How to conduct monetary policies.
The ECB in the past, present and future

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Introduction

- We first provide a short historical analysis of how the operating procedures of the ECB changed over time, and what factors drove these changes.
  - a transition of a scarce reserve system into the present reserve abundant regime.
- We analyze the problems of the present regime when the central bank has to raise the interest rate to fight inflation.
- We argue that the present operating procedures
  - lead to a loss of effectiveness of monetary policies.
  - lead to fairness issues because the ECB (and the national central banks of the Eurosystem) now transfer large amounts of money to banks, while this money should be transferred to taxpayers.
- We conclude by proposing an alternative operating procedure: a two-tier system of reserve requirements

ECB's operating procedure before 2015: the corridor system

- The main technique that the ECB used up to 2015 (when it introduced quantitative easing) were transactions using tenders.

- The ECB calls these its *main refinancing operations*.

  - In this technique, the ECB provided liquidity to financial institutions in exchange for collateral.

  - The Governing Council set the interest rate (the *repo rate*) that is applied to the main refinancing operations. One can call the repo rate also the *policy rate*.

Lending and deposit facilities

- The ECB supplemented the system of *main refinancing operations* by *standing facilities* which aimed to provide and absorb overnight liquidity.
  - Banks can use the *marginal lending facility* to borrow overnight liquidity from the NCBs. The Governing Council fixes the marginal lending rate.
  - During the pre-financial crisis period, it was typically 1 per cent above the interest rate used in the main financing facility.
  - The marginal lending rate acts as a ceiling for the overnight market interest rate.
- Similarly, banks can use the *deposit facility* to make overnight deposits.
  - The Governing Council fixes the interest rate on the deposit facility.
  - During the pre-financial crisis period it was typically 1 per cent below the interest rate used in the main financing facility.
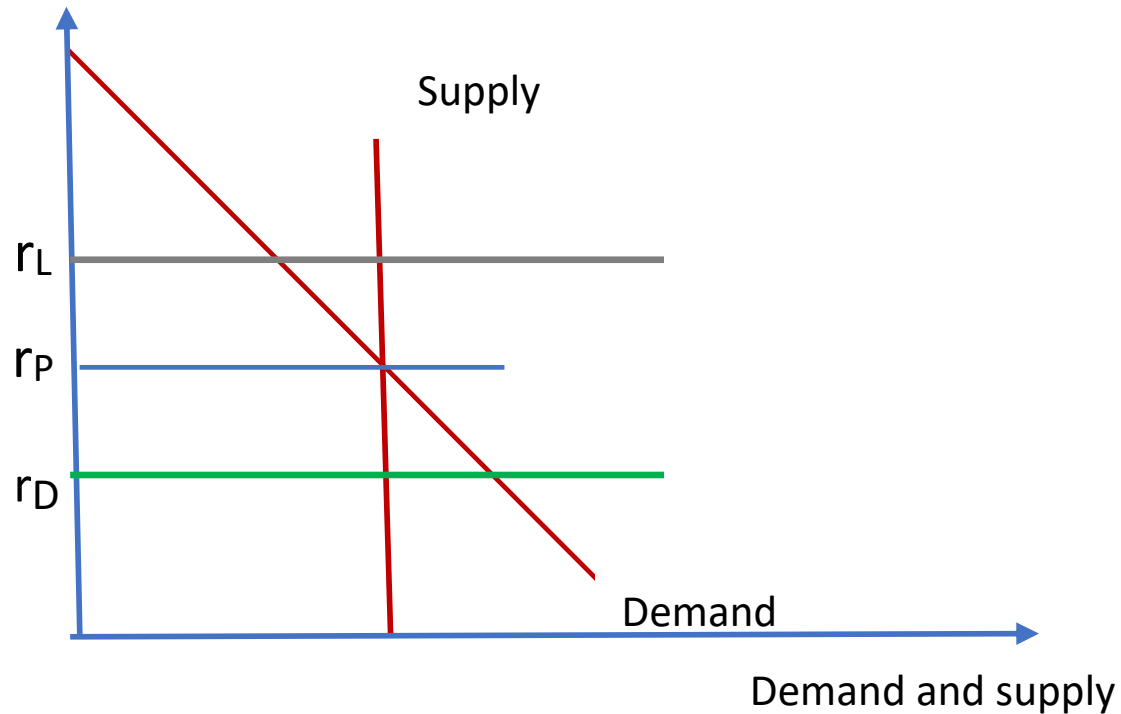 - This interest rate acts as a floor for the overnight market interest rate (interbank rate).

Figure 1: Policy rates ECB
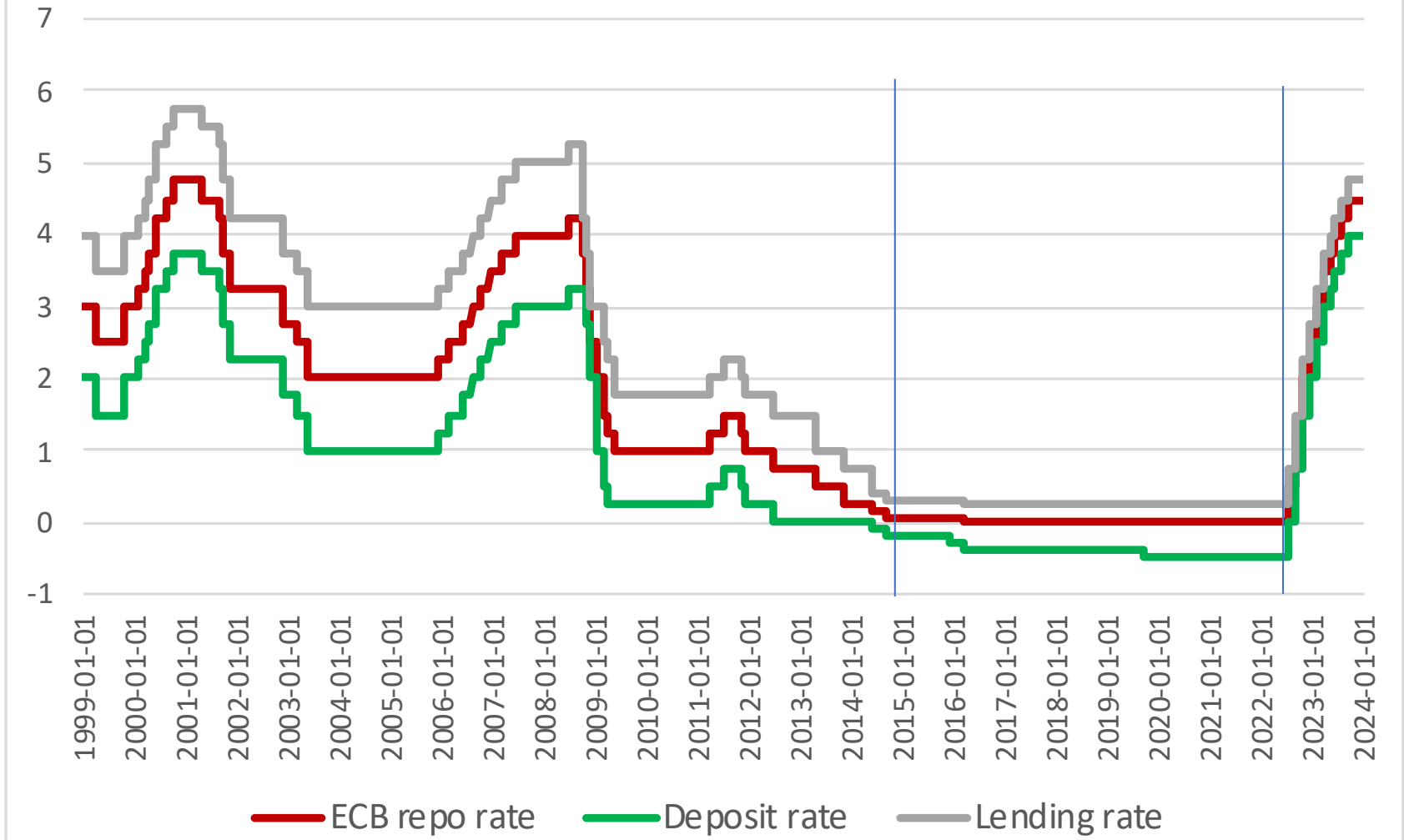
Source: ECB

Figure 2: Demand and supply of reserves in reserve scarce regime (corridor system)

interest rate

- The Governing Council sets the repo rate (policy rate, r_P) together with the lending rate r_L and the deposit rate r_D.
- In order to ensure that the policy rate coincides with the money market rate, the ECB can vary the supply.
- This is done by changing the total allotment of liquidity in the main refinancing operations.
- In Figure 2 we have represented the case where the central bank has manipulated the supply in such a way that the policy rate coincides with the money market rate.

- In this corridor system the lending and deposit rates act as upper and lower limits for the money market rates.
  - The lending rate is an upper limit: if the money market rate were to exceed it, banks would turn to the central bank to borrow and none would borrow in the interbank market.
  - The deposit rate is the lower limit : if the money market rate were to drop below it, banks would invest all their excess funds at the central bank, and none in the interbank market.
- The corridor system implies that the money market rate can vary freely within the bounds set by the lending and the deposit rates.
  - Prior to 2015 the corridor was 2 percentage points.
  - This is quite large and allowed for potentially wide short swings in the money market rate.
  - That is why the ECB (and other central banks) actively intervened to smooth the money market rate by varying the supply of bank reserves.
  - Some variability, however, was difficult to avoid as the demand for reserves itself is stochastic.

The operating regime since 2015: reserve abundance regime

- The biggest change in the operating procedure occurred in 2015 when the ECB started its QE-programme.

- When the ECB bought government bonds from financial institutions, it credited the deposit accounts these institutions held at the central bank (typically the NCBs of the Eurosystem).

- These deposits constitute the bank reserves.

- As these bond purchases became very large (see Figure 3) , the supply of bank reserves increased dramatically.

- The corridor system could not be maintained and the operating regime switched to a reserve abundance regime.

Figure 3: Cumulative bond purchases under APP (million euros)
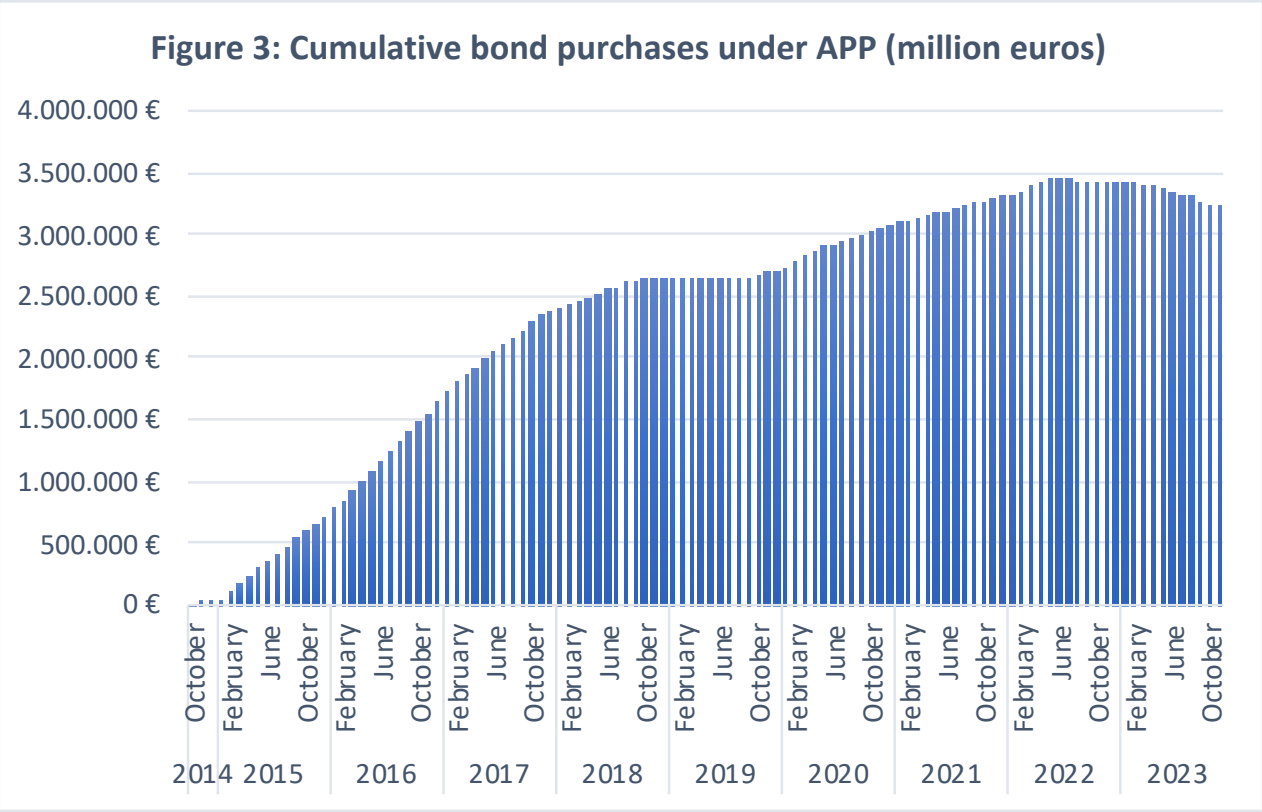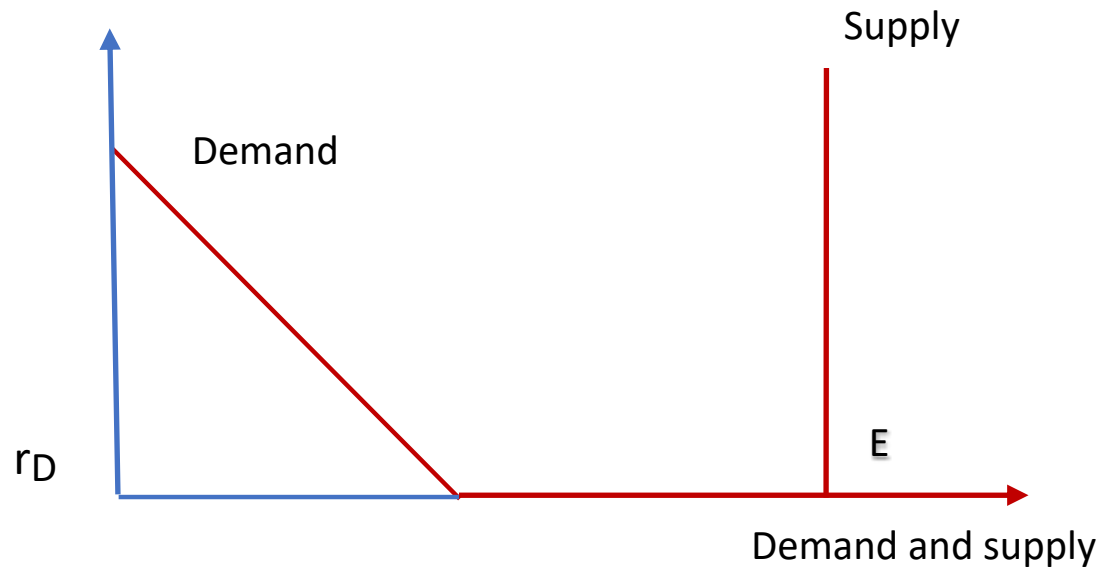
Source: ECB
Note: APP stands for Asset Purchase Programme (commonly called QE). It does not include the PEPP programme which was initiated in 2020 and led to an additional purchase of bonds of more than €1 trillion.

Figure 4: Demand and supply of reserves in reserve abundance regime

interest rate

Supply

Demand

E

r_D

Demand and supply

Note: We do not show the lending rate which acts as an upper limit because in this regime the upper limit becomes redundant.

- As a result of QE operations (the supply of bank reserves shifts to the right.
- Supply curve has shifted so much to the right that the intersection of the demand and supply curves is located in the negative y-axis.
- The deposit rate is the lower bound for the money market rate.
- The demand curve becomes infinitely elastic at intersection with y-axis.
- The equilibrium in the market for bank reserves is now obtained in point E where demand equals supply of bank reserves.

- In Figure 4 we have assumed that the deposit rate is zero.

- This does not have to be the case: from 2015 until 2022 the deposit rate was negative. This implied that the banks paid the ECB (actually the NCBs of the Eurosystem) for holding bank reserves.

  - Note: in this system the money market rate tends to be less volatile than in the corridor system that, without intervention of the central bank, allows the money market rate to fluctuate freely within the corridor.

- In the reserve abundance regime there is no corridor. Only the lower limit of the deposit rate is in effect, working as a point of attraction.

  - The money market rate becomes much less volatile without active intervention of the central bank.

# The operating regime since 2022: the surge in inflation

- The surge in inflation in 2022 had a major effect on the operating procedure of the ECB.

- In order to fight inflation the ECB and the other central banks had to raise the interest rate.

- How to do this in a reserve abundance regime?

Quantitative tightening

- One way would have been to sell government bonds (Quantitative Tightening, QT).

- This would have shifted the supply curve in Figure 3 back to the left.

- By selling enough government bonds the supply of reserves could then have shifted sufficiently to the left to recreate the situation that existed prior to QE.

  - This was a regime of reserve scarcity.

- The central bank would then have set a target interbank interest rate and would guide the market rate towards this target by manipulating the supply of reserves.

- The problem with this approach was that the central banks would have to sell large amounts of government bonds.

  - To bring back the supply curve in the range given by the downward sloping part of the demand curve, the ECB would have to sell almost all the government bonds it holds.

  - An operation that would have created havoc in government bond markets.

- In a monetary union, such as the Eurozone, such a massive sale of government bonds risked to lead to large increases of the spreads in the national government bond markets.

  - In fact, at the start of the inflationary surge when the ECB started to raise the interest rates, this led to a surge in the spreads in the government bond markets.

  - As a result, the ECB announced yet another bond purchase programme, the so-called TIP, which pacified the markets.

Figure 5: 10-year government bond spreads in the Eurozone
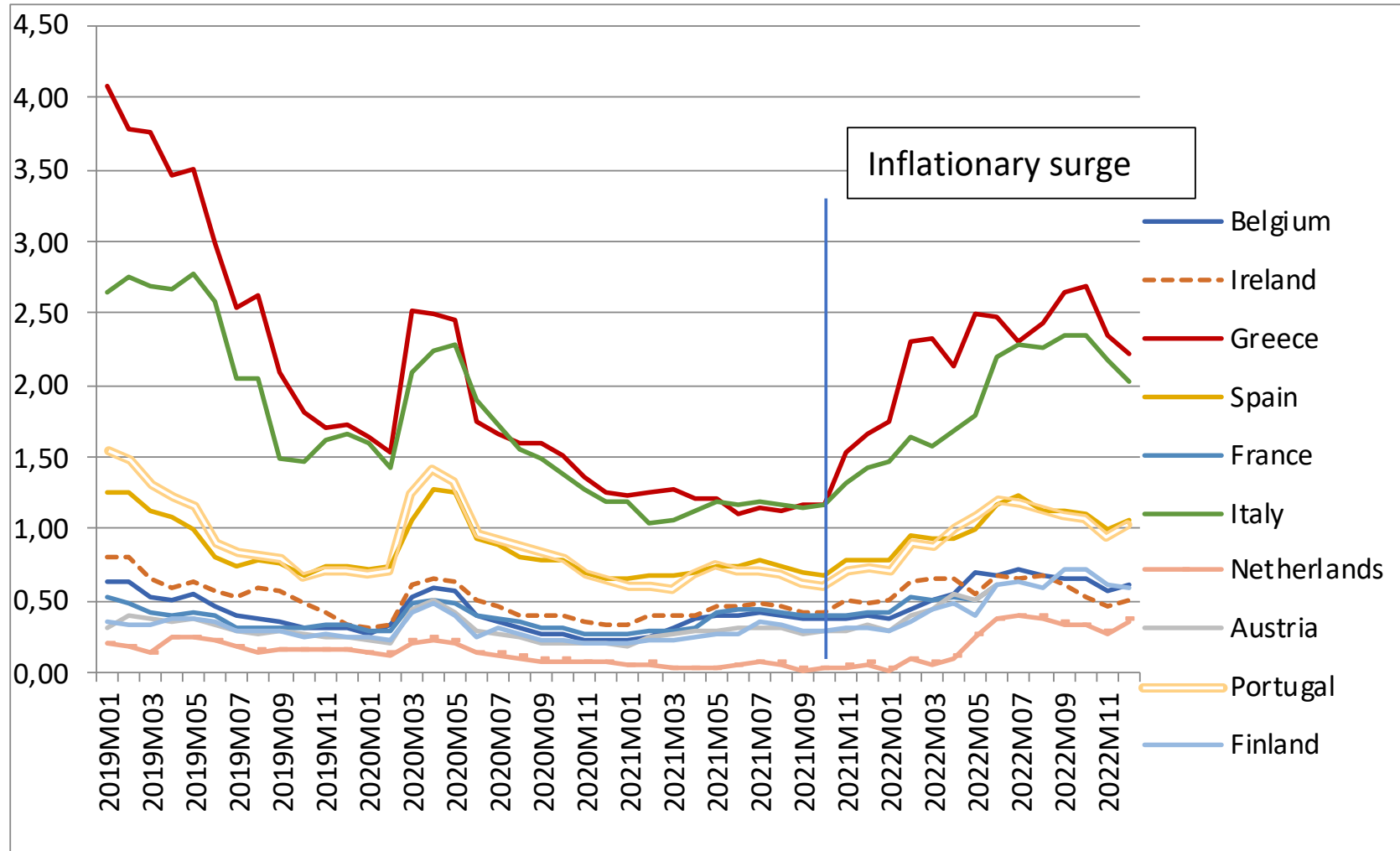
Source: ECB
Note: The spread measures the difference in the yield with the 10-year German government bond.

- Under those restrictions the only way to raise the interest rate was to remunerate the deposits held by the banks at the central banks (bank reserves).

- By raising the deposit rate the lower bound in the market for bank reserves would shift up so that also the money market rate could increase.

- We show this in Figure 6 by an upward shift in deposit rate.

Figure 6: Demand and supply of reserves in reserve abundance regime

interest rate

Supply

Demand

G

r_D

F

Deposit rate

Demand and supply
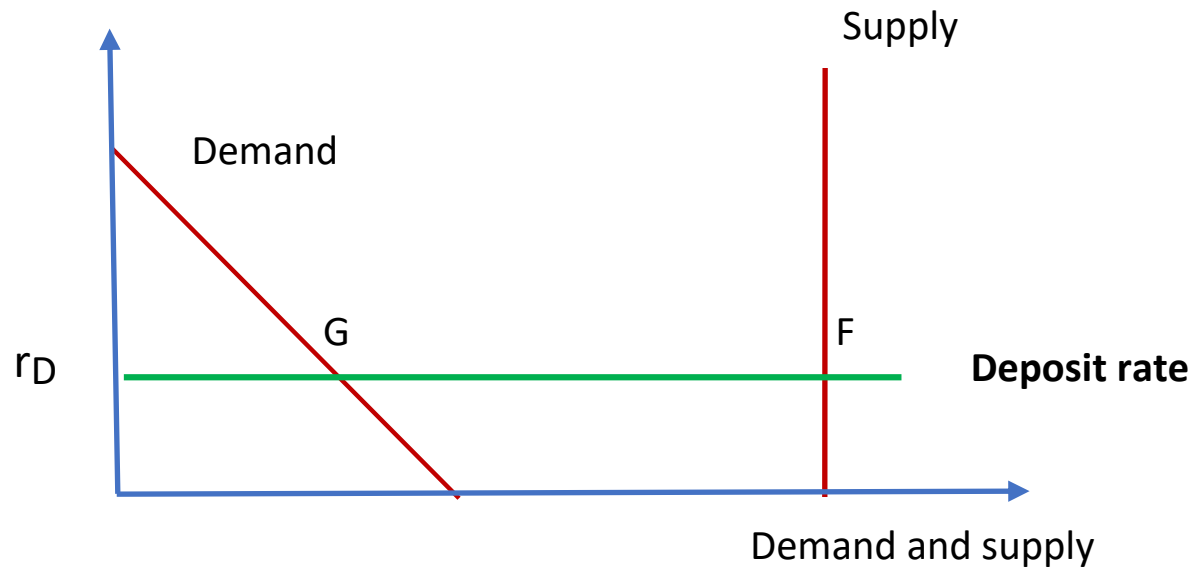
- This positive deposit rate becomes the new lower bound.

- The equilibrium is obtained in point F.

- Note that demand curve becomes infinitely elastic at the point G where the demand curve intersects the horizontal lower bound provided by the deposit rate.

Result of new operating regime:
Massive transfers of central banks' profits to commercial banks

Bank reserves and interest payments to banks (Aug 2023), billions				
	Bank reserves	Interest rate	Interest payments	percent GDP
ECB	€ 3.650	4,00%	€ 146	1.10%
Fed	$3.136	5,15%	$162	0.64%
BoE	£909	4,25%	£39	1.75%

Sources: Bank of England, Board of Governors Federal Reserve and European Central Bank

- These are substantial numbers.
- To give some perspective:
  - Total yearly spending of EU is 165 billion; banks obtain almost as much without any condition
- As a result of their anti-inflationary policies, central banks transfer more than the total seigniorage gains to private banks, and now make significant losses.
- An extraordinary outcome of the fight against inflation.
- This was not the case during 1970s and 1980s when central banks fought inflation: they did not remunerate bank reserves.

Table 2. Remuneration of bank reserves in the Eurosystem (Aug 2023)

| Country	Remuneration (million Euro)	% of GDP
Luxembourg	7095	9.15
Cyprus	920	3.31
Finland	5285	1.97
Belgium	10326	1.88
Netherlands	13918	1.45
Malta	241	1.40
France	35925	1.36
Germany	49107	1.27
Austria	4108	0.92
Croatia	593	0.87
Estonia	302	0.84
Slovenia	426	0.75
Spain	9170	0.68
Ireland	3277	0.65
Portugal	1434	0.59
Greece	1201	0.58
Latvia	215	0.55
Lithuania	360	0.53
Slovakia	484	0.44
Italy	8347	0.43

Source: European Central Bank

Issues that we want to analyze

- Problems with remuneration of bank reserves
- Is the transmission of monetary policy in the current remuneration regime effective/efficient?
- Alternative operating procedures that do not transfer large amounts of money to banks
  - Our proposal: Two-tier MRR

Political economy problems with these transfers

- Seigniorage gains of central banks find origin in monopoly power granted by governments to central bankers to create money base.
- One would expect that these monopoly profits would then be returned to the government.
- Instead, they are returned more than fully to private agents,
- And lead to large losses for central banks

large losses of central banks
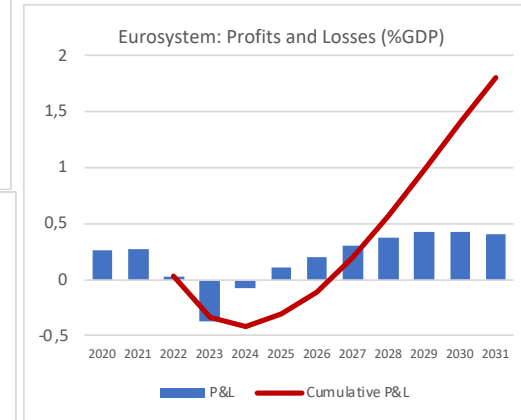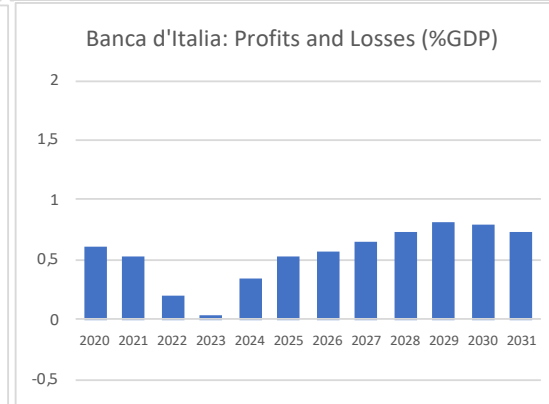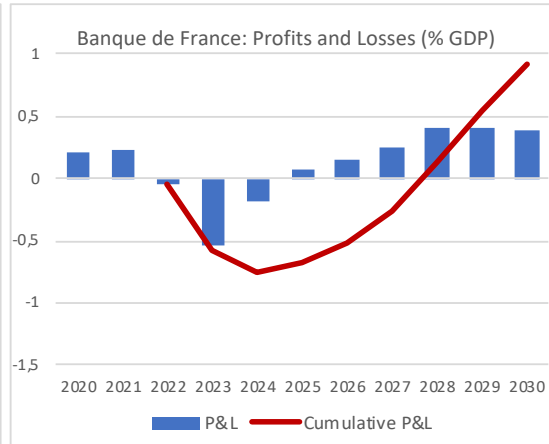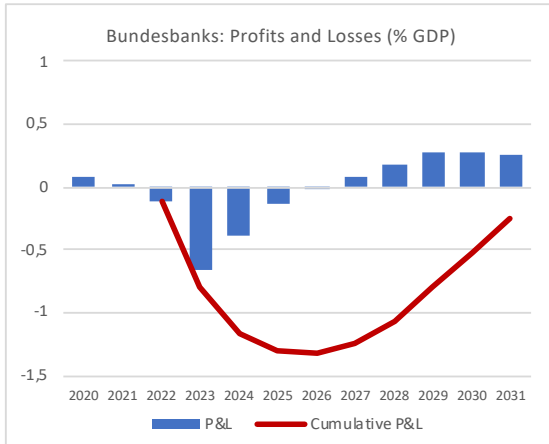
Source: Belhocine, et al. (2023), IMF

Underlying assumptions:
- DR will peak in 2024 and then decline to 2.3%
- Yields on QE-portfolios will increase until 2024-25 and then gradually decline to 2%
- APP is brought down gradually
- PEPP is maintained at same level

Fiscal implications

- The paying of interest on banks' reserve accounts transforms long-term government debt into a short-term debt.
- Most government bonds held by the central banks were issued at very low interest rates
- This implies that governments are immune for some time from the interest rate rises.
- By paying an interest rate of 4% (Eurozone) to 4.9% (US) on bank reserves the central banks transform this long-term debt into highly liquid debt
- forcing an immediate increase in interest payments on the consolidated debt of the government and the central bank.
- This contributes to higher budget deficit and increasing government debt.
- It is paradoxical that central banks contribute to a worsening outlook for the government budget.

Central banks have solved the biggest risk of banks

- The profit and loss profile of the central banks mimicks the profit and loss profile of commercial banks during periods of interest increases.
    - the latter "borrow short and lend long", banks tend to make losses during periods of interest rate increases.
- Banks are escaping this burdensome loss profile as they are making large profits during the current spell of interest rate increases.
- This appears to be possible because central banks have taken over this burden from the commercial banks.

Transmission of monetary policy in the current remuneration regime: is it effective?

- First the theory: Equity channel of bank lending
- When the bank's capital (equity) increases banks will have an incentive to increase lending.
- There are essentially two reasons for this.
  - A higher equity means that the bank may exceed the minimum capital requirements imposed by regulators. Banks will have incentives to increase the supply of loans.
  - With higher equity, the cost of funding bank loans tends to decline, thereby leading to more bank lending.
- Massive remuneration on bank reserves improves banks' equity position
- Thus, the effect of interest rate increase on the real economy is weakened
- Transmission of monetary policy of ECB is less effective

Transmission of monetary policy in the current remuneration regime: is it effective?

- The use of remunerating bank reserves is likely to weaken the transmission process of interest rate increases due to this equity effect
  - Massive transfers of subsidies by central banks improve banks' equity position thereby reducing this equity effect
  - Thus, the effect of the interest rate increase on the real economy is weakened
  - Transmission of monetary policy of ECB is less effective
  - We tested this hypothesis empirically

- We test this hypothesis by estimating the following econometric equation, using monthly country-level data of the 20 Eurozone countries from September 2022 to August 2023:

$$y_{it} = \alpha + b1 * Reserve_{it-1} + b2 * r_t + b3 * \Delta Rm_{it} + b4 * Con_{it} + \alpha_i + \varepsilon_{it}$$

  - y_{it}: percentage change in the aggregate loans to non-financial corporations/households in country i in month t
  - $Reserve_{it-1}$: aggregate level of reserves in country i in previous month as a percent of GDP of country i.
  - r_t: policy rate in month t.
  - ΔRm_{it}: change in the remuneration of bank reserves in month t as a percent of GDP of country i.
  - Con_{it}, α_i, ε_{it}: control variables, countries' fixed effects and error term, respectively.

- This hypothesis has been tested by Fricke, D., Greppmair, S., Paludkiewicz, K., (2023), Excess Reserves and Monetary Policy Tightening, Discussion Paper, Bundesbank, Frankfurt, using bank-level data.

The transmission of monetary policies:
Loans to non-financial corporations (growth rate, in yearly percent changes)

	(1)	(2)	(3)	(4)	(5)
	All sample	Top 50%	Top 50% exclude	Top 50% exclude	Bottom 50%
Lag reserve	7.05***	12.42***	16.29***	13.92***	-7.23
	[2.43]	[1.58]	[4.28]	[3.57]	[20.24]
Policy rate	-3.00***	-1.46**	-1.64**	-1.42***	-3.75***
	[0.54]	[0.54]	[0.59]	[0.18]	[0.65]
Ln (oil price)	-8.11***	-1.59	-3.57*	1.13	-10.26**
	[2.03]	[2.13]	[1.80]	[1.71]	[3.42]
Change in remuneration	2.13***	1.98***	2.71***	1.16**	7.84
	[0.24]	[0.09]	[0.37]	[0.51]	[4.66]
Business confidence				1.32***	0.35
				[0.41]	[0.59]
Constant term	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	216	106	84	72	97
R^2	0.627	0.711	0.583	0.882	0.746

Clustered at the country level, the results display robust standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Note: we use adjusted loans to non-financial corporations which measures lending to the real economy (non-financial corporations). "Exclude" means that Cyprus and Luxembourg are excluded from the sample

Quantitative effects depend on size of bank reserves

Total effect of a one percent rate hike on % change loans to non-financial corporations (Top 50% sample)
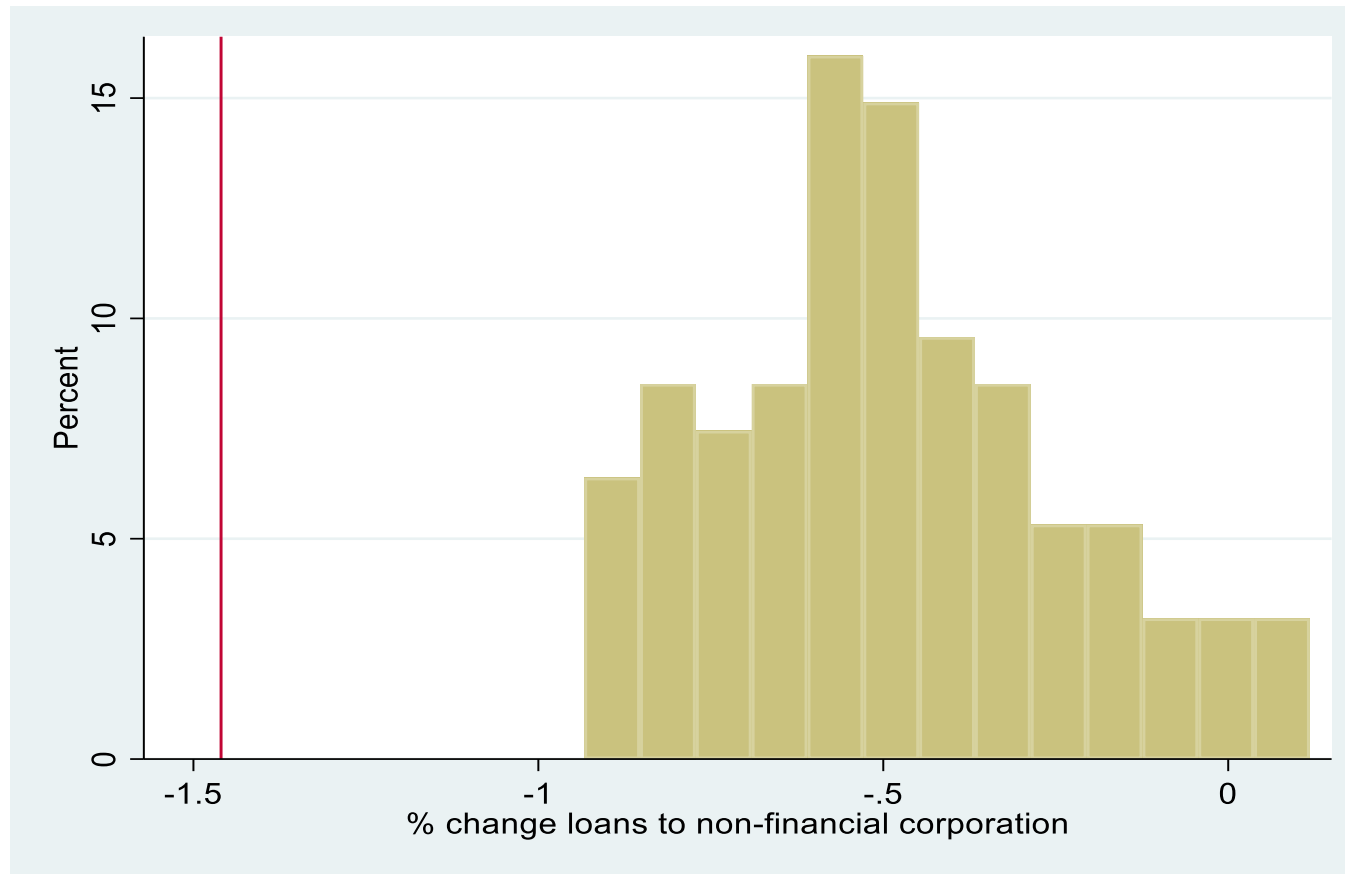
- Total effect is sum of direct effect and equity effect
- Since equity effect depends on size of bankreserves, the total also depends on size bank reserves

Alternative operating procedures: a two-tier system

- Required minimum reserves are not remunerated
- Excess reserves are remunerated
- Demand curve shifts to the right

Figure 6. Demand and supply of reserves: two-tier system

interest rate

Demand (+ req. reserves)

Supply

Demand

Min reserve requirement

r_D

Demand and supply
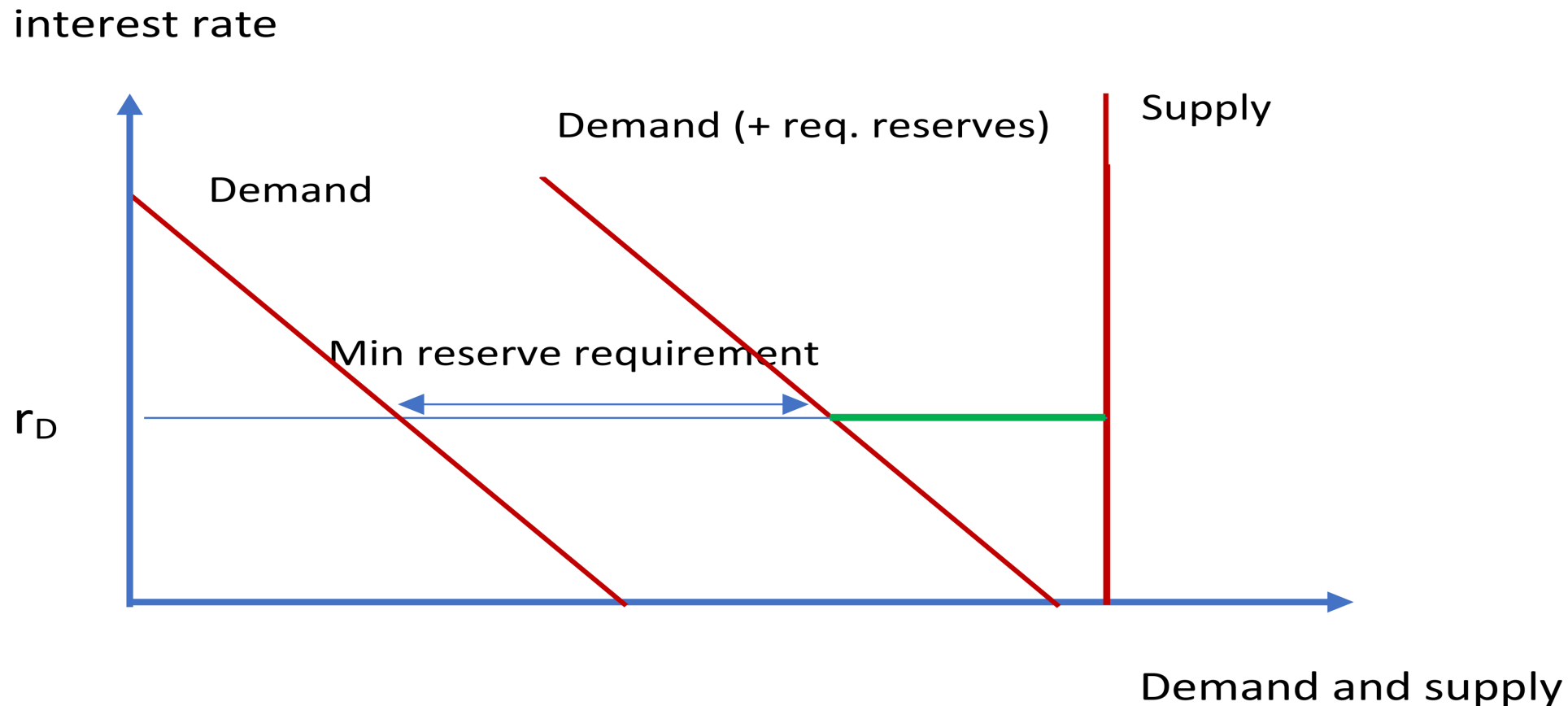
Advantages of two-tier system

Table: Total reserves (Aug 23), minimum reserves and transfers (billion euros)				
total reserves	percent min res	min reserves	reduction transfer	excess reserves
€ 3.818	1%	€ 168	€ 7	€ 3.650
€ 3.818	5%	€ 840	€ 34	€ 2.978
€ 3.818	10%	€ 1.680	€ 67	€ 2.138
€ 3.818	15%	€ 2.520	€ 101	€ 1.298
Note: total reserves = deposit facility + current accounts (min reserves)				

- ECB could reduce transfers profits to banks applying reasonable minimum reserve requirements
- Thereby reducing transfers significantly
- Maintaining operating procedure
- Window of opportunities has been opened recently when ECB stopped remunerating MRR (1%)

MRR combines fairness with effectiveness

- The existence of non-remunerated minimum reserve requirements reduces the profitability of credit transformation by banks.

- As a result, a reverse equity effect is set in motion.

- By reducing the profit margins of banks, the use of unremunerated minimum reserve requirements tends to reduce the net worth (equity) of banks.

- With a lower net worth banks will be less willing to take risks by extending loans.

- As a result, loan supply declines and the loan rate must increase.

- Thus, the use of minimum reserve requirements together with the interest rate instrument makes the fight against inflation more effective.

- Or put differently, the central bank would not have to increase the policy rate as much as it does today to have the same effect on bank credit.

MRR as a temporary measure

- A combination of sustained sales of government bonds and minimum reserve requirements would probably be the best policy option.

- Thus, the central bank would raise minimum reserve requirements as in Figure 6.

- It would then gradually start reducing its bond holdings allowing the supply curve to shift to the left.

- This also would make it possible for the minimum reserve requirements to be relaxed gradually.

- In such a strategy, both the supply and the demand curves in Figure 6 would then shift to the left, maintaining a regime of reserve abundance and allowing the central bank to use its monetary policy tools while reducing the subsidies to banks.

Conclusion

- Change in operating procedure from reserve scarce regime (before 2015) to reserve abundant regime has created major problems today.
- They led to massive transfers of central banks' profits to banks
- These large transfers raises fairness issue
- They reduce the effectiveness of monetary policy to fight inflation
- These transfers can be reduced significantly without affecting the central banks' operating procedures
  - by using a two-tier system of reserve requirements
- This will also lead to a significant decline in the losses of the central banks and increase effectiveness of monetary policy.
- There is a window of opportunities to introduce such a system today

Rethinking the role of minimum reserves

- Since the 1980s minimum reserve requirements are increasingly seen as introducing important inefficiencies in the financial markets
- that have negative effects on the optimal allocation of capital
- This coincided with paradigm shift:
  - a shift that stressed the use of market forces
  - and that frowned upon policy induced distortions.
  - In this view: if minimum reserve requirements are used, they should be remunerated (Friedman(1960))
  - Remuneration minimizes distortions
- Central banks abandoned minimum reserve requirements based on efficiency grounds, setting aside stabilization concerns
- Time to rethink

The transmission of monetary policies:
Loans to households (growth rate, in yearly percent changes)

	(1)	(2)	(3)	(4)	(5)
	All sample	Top 50%	Top 50% exclude	Top 50% exclude	Bottom 50%
Lag reserve	6.11***	7.45***	2.92	1.79	-0.82
	[1.51]	[0.81]	[2.32]	[1.97]	[4.66]
Policy rate	-1.05***	-0.98***	-1.10***	-1.30***	-1.90***
	[0.21]	[0.22]	[0.22]	[0.39]	[0.12]
Ln (oil price)	-2.44***	-3.04***	-3.19***	-3.67***	-3.02**
	[0.84]	[0.76]	[0.68]	[0.44]	[1.06]
Change in remuneration	1.08***	1.00***	1.38***	1.44***	2.76**
	[0.24]	[0.22]	[0.24]	[0.31]	[0.88]
Consumer confidence				0.04	0.29**
				[0.32]	[0.11]
Constant term	Yes	Yes	Yes	Yes	Yes
Fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	216	106	84	72	97
R^2	0.658	0.778	0.749	0.828	0.866

Total effects of a one percent rate hike on the % change loans to households (Top 50% sample)
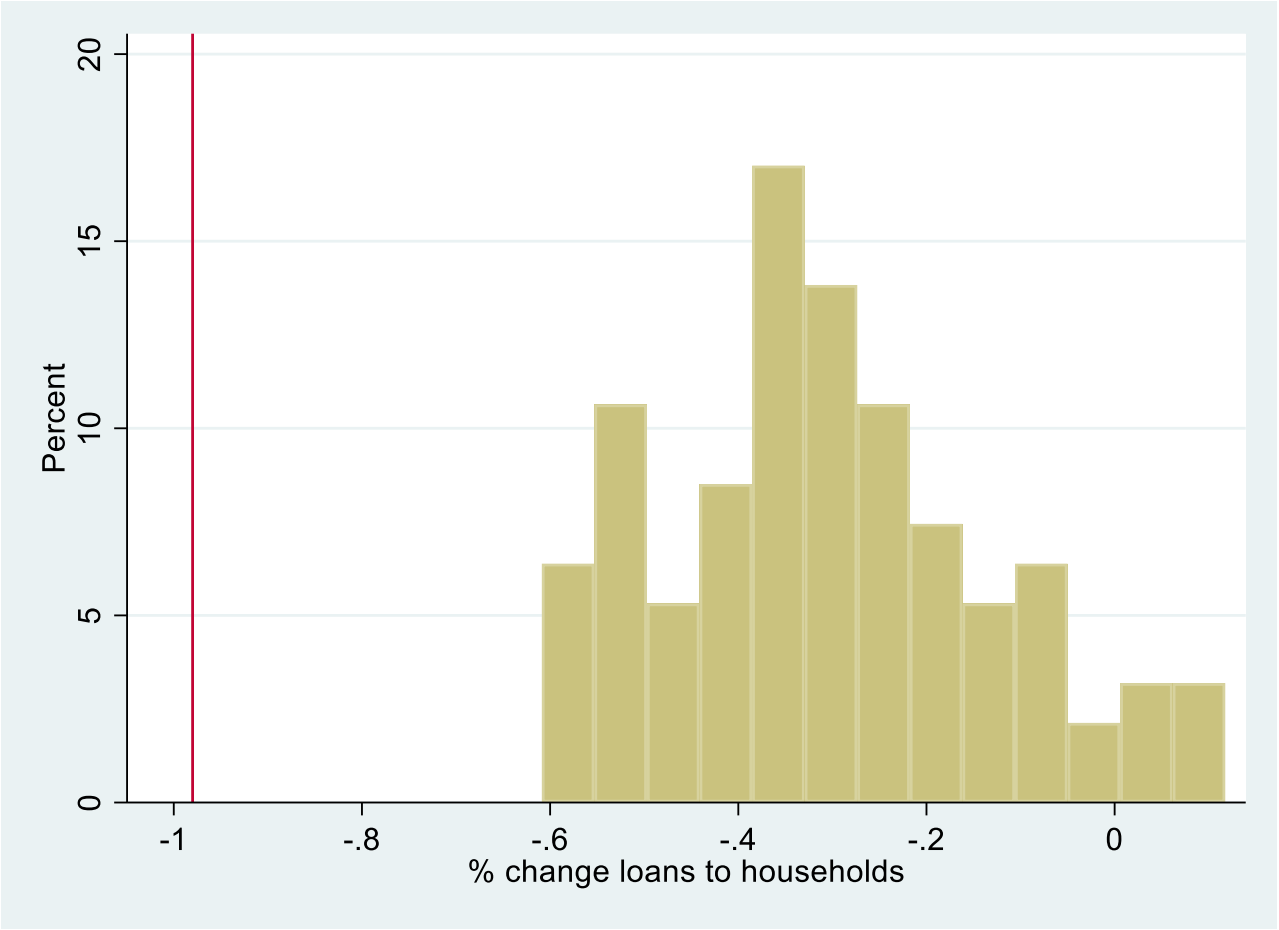
Problems of MRR in Eurozone: heterogeneity

- The distribution on bank reserves is uneven in Eurozone
- And so is the share of minimum reserves in total reserves

Minimum reserves as percent of total reserves

Austria	5,6%
Belgium	3,3%
Cyprus	2,9%
Germany	5,6%
Estonia	6,6%
Spain	7,5%
Finland	3,4%
France	4,7%
Greece	5,7%
Ireland	5,5%
Italy	9,2%
Lithuania	8,8%
Luxembourg	6,1%
Latvia	6,6%
Malta	14,9%
Netherlands	5,0%
Portugal	7,4%
Slovenia	5,3%
Slovakia	4,8%

Heterogeity of distribution of reserves
Example Italy:

- Has a high proportion of minimum reserves in total reserves
- A minimum reserve ratio of more than 10% would lead Italian banks into scarcity of excess reserves to satisfy MRR
- They would have to borrow reserves in interbank market
- Thus, MRR should not exceed 10%
- As long as MRR < 10% no significant problem with heterogeneity

Source: ECB, Disaggregated financial statement of the Eurosystem