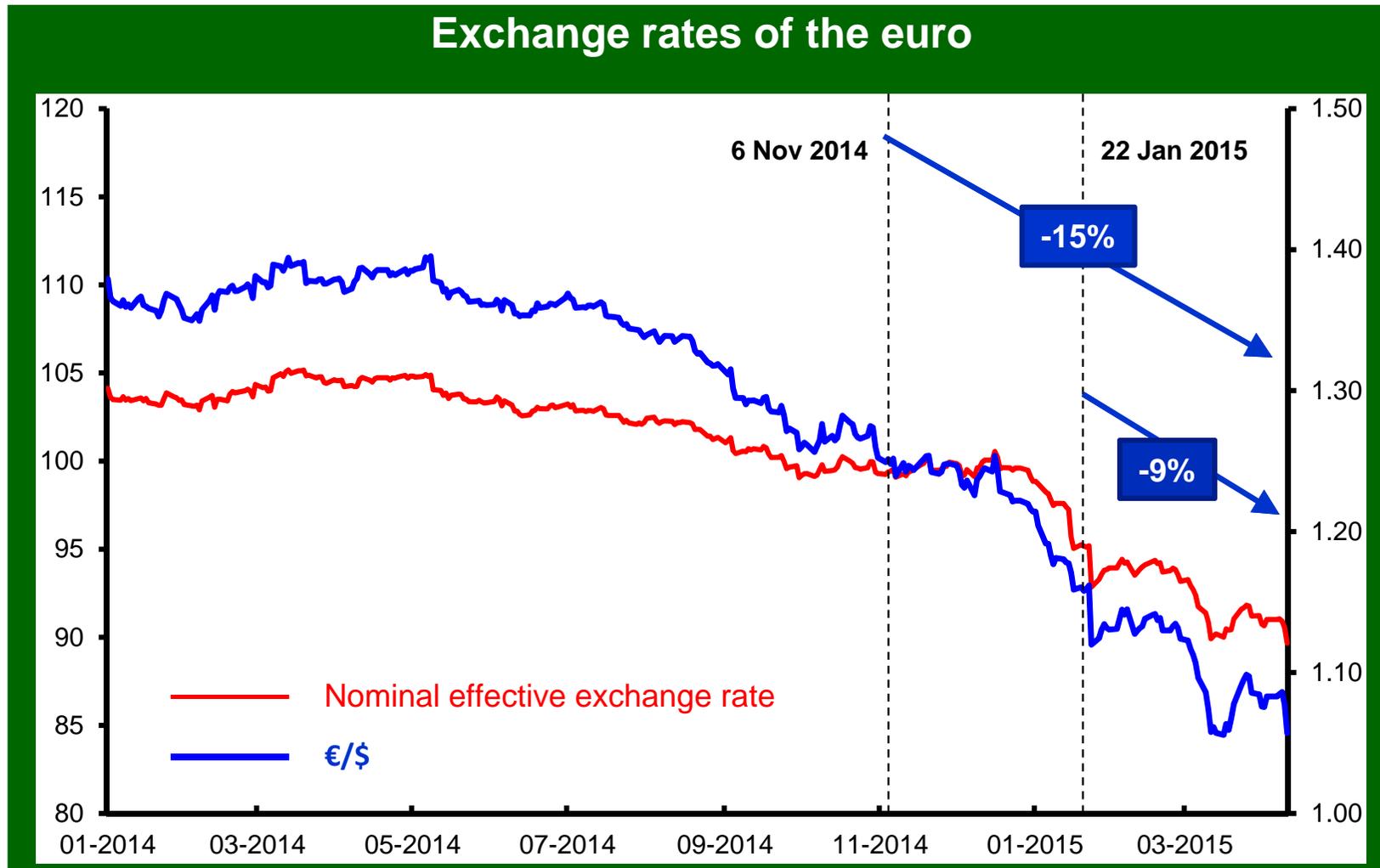
...



Source: Bloomberg and Consensus Economics.

# The Risk of Deflation: APP

- ... the exchange rate appreciated, ...

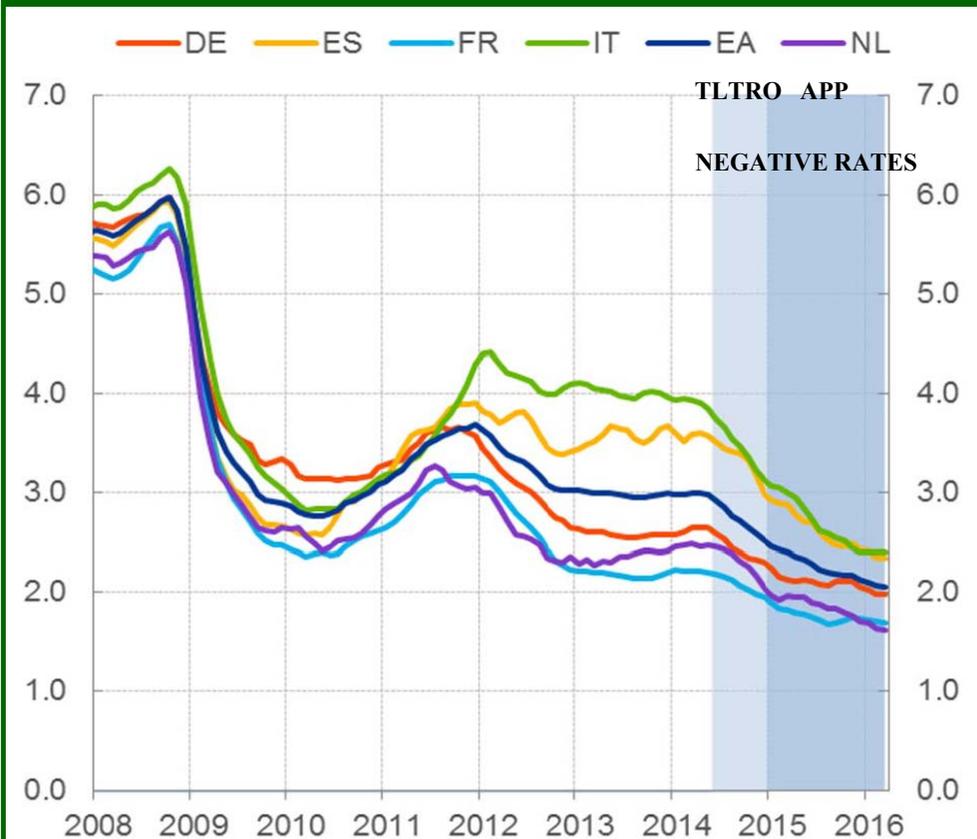


Source: ECB.

# The Risk of Deflation: APP

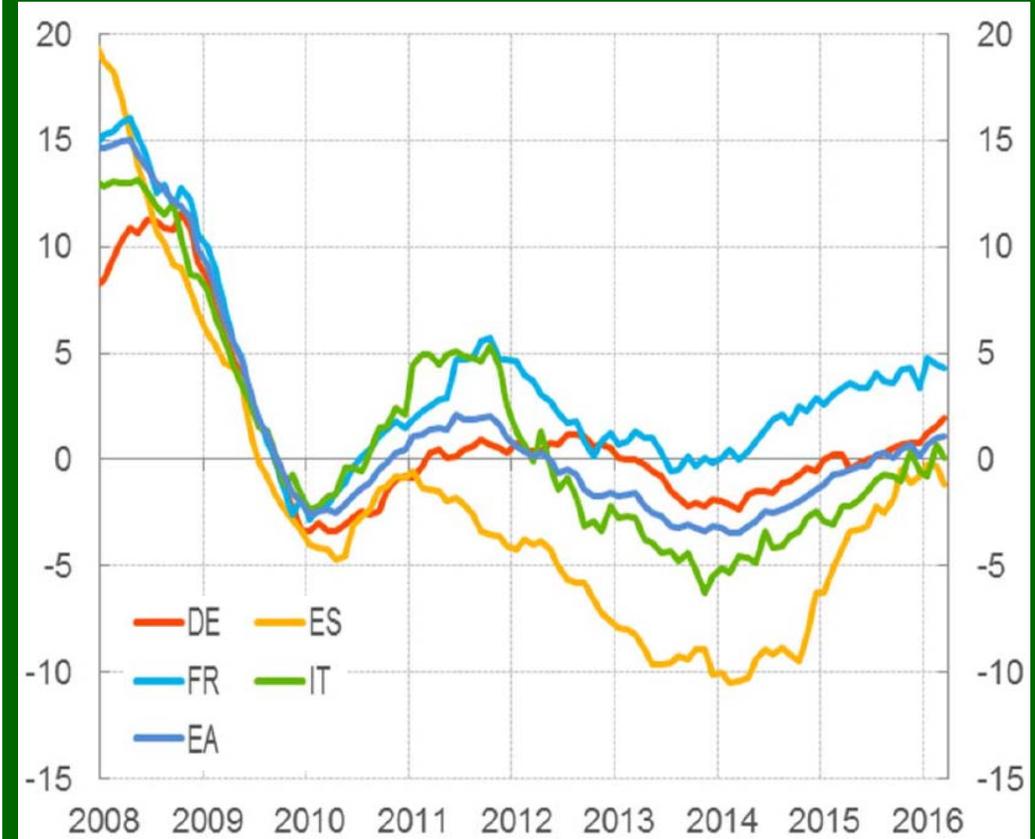
- Interest rates on new loans decreased, growth rates of new loans increased and heterogeneity across euro area countries reduced.

Composite indicator of cost of new loans to non-financial corporations (annual percentage)



Source: ECB.

MFI loans to non-financial corporations in selected euro area countries (annual percentage changes)



Source: ECB.

# The Recalibration: **stance in the time of APP**

- Since the introduction of the APP, **monetary policy stance** is determined by the **combination** and **mutual interaction** of
  - the asset purchase programme,
  - policy rates and
  - forward guidance on each of these tools.

# The Recalibration: **stance in the time of APP**

*March 2016: Comprehensive package of expansionary measures*

- Policy rates:

- interest rates on **MRO** and on **ML** reduced by 5 basis points (respectively to 0.0 per cent and 0.25 per cent) and
- interest rate on **DF** reduced by 10 basis points (to -0.40 per cent).

- APP

- by raising the amount of **monthly purchases** from €60 billion to **€80 billion** as of April 2016 and
- by **including** in the list of eligible assets **bonds issued by non-bank corporations** established in the euro area (**CSPP**).

- **T-LTRO**

- four **targeted longer-term** refinancing operations (TLTRO2).

# The Recalibration: **stance in the time of APP**

- *December 2016: APP*
  - **extended** to the **end of December 2017**, or beyond and in any case until it sees a sustained adjustment in the path of inflation consistent with its inflation aim, and
  - announced that **starting in April 2017** purchases are continued at **a monthly pace of €60 billion**.
- *June 2017: Forward guidance on policy rates*
  - **removal of easing bias on policy rates**: “*the key ECB interest rates to remain at present ~~or lower~~ levels for an extended period of time*”

# The Recalibration: **stance in the time of APP**

- *October 2017: APP*
  - **extended** until the **end of September 2018**, and in any case until the Governing Council “*sees a sustained adjustment in the path of inflation consistent with its inflation aim*”.
  - **from January 2018 net asset purchases reduced at a monthly pace of €30 billion.**

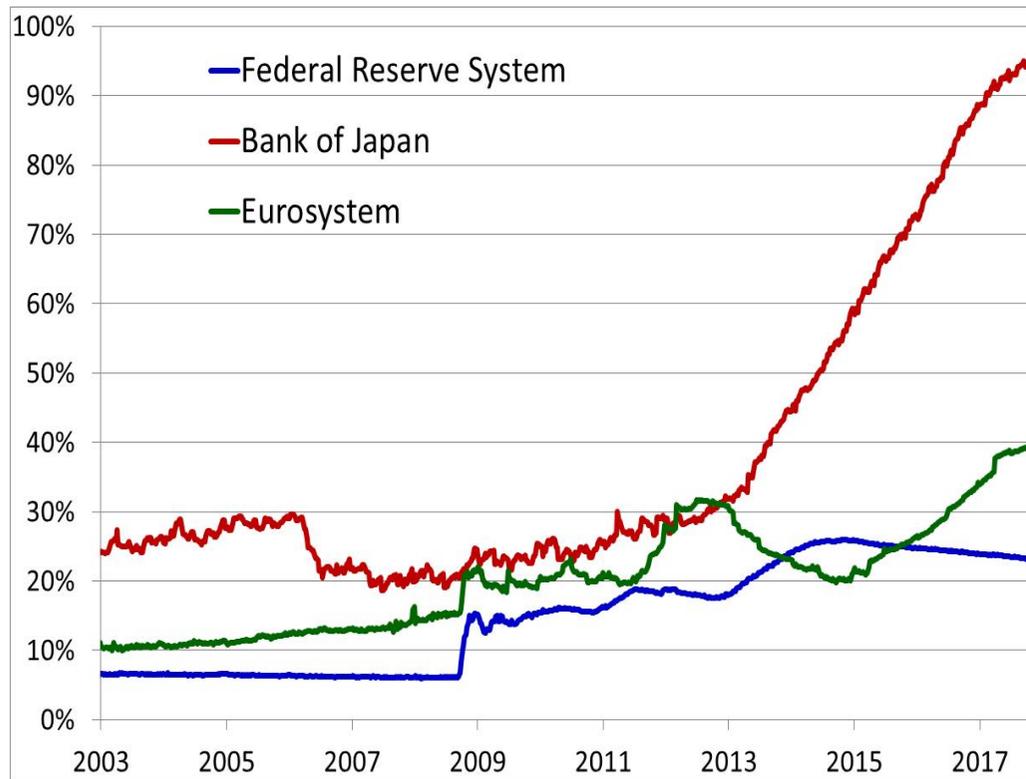
# The Recalibration: **stance in the time of APP**

- *March 2018: Forward guidance on APP*
  - *removal of easing bias on APP purchases: “Regarding non-standard monetary policy measures, we confirm that our net asset purchases, at the new monthly pace of €30 billion, are intended to run until the end of September 2018, or beyond, if necessary, and in any case until the Governing Council sees a sustained adjustment in the path of inflation consistent with its inflation aim. ~~If the outlook becomes less favourable, or if financial conditions become inconsistent with further progress towards a sustained adjustment in the path of inflation, we stand ready to increase the asset purchase programme (APP) in terms of size and/or duration.”~~”*

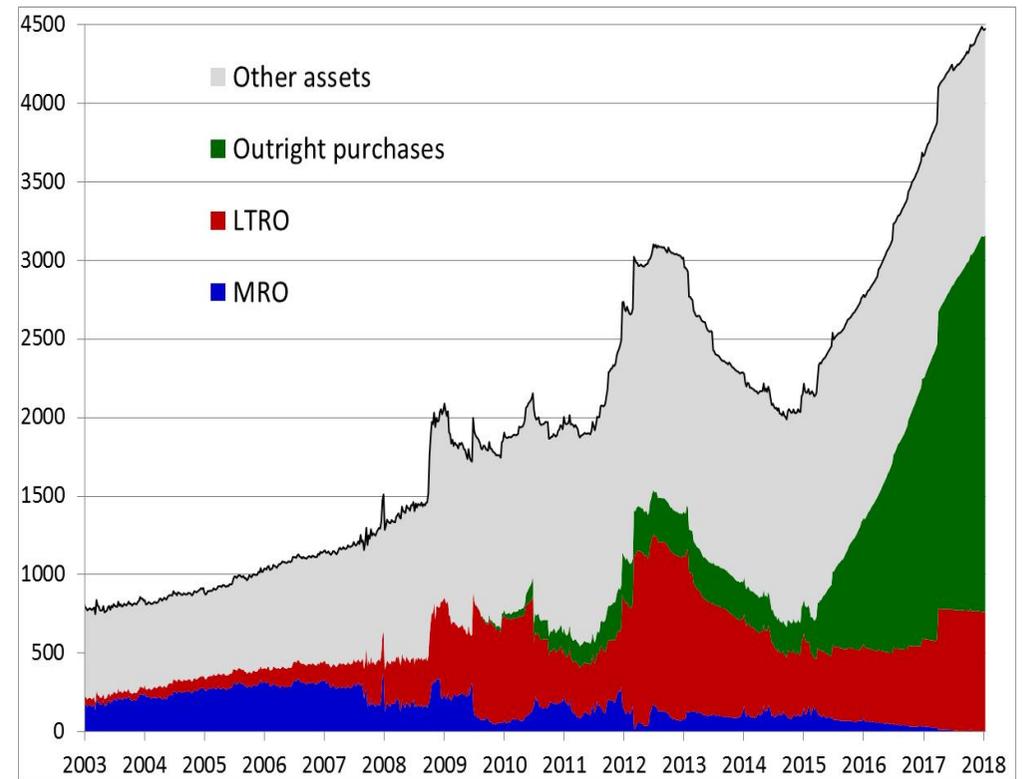
# Some thoughts on the new normal

## 1. Unconventional measures had large impact on size & composition of central bank balance sheets ...

Size of Central Bank Balance sheets - Total assets / GDP (%)



Composition of Eurosystem Balance sheet - Assets (€ bln)

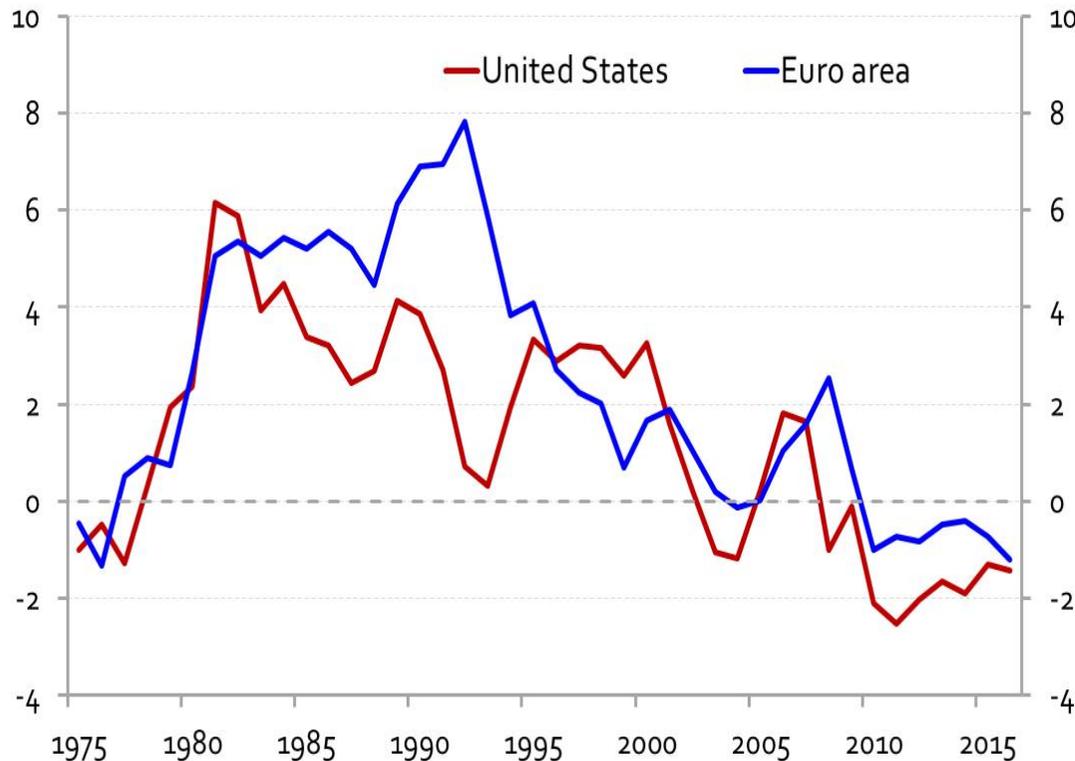


- US: from 10% to 25% of GDP
- Euro area: .from 12% to 40% of GDP
- Japan: .from 25% to 95% of GDP

# Some thoughts on the new normal

... returning to a pre-crisis size may contrast with need to face **structural factors** that put **downward pressure on interest rates**

Estimates of the natural rate of interest  
(percentage points)



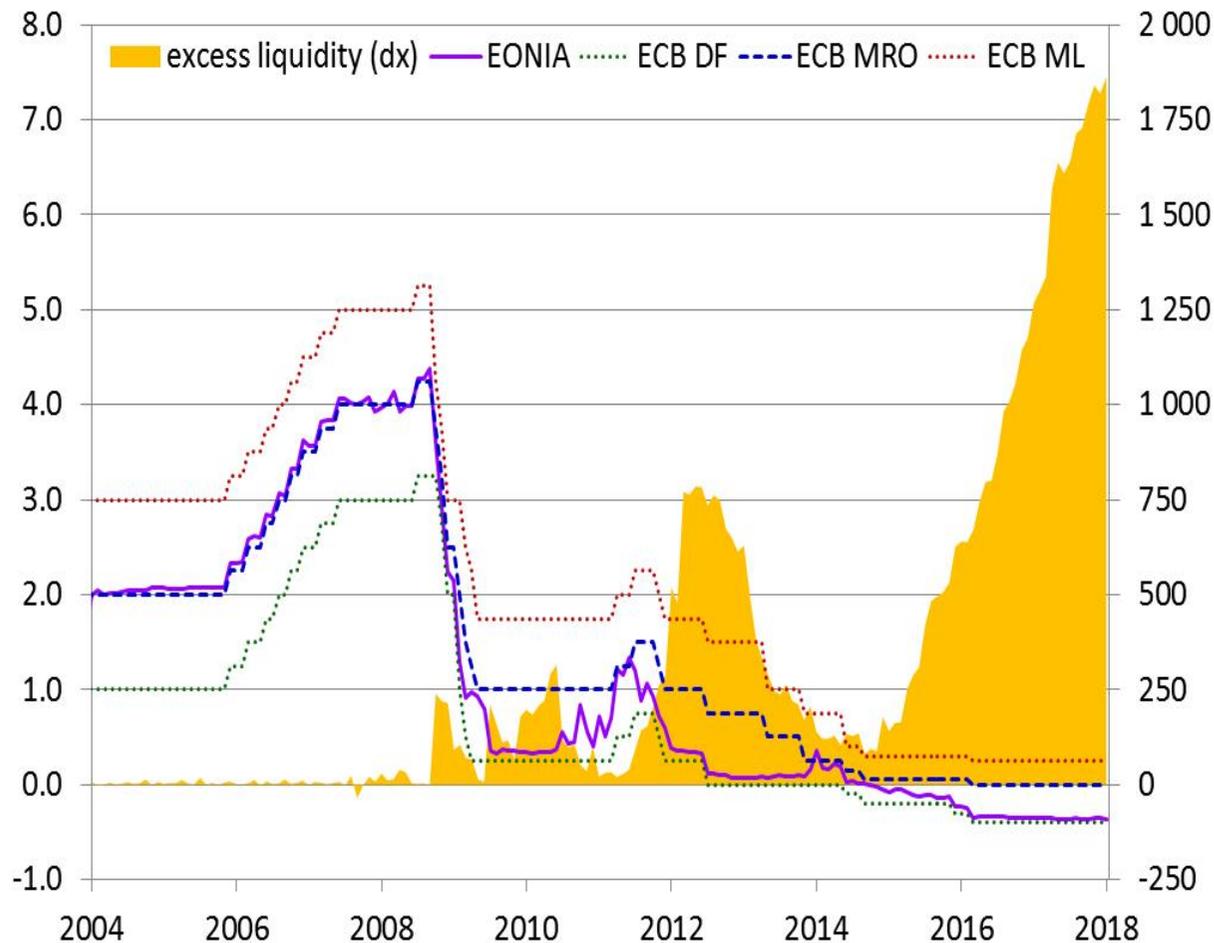
■ Source: Gerali and Neri (2017)

- Estimates of the **natural rate of interest** for the euro area and US (see for example Gerali and Neri, 2017) suggest a **trend decrease** since the 1980s and point towards negative values in recent years.
- If the **natural rate of interest** were to stay around zero, even if inflation returns to levels consistent with the definition of price stability, the ECB main policy rate should be around 2 percent in steady state (i.e., when the output gap is 0), which **may not give enough leeway to cut policy rates** in response to future recession.
- In that environment **asset purchases** may become one of the main ways to provide **monetary policy accommodation**.
- In that case, going back to the previous size of the balance sheet might not even be possible.

# Some thoughts on the new normal

2. In a corridor system the level of EONIA depends on the amount of **excess liquidity** ...

Reserves in excess to reserve requirement (€ bln), official interest rates and EONIA (%)

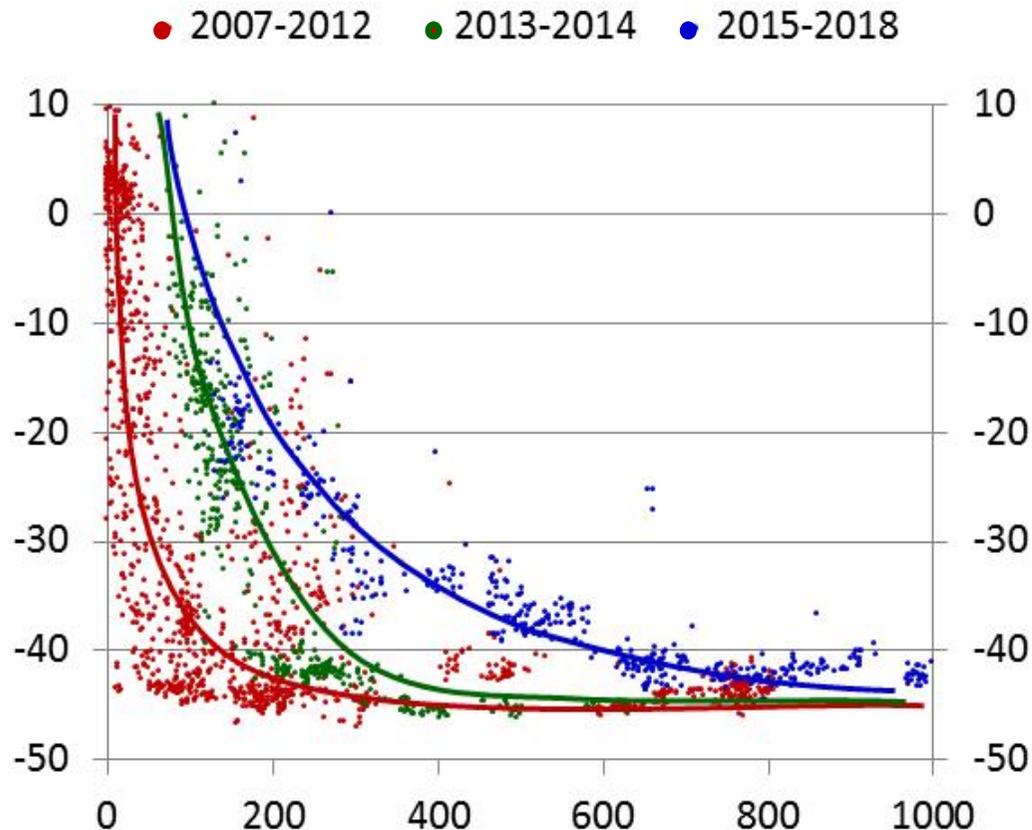


- Before the financial crises: The ECB maintained the system in **liquidity deficit** (reserves < reserve requirement) and through OMOs provided the amount of reserves necessary to close the deficit. As a consequence the short-term interbank interest rate (**EONIA**) was very close to the interest rate at which the central bank provided reserves in OMOs and remunerated reserves held by banks in order to satisfy the reserve requirement (**MRO rate**).
- During the financial crises: The ECB unconventional measures increased the amount of reserves above the reserve requirement (**excess liquidity**). As a consequence the **EONIA** declined towards the interest rate at which the central bank remunerates excess liquidity (**Deposit facility rate**).

# Some thoughts on the new normal

... returning to pre-crisis size may imply a phase of **large volatility** and sudden increase of EONIA

Normalised spread of EONIA to the MRO rate and excess liquidity (percentage points; € bn)

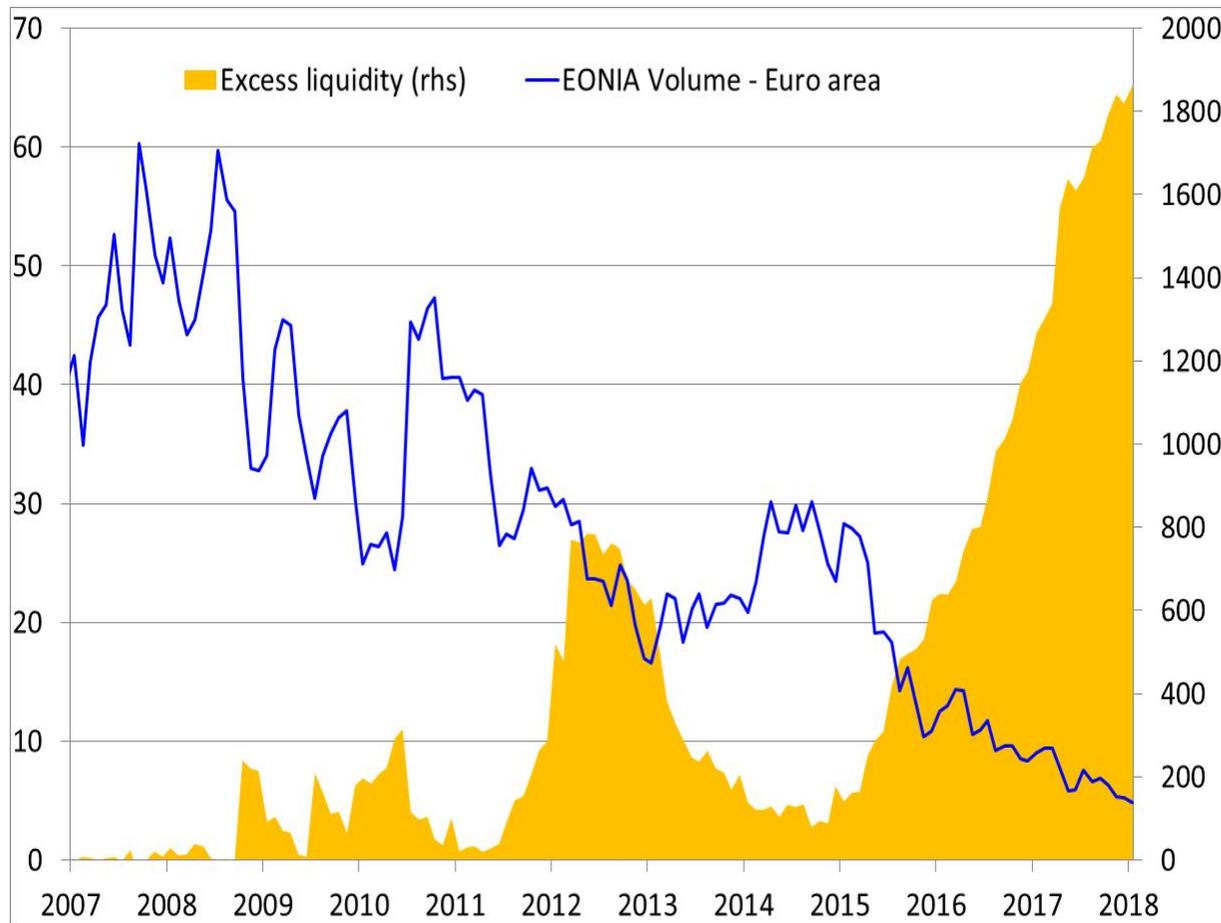


- For **large** amount of excess liquidity, EONIA converges to the **deposit facility rate**.
- For **small** amount of excess liquidity, EONIA is highly **volatile**
- Different factors affect the **shape of the curve** (which describes the relation between EONIA and excess liquidity) and the **threshold**:
  - **market conditions** (counterparty risk, liquidity risk, market fragmentation) and
  - **regulation**

# Some thoughts on the new normal

3. A **large balance sheet** and a large amount of **excess liquidity** reduce incentive to trade & monitoring between banks ...

Monthly average of daily volume exchanged in the interbank market and excess liquidity (€ bns)



- Issues related to **low utilisation** of the interbank market:
  - **increased exposure** of central bank to banks
  - **reduced incentives** for banks to **monitor** each other (when banks provide unsecured lending to each other, they have incentive to monitor).

# Some thoughts on the new normal

... but **increase** the **effectiveness** of monetary policy in controlling as precisely as possible the EONIA.

Excess liquidity (€ bln) and EONIA (percentage points) before the financial crisis (LHS) and during APP (RHS)

