Erasmus
School of
Economics

ECB policy and the IS-MP-AS model

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Outline

- Building blocks IS-MP-AS model
- The monetary policy rule: a good characterization of monetary policy?
- Can the model help us:
  - to understand recent ECB policy?
  - to understand asymmetric shocks and fragmentation risk?

- 4 cases:
  - standard analysis
  - supply shocks
  - asymmetric shocks within EMU
  - fragmentation risk

IS-MP-AS (1)

- IS-curve: $y = \alpha_0 - \alpha_1 r$
- Aggregate supply
  - LRAS: $y = y_N$
  - SRAS (or PC): $\pi = \pi^e + \beta (y - y_N) + \varepsilon$

  - Expected inflation π^e causes workers to demand higher wages, which increases prices of goods and services and, thus, actual inflation.
  - Positive output gap $(y - y_N)$ causes firms to raise prices to benefit from good economic conditions. This will lead to higher inflation.
  - Temporary supply shocks ε

IS-MP-AS (2)

- MP rule incorporates the Taylor principle: real interest rates have to rise in order to reduce inflation. Exam program: "the real rate increases (decreases) when inflation increases (decreases)":

$$r = \gamma \pi_{-1} + \delta \qquad \text{or}$$
$$\Delta r = \gamma \Delta \pi_{-1}$$

- Issues with the interest rate:
  - expected vs realized rates
  - nominal vs real rates
  - long-term vs short-term rates
  - risk-free vs rates including risk premia
  - for now: $r = i - \pi^e$ (expected real rate)

IS-MP-AS (3)

- Issues with MP-rule
  - $\Delta r = \gamma \Delta \pi_{-1}$ => implies no tightening if inflation is high yet stable

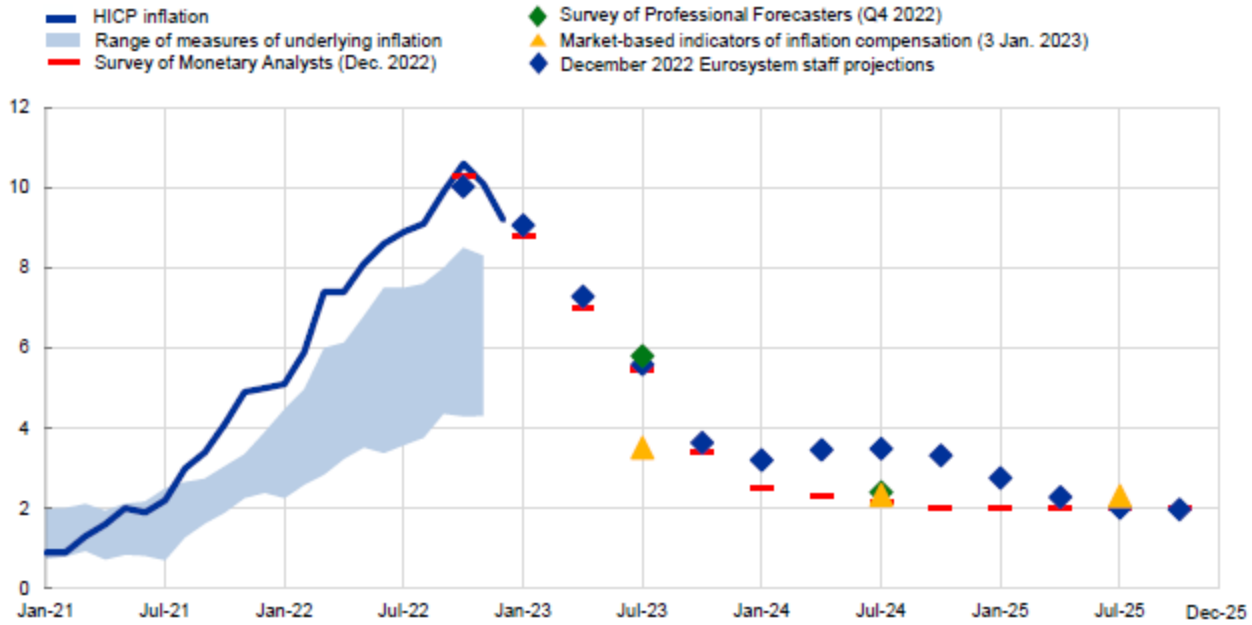
- Better to build in an inflation target (π_T)
  - $\Delta r = \gamma (\pi_{-1} - \pi_T)$

- Even more realistic to take into account inflation expectations
  - $\Delta r = \gamma (\pi^e - \pi_T)$

- Full Taylor rule would also include output gap

Headline inflation, measures of underlying inflation, and inflation projections and expectations

(annual percentage changes)



Sources: Eurostat and ECB calculations.
The latest observations are December 2022 (flash) for HICP and November 2022 for the range of measures of underlying inflation. The latest observations for market-based indicators of inflation compensation are for 3 January 2023. The SPF data show expected annual percentage changes for the year 2022, 2023 and 2024. The Survey of Monetary Analysts and the September 2022 ECB staff projections show quarterly forecasts. The cut-off date for data included in the Eurosystem staff macroeconomic projections was 30 November.

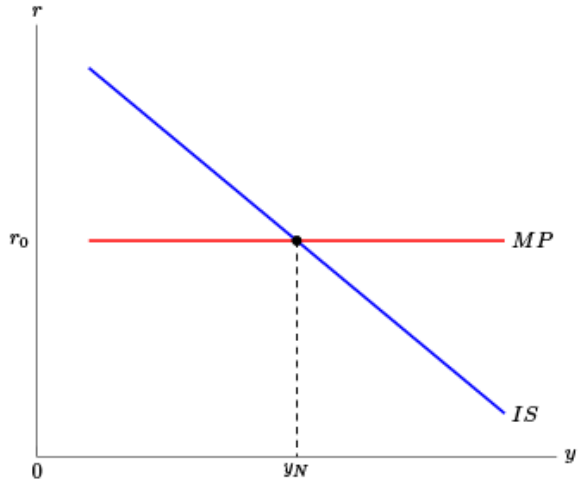
Case 1: Standard analysis

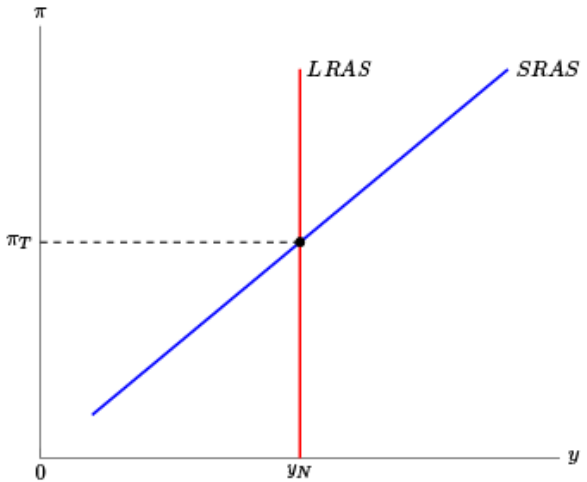
Starting position

- $y = \alpha_0 - \alpha_1 r$
- $\pi = \pi^e + \beta (y - y_N) + \varepsilon$
- $\Delta r = \gamma (\pi_{-1} - \pi_T)$

Equilibrium:

- y is at y_N
- $\varepsilon = 0$
- $\pi = \pi^e = \pi_{-1} = \pi_T$
- anchored inflation expectations
- r is stable at r_0

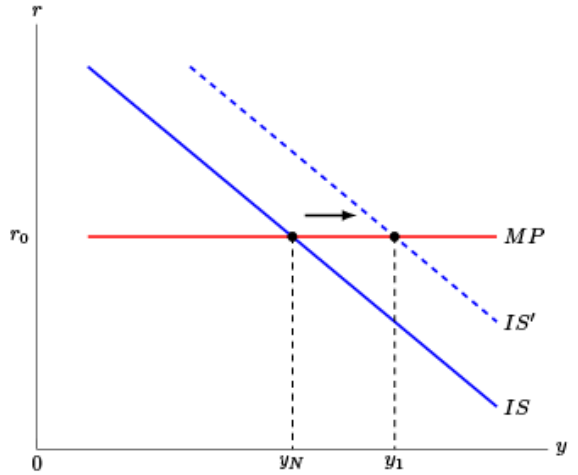


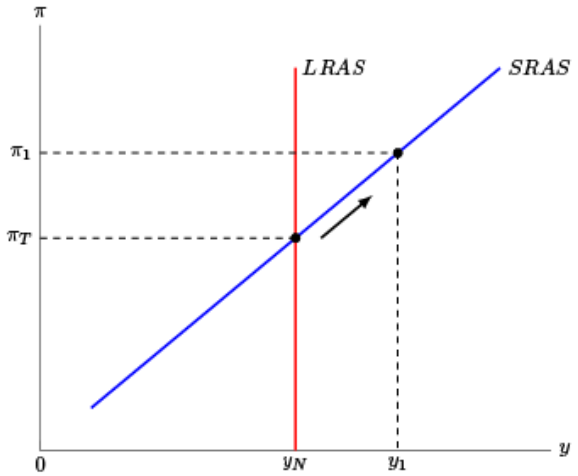


Fiscal expansion

- shift of *IS*-curve to *IS'*
- output increases to y_1
- inflation increases along the *SRAS*-curve to π_1

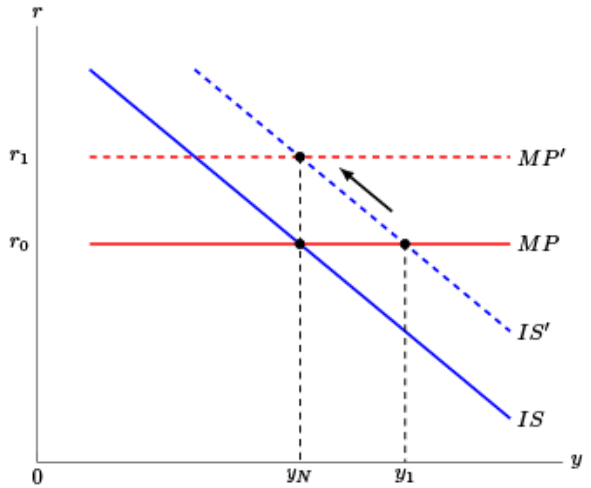
- what if central bank keeps real rate at r_0 ?

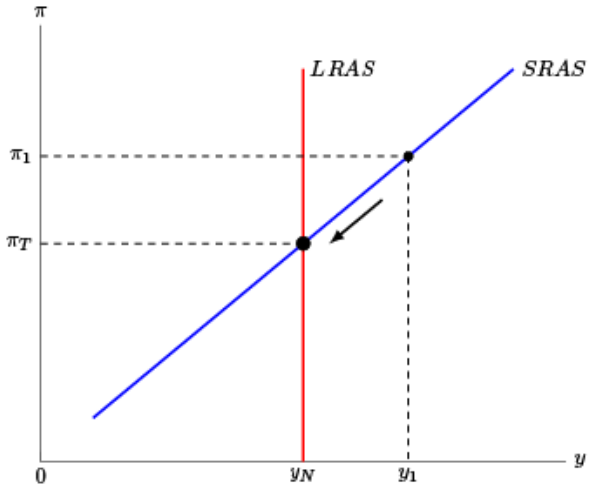




Monetary tightening

- inflation expectations remain anchored ($\pi^e = \pi_T$)
- central bank increases real rate from r_0 to r_1
- y moves back to increases to y_N
- π moves back to increases to π_T



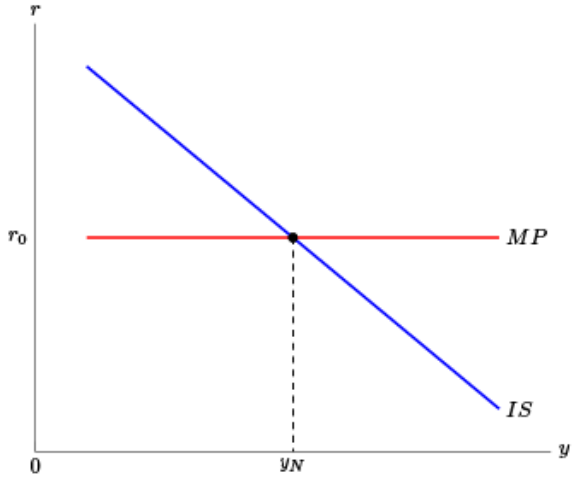


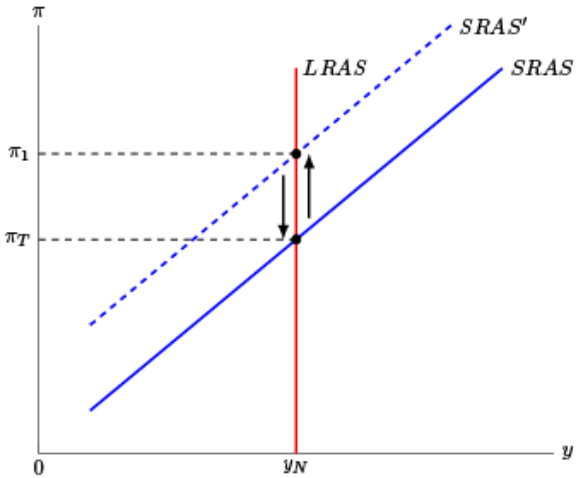
Case 2: Supply shocks

Team transitory

- supply shocks are transitory (ε)
- inflation expectations remain anchored ($\pi^e = \pi_T$)
- inflation will increase temporarily to π_1 but fall back to by π_T all by itself

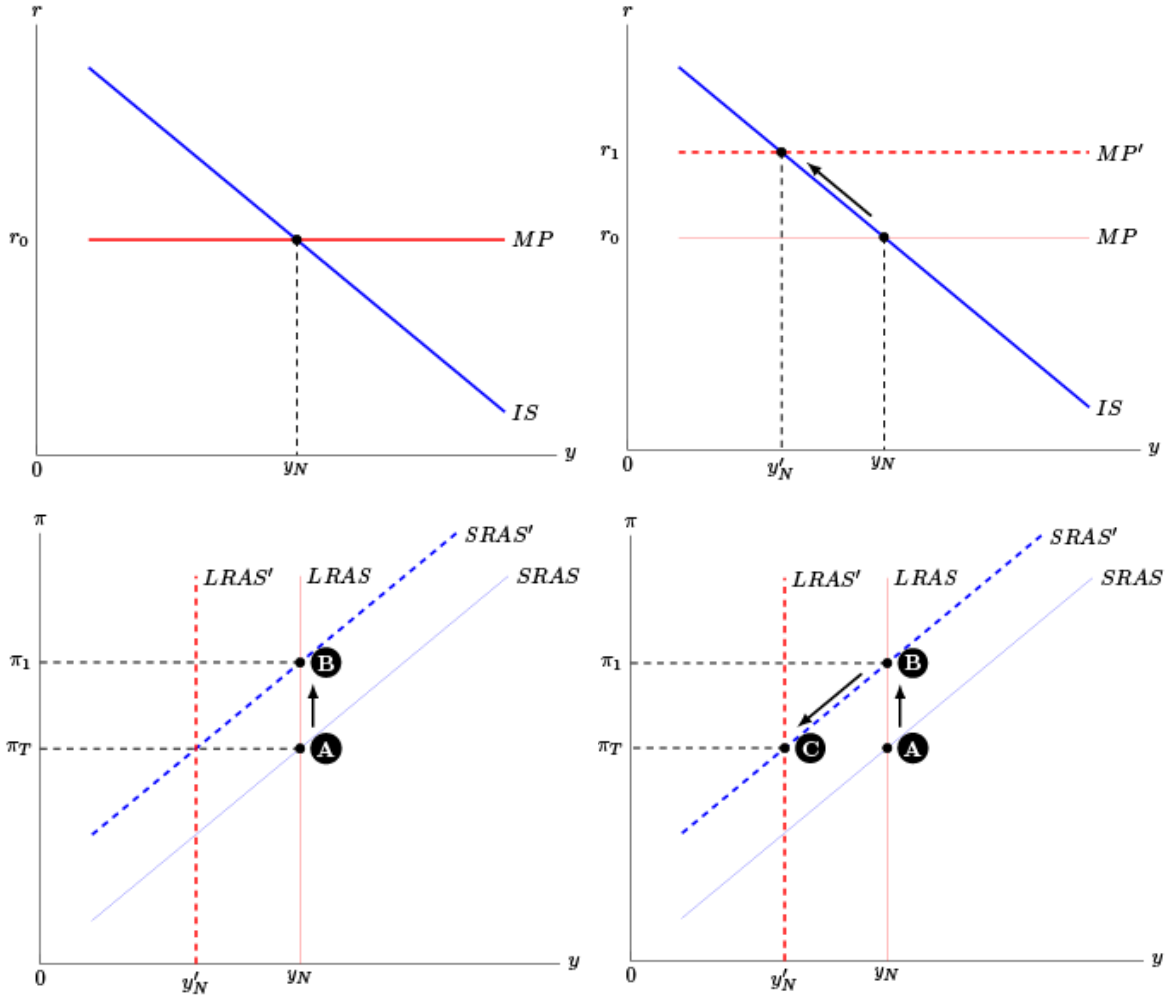
- central bank does <u>not</u> need to increase the real rate





Team permanent (1)

- permanent supply shock (A to B)
- inflation expectations remain anchored ($\pi^e = \pi_T$)
- inflation will <u>not</u> decrease by itself
- central bank acts to lower π_1 before de-anchoring (B to C)

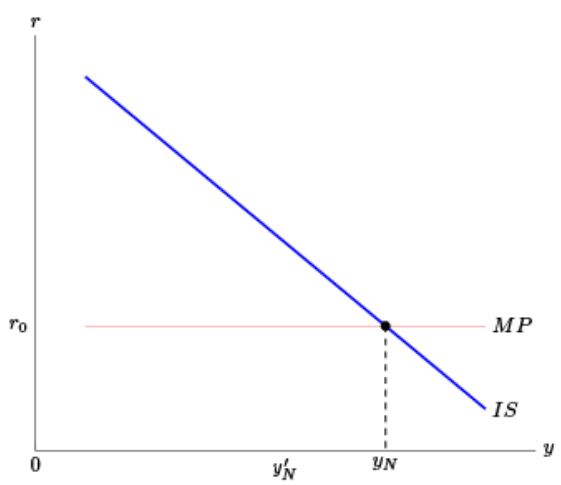


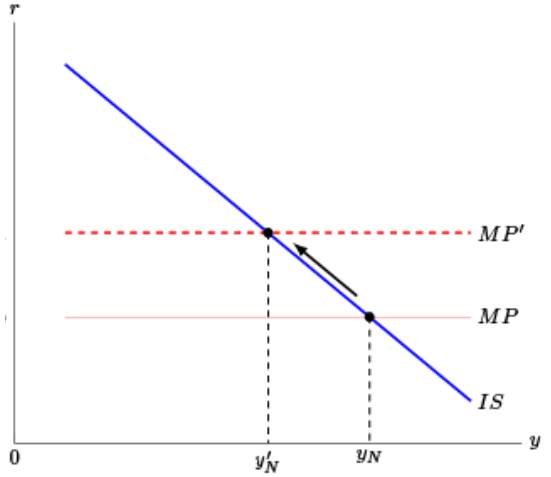
Team permanent (2)

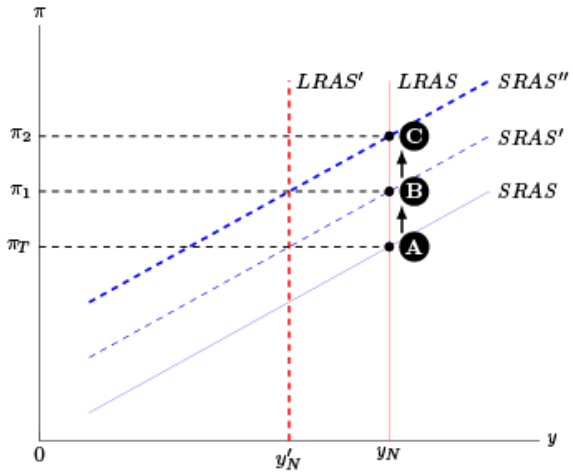
- permanent supply shock (A to B)
- inflation expectations de-anchor (B to C)
- central bank acts to lower π using the rule:

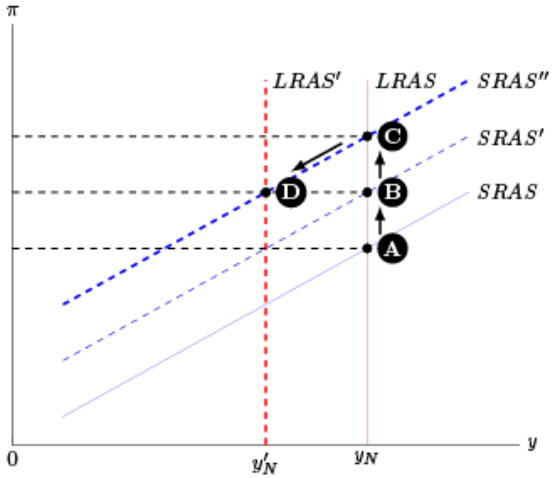
$$\Delta r = \gamma \Delta \pi_{-1}$$

- inflation stabilizes when $y=y'_N$ at π_1 (C to D)







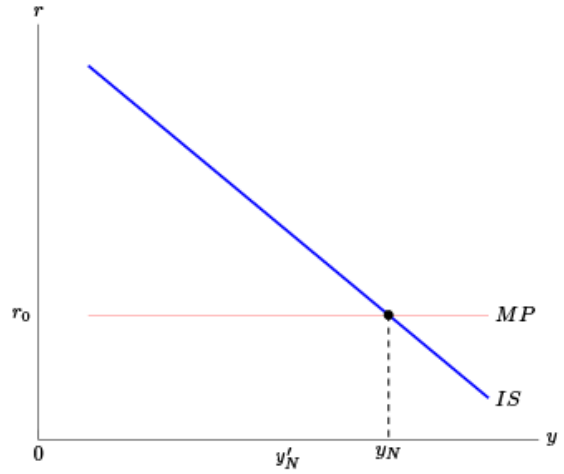


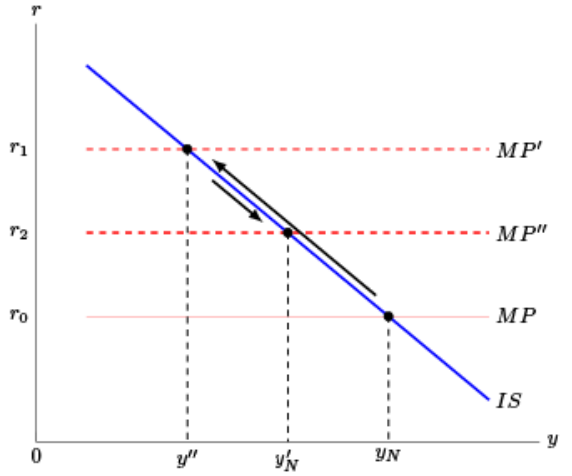
Team permanent (3)

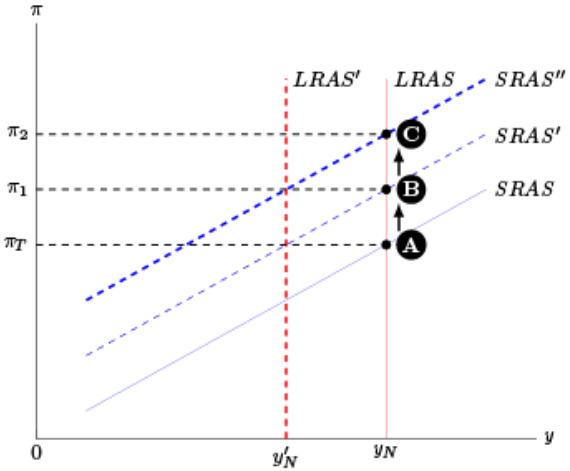
- permanent supply shock (A to B)
- inflation expectations de-anchor (B to C)
- central bank acts to lower π using the rule:

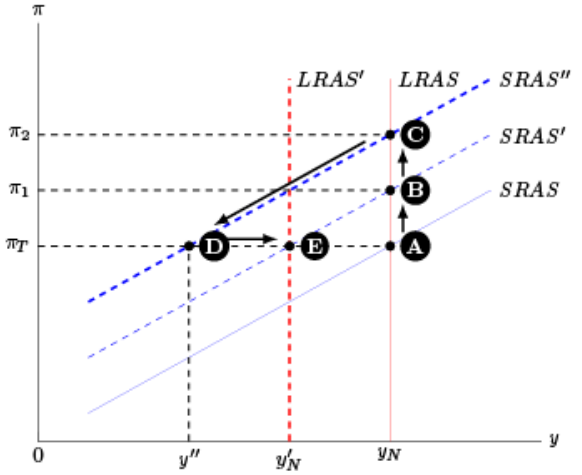
$$\Delta r = \gamma(\pi_{-1} - \pi_T)$$

- central bank creates recession to lower π^e (C to D)
- Inflation stabilizes when $y=y'_N$ at π_T (D to E)









Case 3: Asymmetric regional shocks within EMU

Macro-analysis of country within EMU

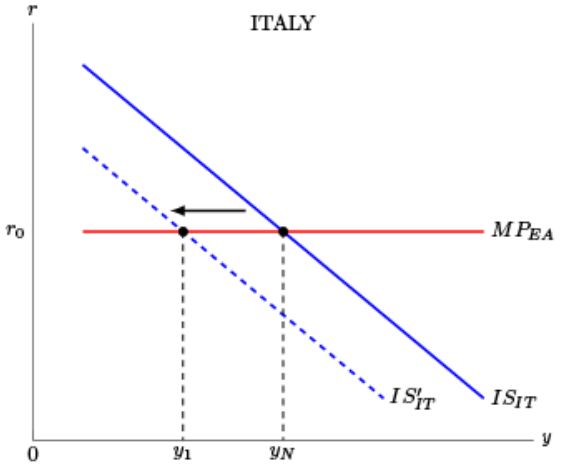
- Monetary policy is set at the level of the union
- Asymmetric regional *IS*- and *AS*-shocks can still occur, but monetary policy cannot react to these

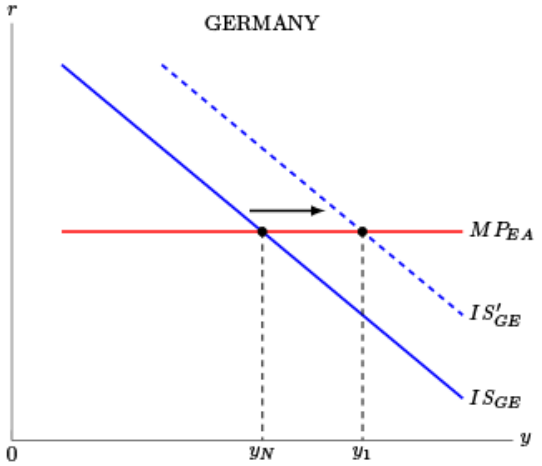
- $r = i - \pi^e$
  - i set by ECB
  - π^e: may differ across countries, unless anchored to ECB inflation target

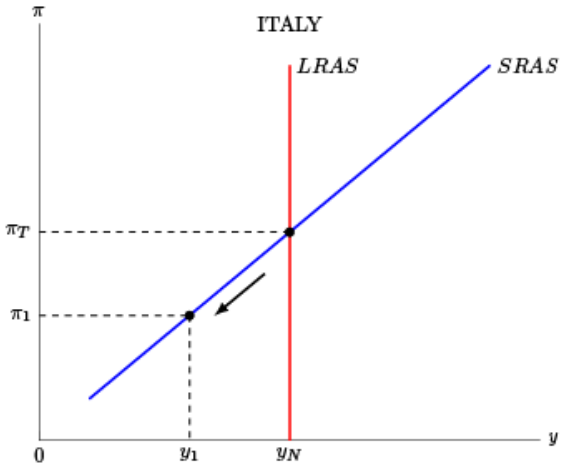
- regional de-anchoring of π^e may destabilize the monetary union ("Walters critique")

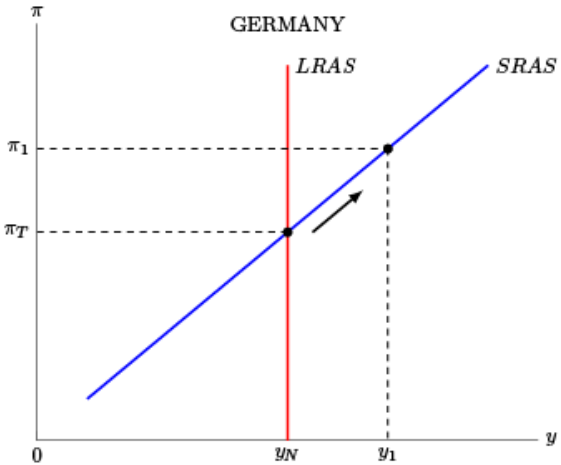
Boom & bust (1)

- positive demand shock in Germany; negative demand shock in Italy
- inflation & output increase in Germany and decrease in Italy
- at EA level: $\pi^e = \pi_T = \pi_{-1}$
  $\Delta r_{EA} = \gamma(\pi_{-1} - \pi_T) = 0$
  no ECB response, $\Delta i_{EA}=0$







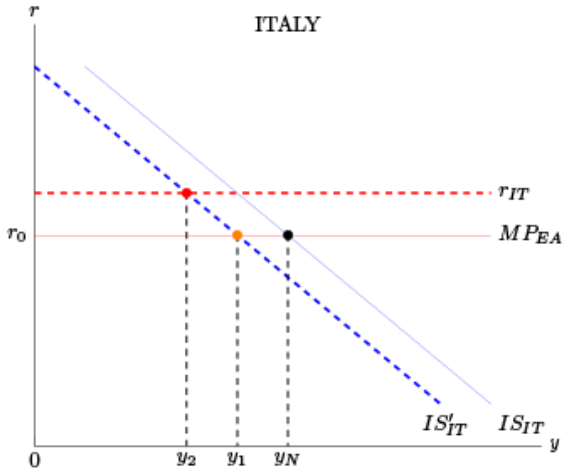


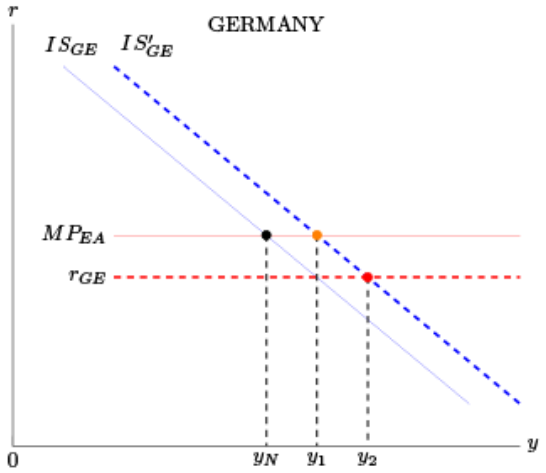
Boom & bust (2)

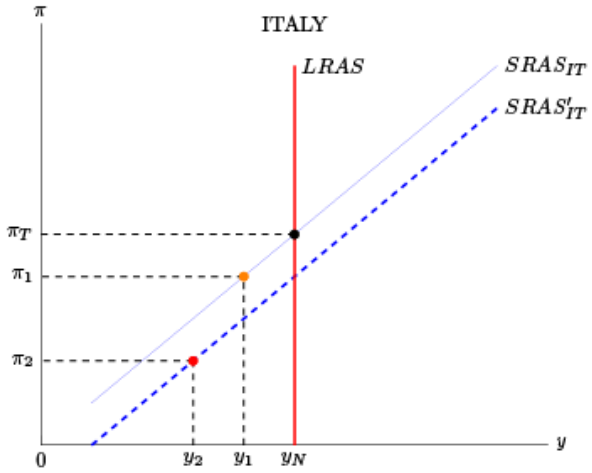
- risk when regional inflation expectations de-anchor:

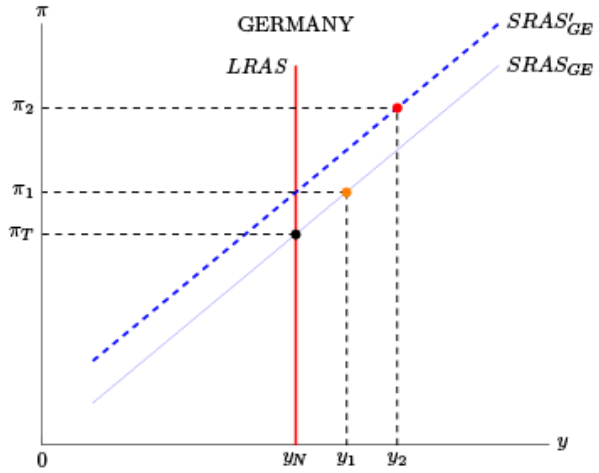
- deflation spiral in Italy
  $r_{IT} = i_{EA} - \pi^e_{IT}$
  $\Delta r_{IT} = - \Delta\pi^e_{IT}$

- inflation spiral in Germany
  $r_{GE} = i_{EA} - \pi^e_{GE}$
  $\Delta r_{GE} = - \Delta\pi^e_{GE}$

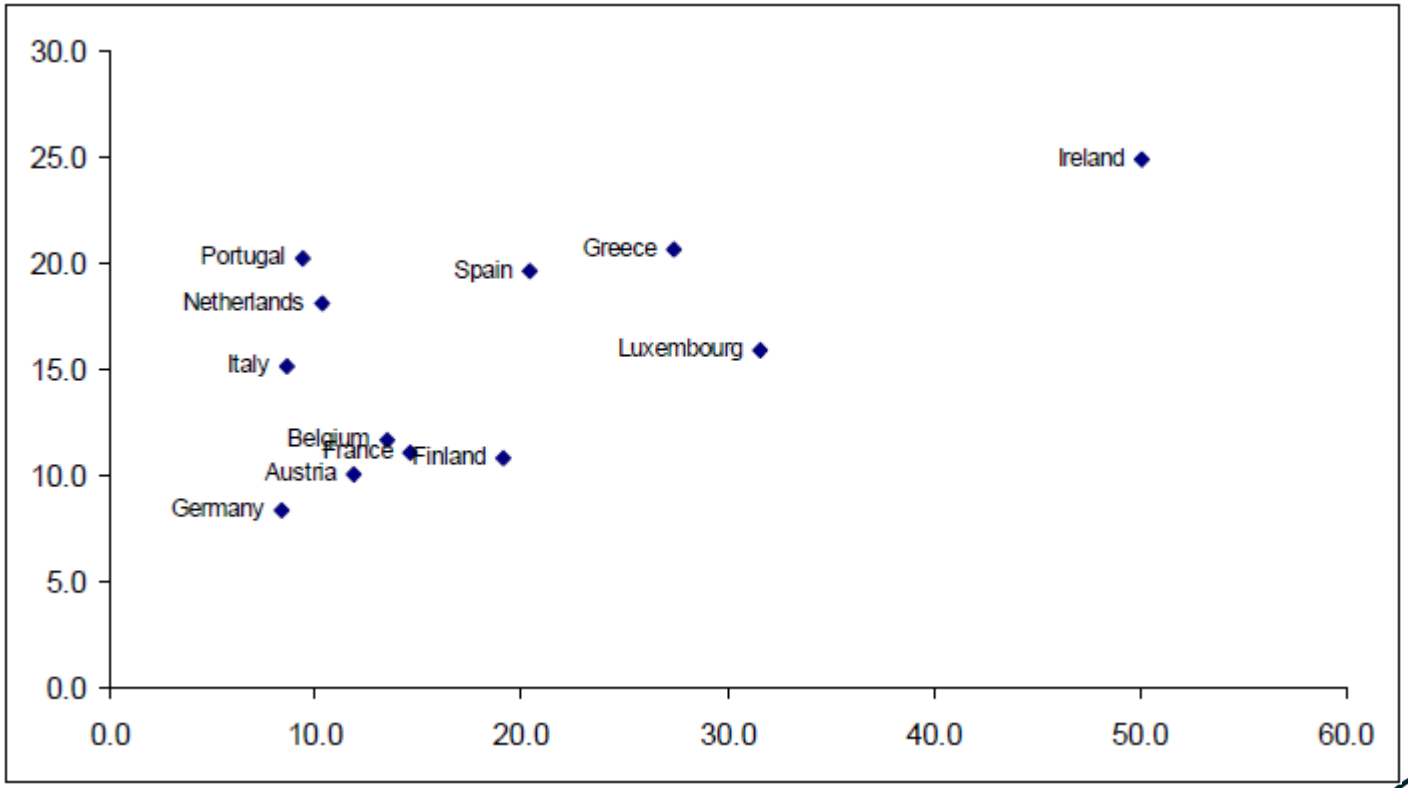




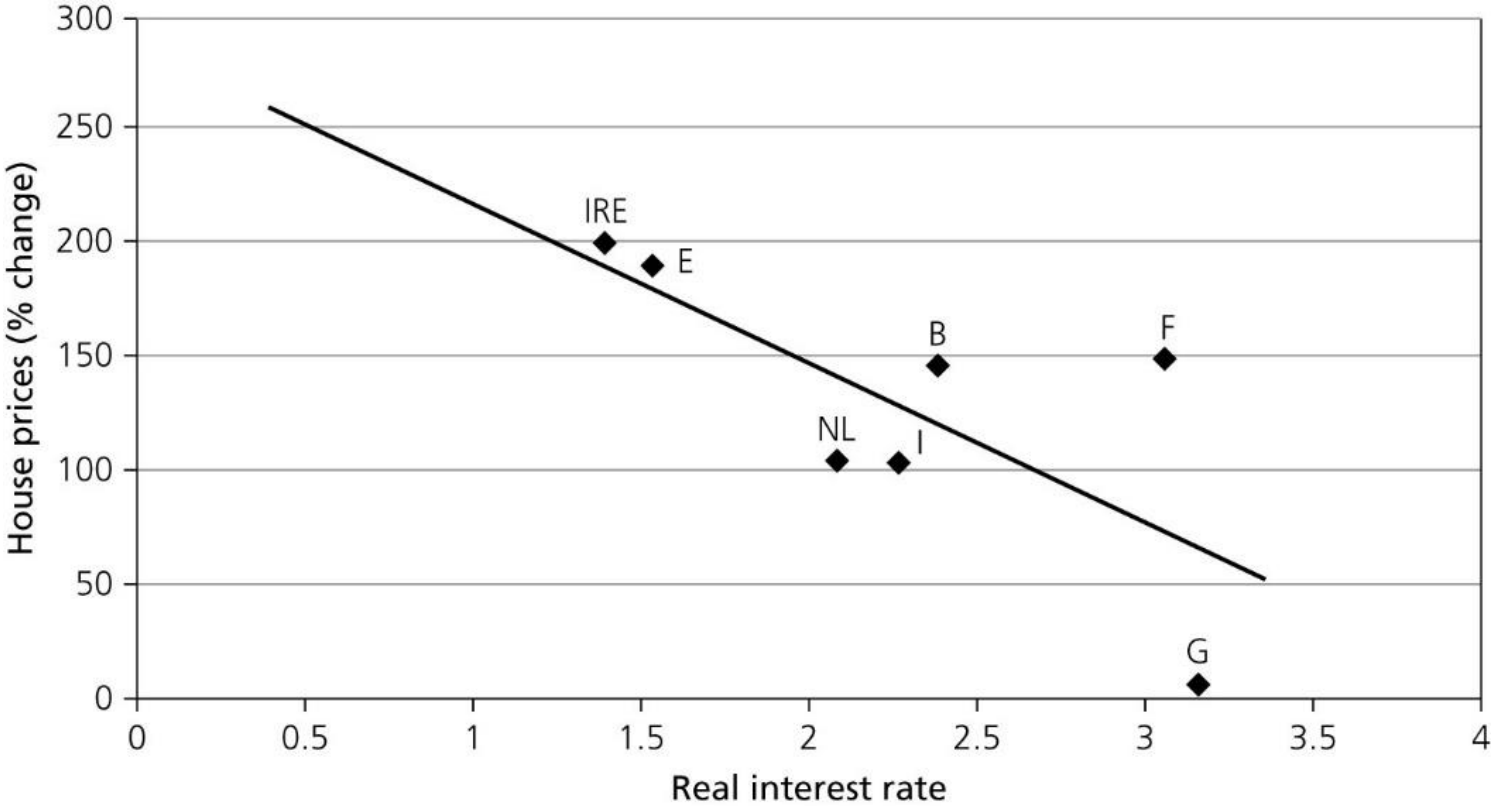




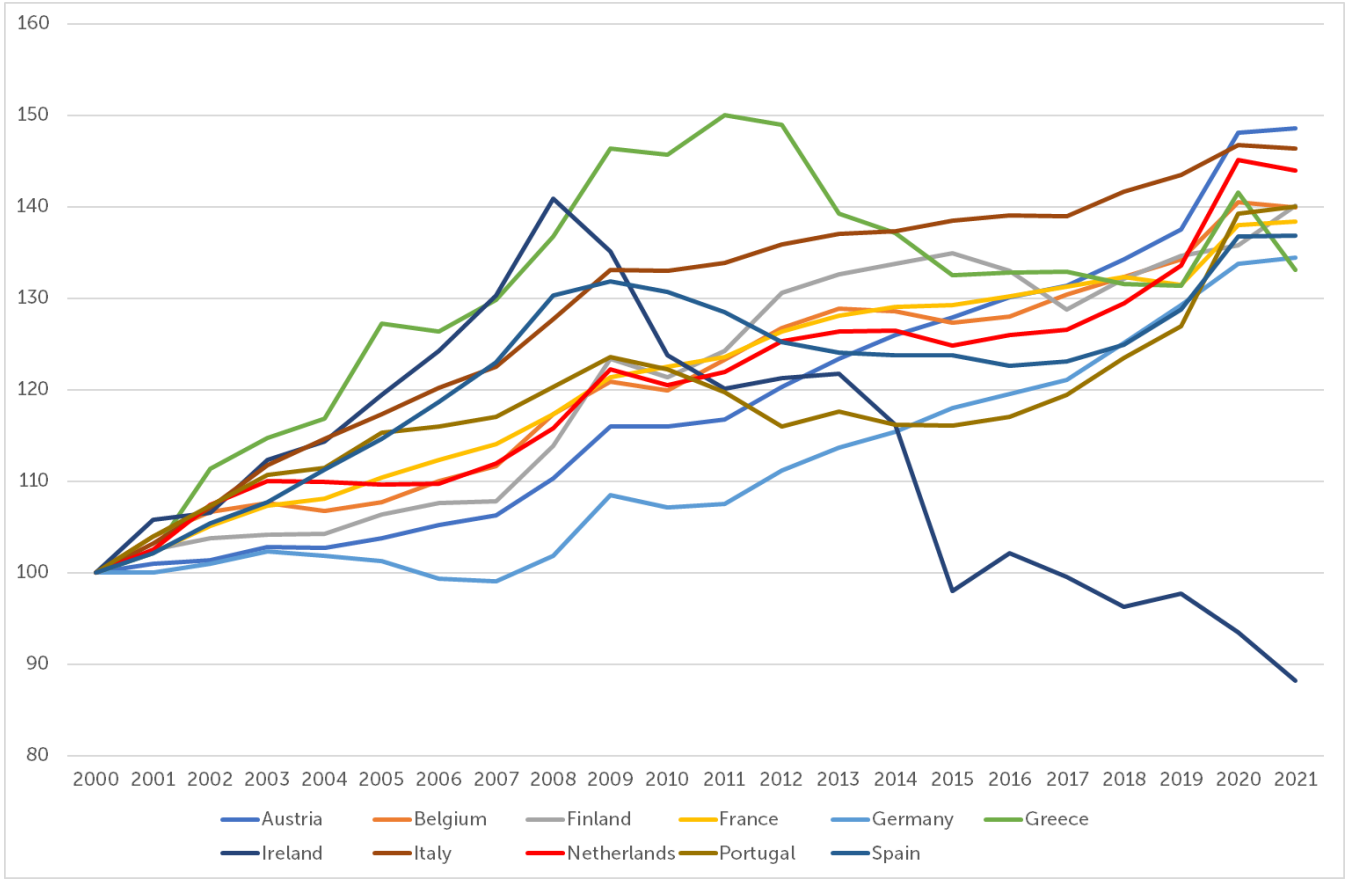
Is this a problem in practice?



Cumulative output (vertical axis) and inflation (horizontal axis) over the period 1999-2004 (Source P. Lane, The real effects of EMU)



Real interest rates and housing prices, %change 1997-2008)



Change in unit labor costs since 2000, data from OECD

Adjustment

- Devaluation of the nominal exchange rate is no longer possible within EMU
- Other adjustment channels:
  - <u>trade</u>
    modified IS-curve: $y = \alpha_0 - \alpha_1 r - \alpha_2 q$
    where: $q = p/p^*$ (real exchange rate)
    increase in q hurts competitiveness and reduces demand for exports
    shifts *IS*-curves back
  - <u>fiscal policy</u>
    redistributive fiscal policies across generations or across countries
    shifts *IS*-curves back (via government spending)
  - <u>labour mobility</u>
    emigration to booming regions
    affects y_N

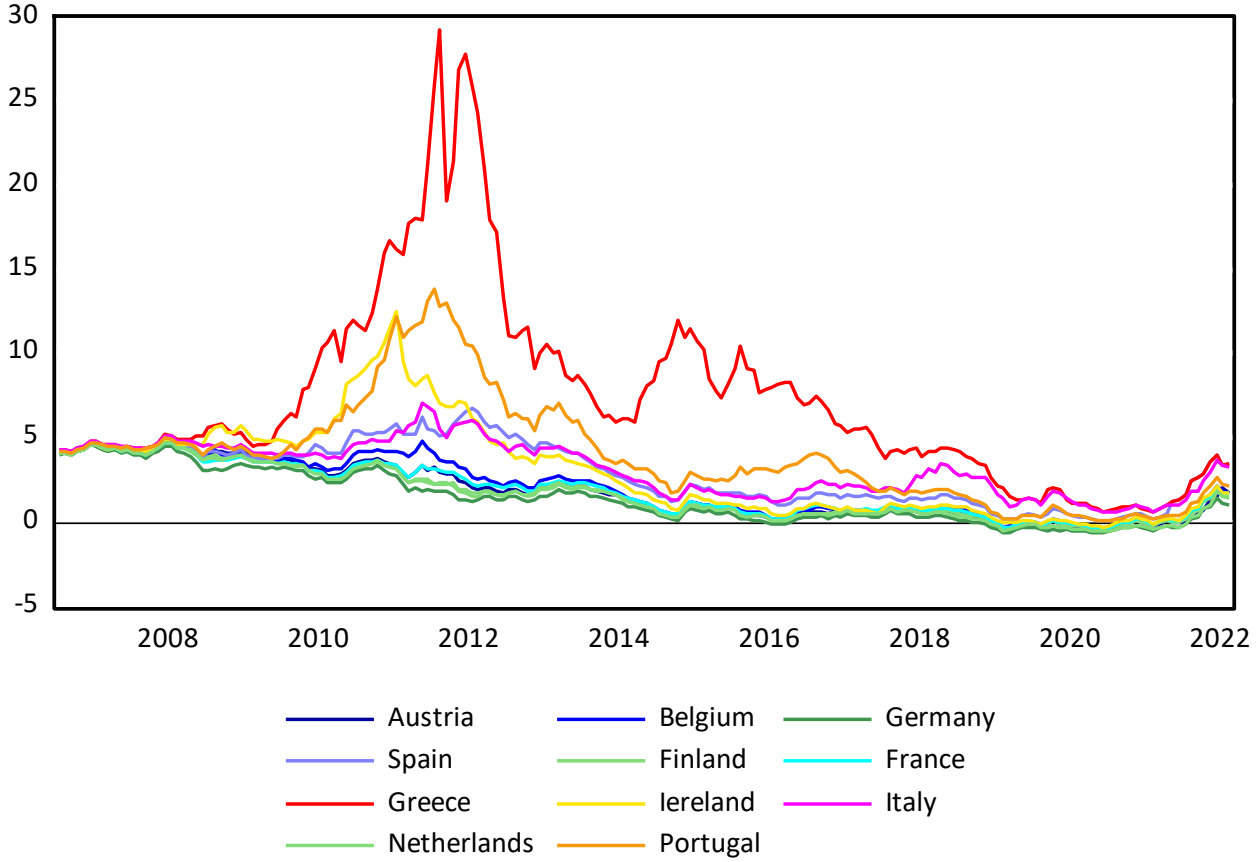
Case 4: Fragmentation risk in EMU

Introduce risk premia

- Shouldn't nominal interest rates be the same across EMU?
  - Yes, for short-term interest rate: this is the interest rate the ECB sets for the whole union
  - No, for long-term government bond rates
  - These diverge if investors perceive different risks from holding different government bonds (default risk)

- ECB has become concerned that differences in long-term government bond rates (so-called sovereign spreads) affect lending conditions and lead to financial fragmentation

Yields on 10-year government bonds



Fragmentation risk

- Will higher bond yields spread to lending rates for households and firms?
- Possible channels:
  1) Government bond yield acts as a minimum rate
  2) Higher government bond yield may lead to austerity, negatively affecting the growth. This may increase private sector credit risk
  3) Higher government bond yields may weaken domestic banks, increasing their funding costs
  4) Redenomination risk: if investors expect a country to exit the euro area, this will increase risk premia on all domestic rates

Fragmentation risk in the IS-MP-AS model

- Risk premia (*rp*) can be incorporated in the MP rule
- *r* should now be re-interpreted as the expected real borrowing rate (relevant for IS-curve) instead of the real risk-free policy rate:

$$r = i - \pi^e + rp$$

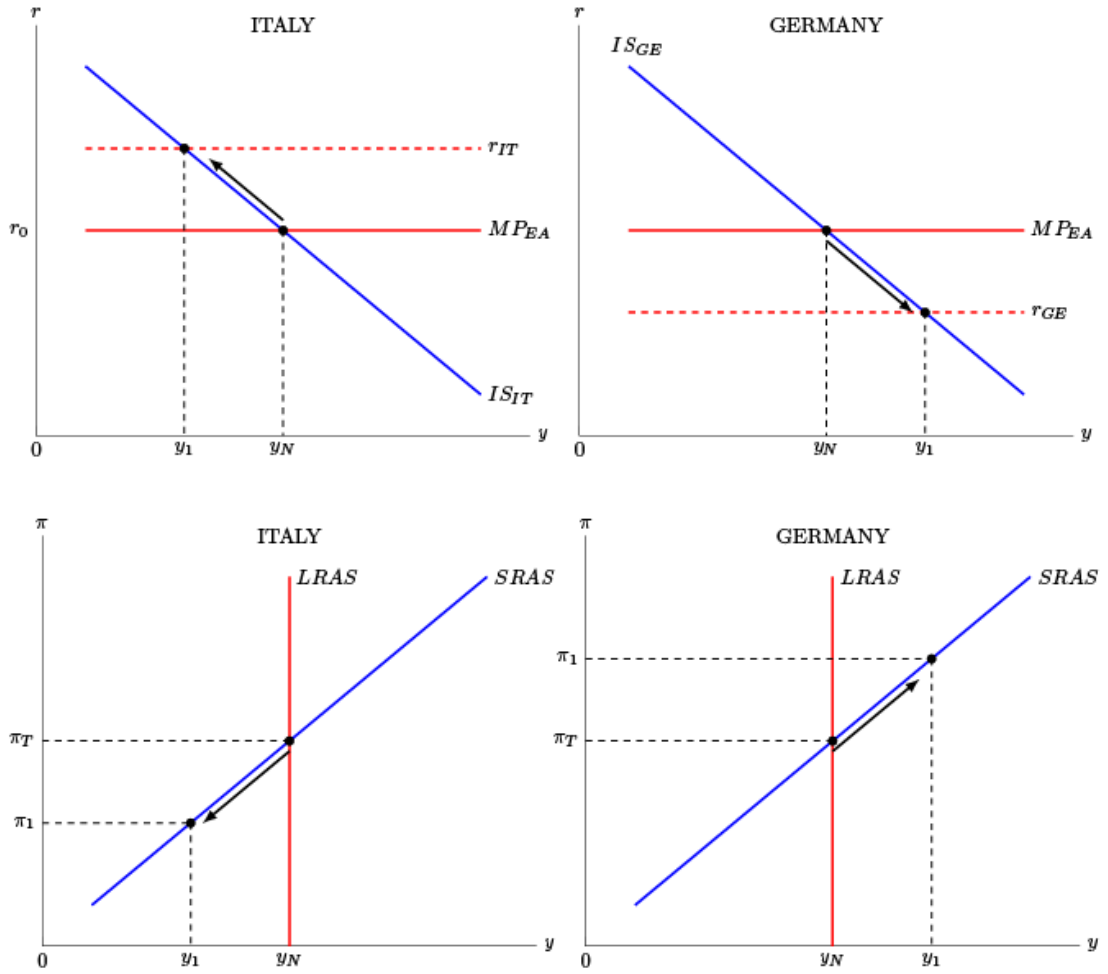
- *r* can now change due to:
  - changes in in nominal risk-free rate
  - expected inflation
  - financial shocks (*rp*)

Fragmentation risk

- risk premia in the IS-MP-AS model

- in Italy
  $r_{IT} = i_{EA} - \pi^e_{IT} + rp_{IT}$
  $\Delta r_{IT} = rp_{IT}$
  $rp_{IT} > 0$ (fear of default)

- in Germany
  $r_{GE} = i_{EA} - \pi^e_{GE} + rp_{GE}$
  $\Delta r_{GE} = rp_{GE}$
  $rp_{GE} < 0$ (safe haven)



Further destabilizing dynamics

- regional de-anchoring of π^e may destabilize the monetary union (case 3)
  - Italy: *SRAS* shifts down, r_{IT} shifts further up
  - Germany: *SRAS* shifts up, r_{GE} shifts further down

- debt trap
  - Italy: rp_{IT} increases and r_{IT} shifts further up
  - Germany: rp_{IT} decreases and r_{GE} shifts further down

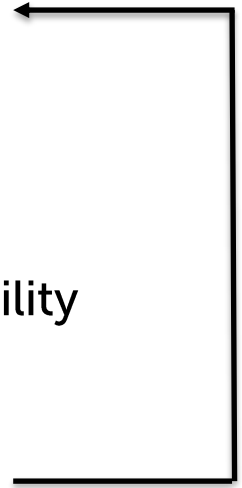
Debt trap

Risk of vicious cycle for weak eurozone countries:

- high public debt and low or negative economic growth
- higher interest rate costs (*rp*)
- higher deficits

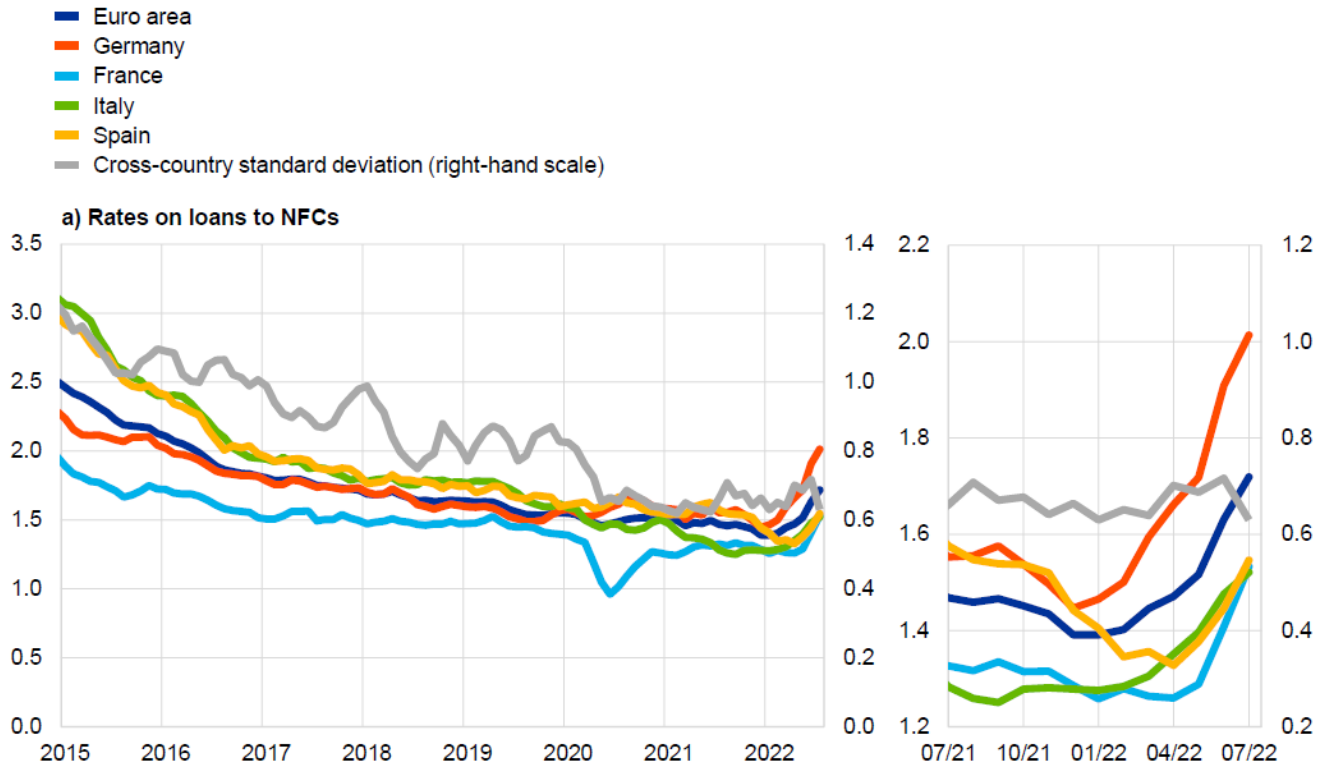
- increase in Debt/GDP-ratio
- financial markets concerned about debt sustainability

- even higher interest rates (*rp*)



Is fragmentation risk a problem in practice?

(annual percentages, three-month moving averages; standard deviation)



- The spillover of sovereign spreads to lending rates for non-financial corporations is not so clear
- But ECB has been active in bond markets

Source: ECB Economic Bulletin, June 2022

What can be done about fragmentation risk?

- Austerity measures ?
- Fiscal union: more cross-country risk-sharing through fiscal policy
- Breaking the sovereign-bank nexus
- ECB as lender of last resort

Reducing fragmentation risk:

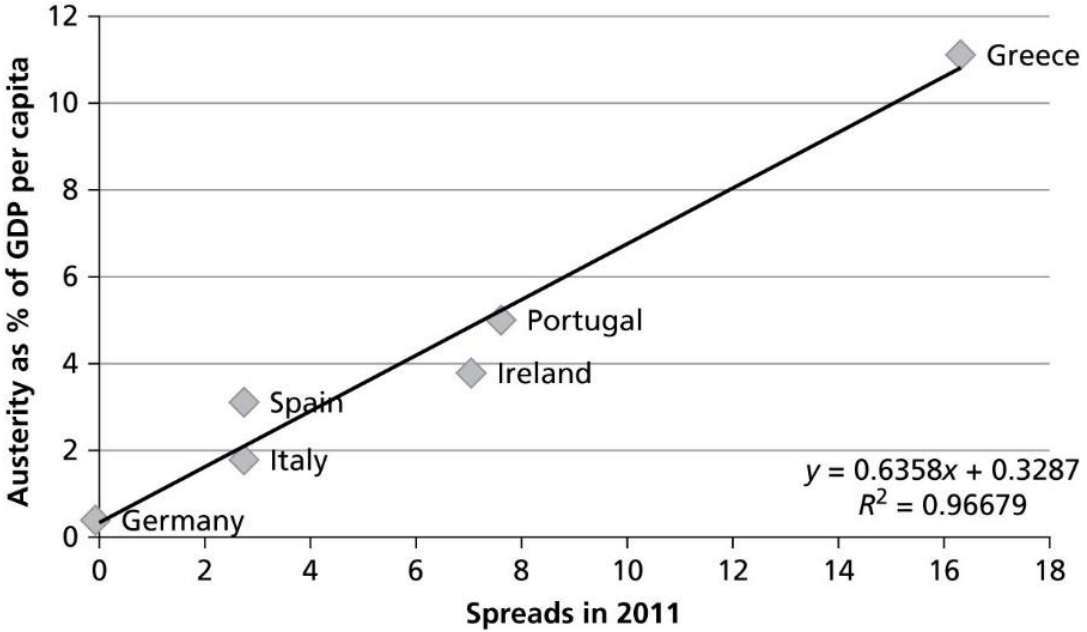
4.1 Austerity ?

Austerity measures following the eurocrisis

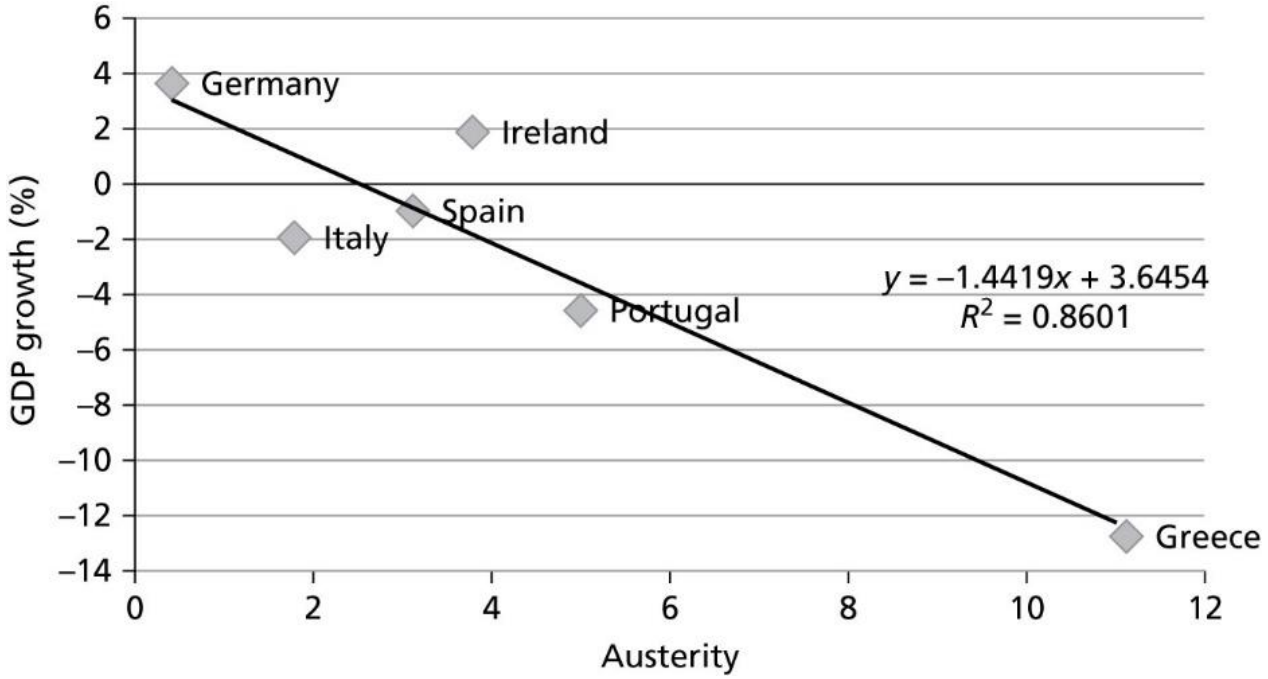
- Strong increases in the sovereign spreads in the Eurozone since 2010
  - were not only due to deteriorating fundamentals (e.g. government budget deficits and debt levels), but also to market sentiments (i.e. by panic and fear)
- The spreads forced countries into severe austerity measures that in turn led to increasing Debt/GDP ratios.

- In terms of the IS-MP-AS model: austerity implies a downward shift in the *IS*-curve, worsening deflationary tendencies and possibly further increasing risk premia

Austerity measures and interest spreads



Austerity (2011) and GDP growth (2011–12)



Reducing fragmentation risk:

4.2 Fiscal union

Fiscal union (or budgetary union)

- This consists of centralizing a significant part of the national budgets into a common union budget
- Such a fiscal union achieves two things:
  - It creates an insurance mechanism triggering income transfers from countries experiencing good times to countries hit by bad luck
  - It allows consolidation of national government debts and deficits, thereby protecting its members from liquidity crises and forced defaults

Fiscal union as an insurance mechanism

- Centralized budget allows for automatic transfers between countries of monetary union:
  - can offset asymmetric shocks
  - works through the *IS*-curves (government spending/taxation)

- Issues:
  - Creates problems of moral hazard
  - Offsetting shocks or policy mistakes?

Fiscal union as a protection mechanism

- Fiscal union centralizes national government debts into union debt:
  - Joint liability would eliminate risk premia
  - The union government acquires the characteristics of a ‘stand-alone’ government, i.e. it issues debt in a currency over which it has full control
  - This creates a union government capable of forcing common central bank into providing liquidity in moments of crisis

Reducing fragmentation risk:

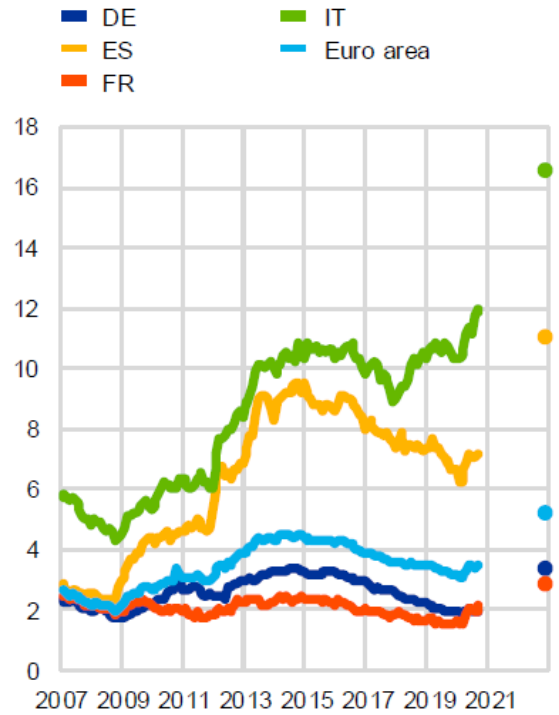
4.3 Breaking the sovereign-bank nexus

Sovereign - bank nexus

- Spillover from sovereign risk to bank risk
  - banks are exposed to credit risk on sovereign bonds that they hold on their balance sheet (examples: Greece, Italy)
  - thus higher sovereign spreads can negatively affect banks and lending conditions for banks' customers
- Solution
  - Reduce sovereign exposure of banks

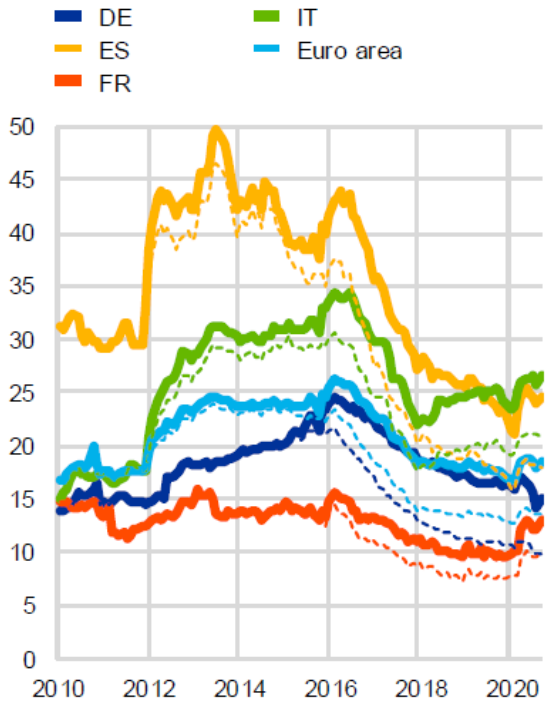
Euro area banks' exposures to domestic sovereign debt securities relative to total assets

(Jan. 2007-Sep. 2020, observed data (solid lines); Dec. 2022, potential development (simple) (end-dot); percentages)

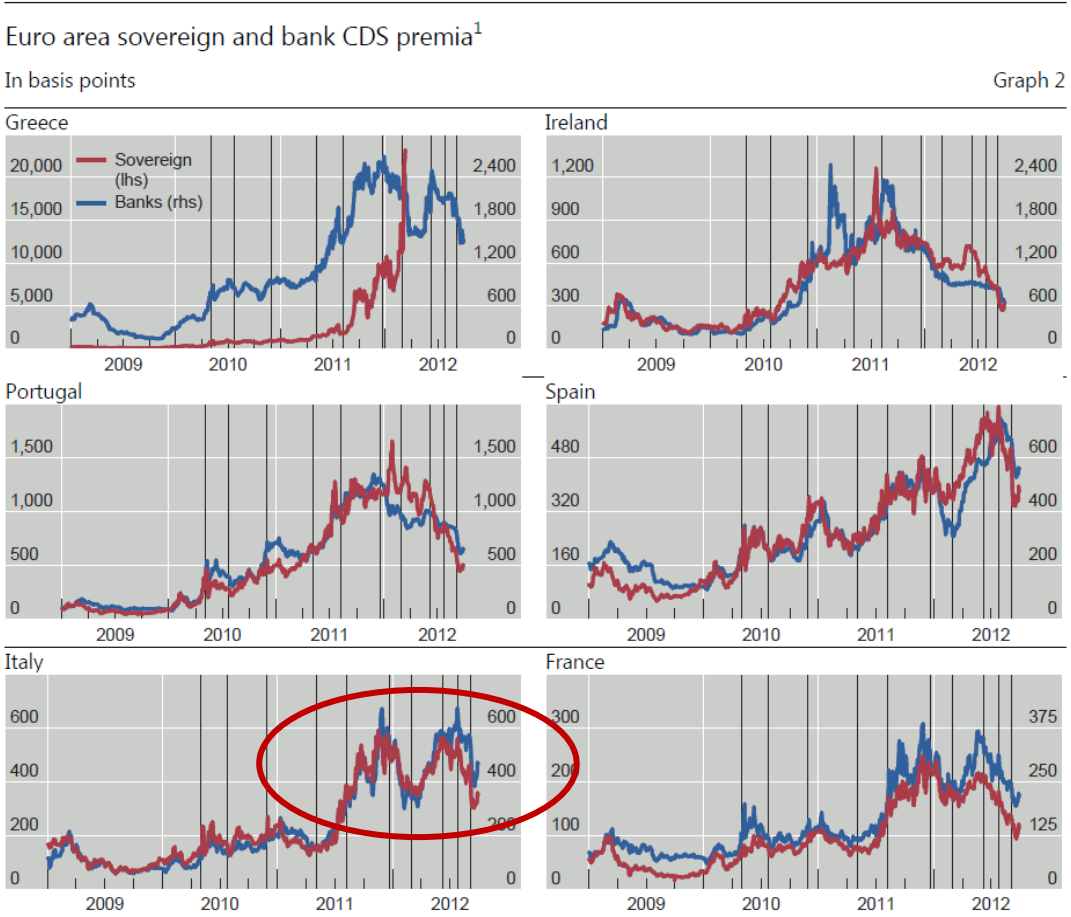


Euro area banks' domestic sovereign debt exposures relative to outstanding public debt

(Jan. 2010-Sep. 2020, excluding (solid lines) and including (dotted lines) Eurosystem holdings in the outstanding sovereign debt; percentages)



Source: ECB, FSR, Nov. 2021



- Evidence on the sovereign-bank nexus using Credit Default Swap (CDS) rates

Source: BIS (2012)

Reducing fragmentation risk:

4.4 ECB as lender of last resort

The central bank as lender of last resort (LOLR)

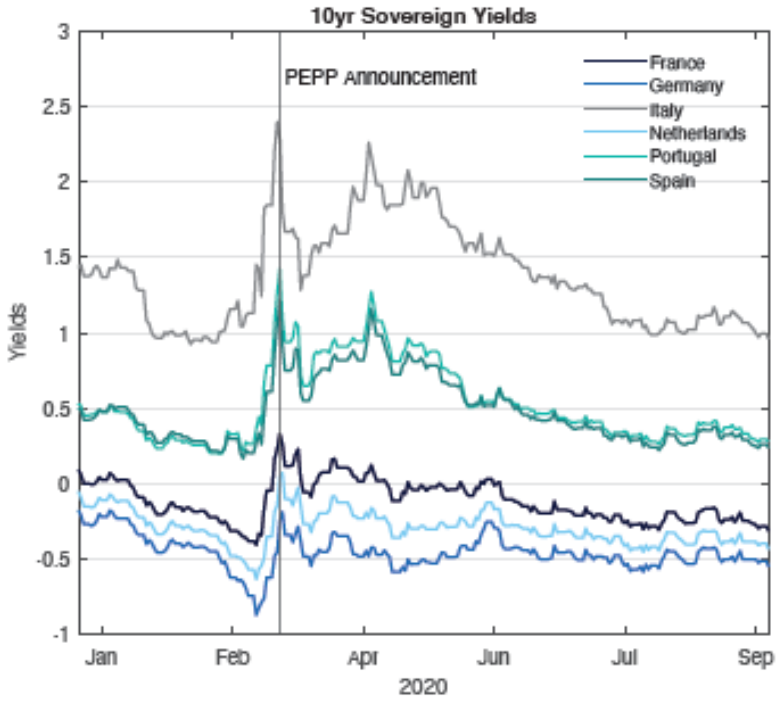
- Liquidity crises are avoided in stand-alone (i.e. non-EMU) countries mainly because the central bank can be forced to provide all the necessary liquidity to the sovereign.
  - This creates an implicit guarantee for the bondholders that they will be paid out when the bond matures
- This outcome can also be achieved in EMU if the ECB is willing to provide the necessary liquidity in the different sovereign bond markets. This can prevent the market from pushing the member countries towards a bad equilibrium.
- By guaranteeing that liquidity will always be available it reduces the risk premia (*rp*)

ECB became LOLR in 2012

- In September 2012, the ECB stepped in and committed itself to buying unlimited amounts of government bonds in times of crisis. ECB calls these operations ‘Outright Monetary Transactions’ (OMT).
- Conditions to the application of its OMT facility:
  - Countries should apply for it and commit themselves to further austerity programmes
  - But, the fact that the ECB committed itself to unlimited purchases of the bonds of troubled governments dramatically reduced the fragility of the system.
  - OMT was very successful: yields declined fast immediately after announcement, while ECB did not actually have to use the OMT facility

Spread control: PEPP & TPI

- March 12, 2020: Lagarde: “we are not here to close spreads”
- But March 18, 2020: ECB announces PEPP
  - New feature: asset purchases can be targeted at specific countries
- July 2022: ECB announces TPI (Transmission Protection Instrument)
  - “to support the effective transmission of monetary policy”
  - allows asset purchases targeted at specific countries
  - works to reduce *rp*



Criticism against LOLR role of ECB

- Mission creep
  - interest rates subsidies should be part of fiscal, not monetary policy

- Moral hazard
  - like with all insurance mechanisms there is a risk of moral hazard:
  - by providing a LOLR insurance the ECB gives an incentive to governments to issue too much debt.
  - the way to deal with moral hazard is to impose rules that will constrain governments in issuing debt

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Thank you for your attention!