

Practical Monetary Policy II: Unconventional Policies

PhD Course in Monetary
Economics

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Negative policy rate




















Negative repo rate

- Theory: limit because of cash
- In practice: lower than zero is possible
- Broad transmission
- No direct losses on the Riksbank's balance sheet
- Administrative & technical problems for banks and markets?

Negative repo rate

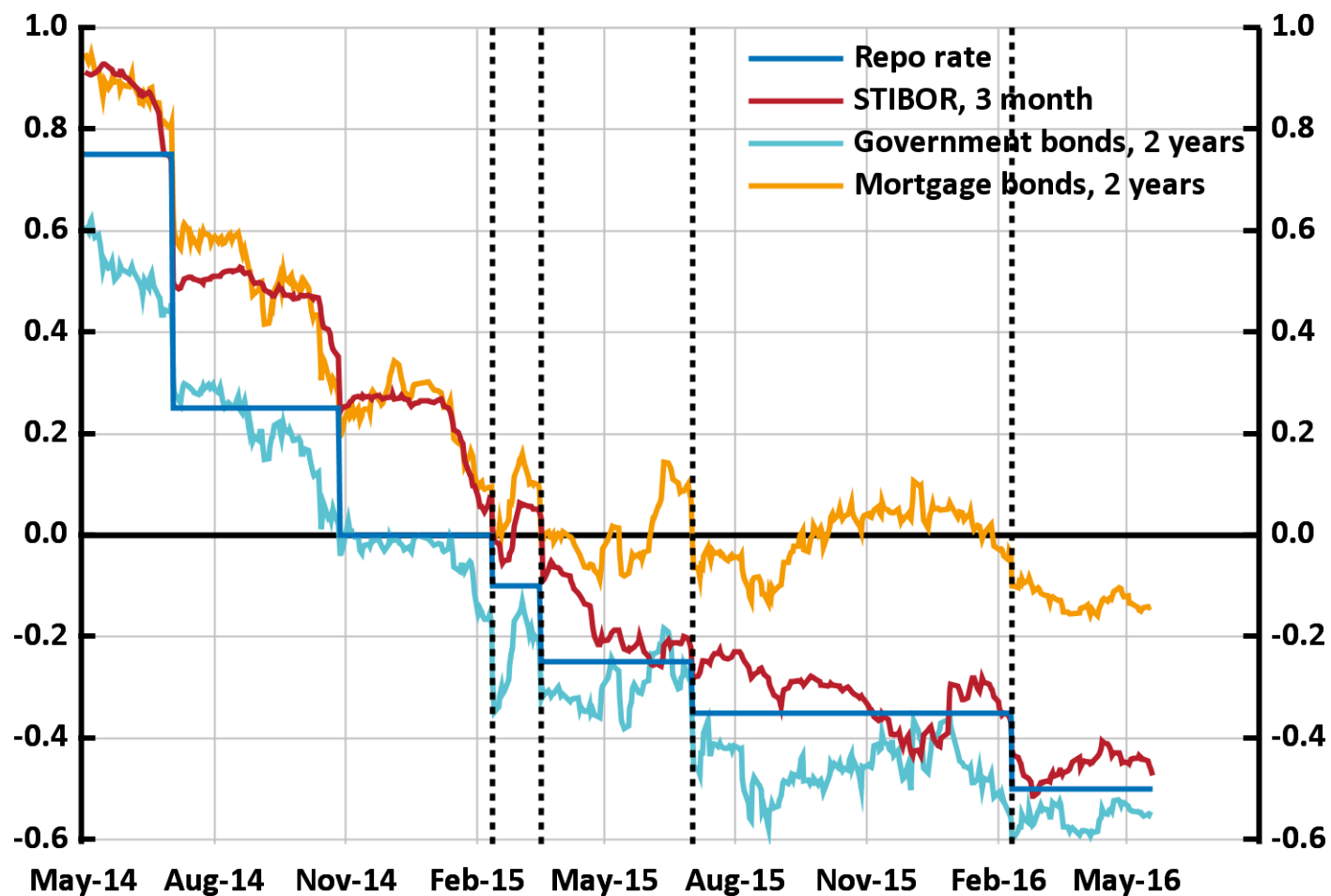
- Transmission rather normal
 - Interest-rate channel
 - Exchange-rate channel
- Technical problems?
 - FRN market: yes
 - IT systems: some
 - Cash: not yet
- Other?
 - Media attention
 - Outflow from money-market funds
 - Search for yield, asset prices
 - Banks' margins
 - Pension funds

Table 1. Schematic representation of effects which occur when the repo rate is negative

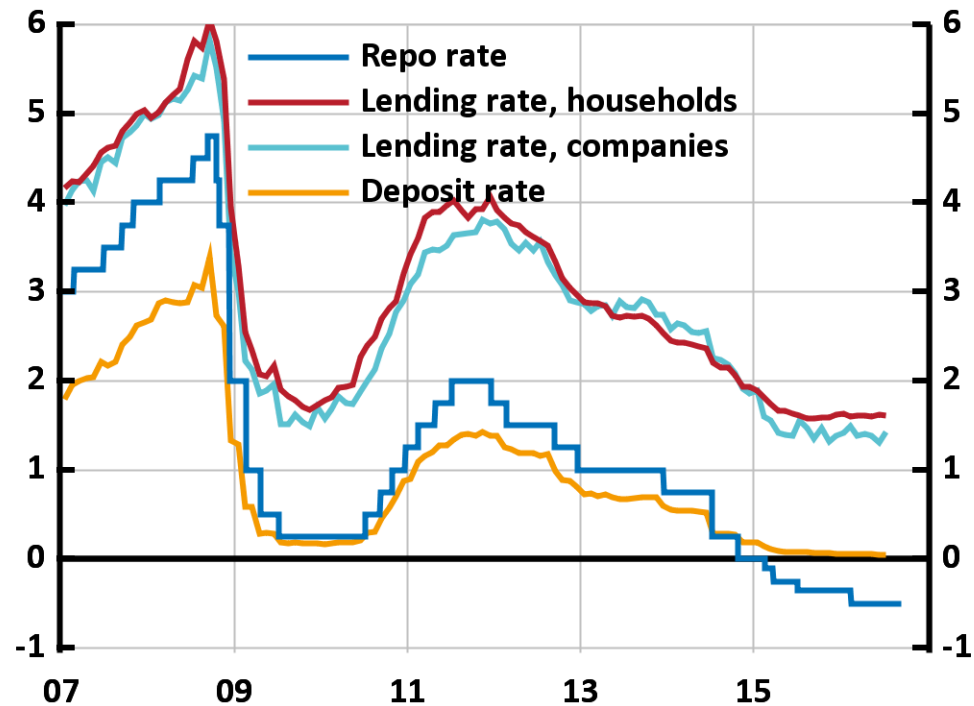
FRICTIONS					RISKS
Lowering the repo rate to	Deposit rate (households)	Lending rate	Interest rate channel	Cash is profitable	Additional stability risks at different levels of the repo rate
Weakly negative 	Does not follow 	Follows 	OK 	No 	Exaggerated risk-taking 
Very negative 	Follows 	Partially follows 	Weak 	For some 	FRN, reallocation of deposits 
		Does not follow 	Very weak 	For many 	
		Follows 	Weak 	For most 	Liquidity risks for banks 

Interest rates

Percent



Impact on interest rates for households and companies



Per cent. MFIs' average deposit and lending rates for companies and households.

Sources: Statistics Sweden and the Riksbank

Negative repo rate: Further remarks

- Two lower bounds:
 - Technical: substitution to cash, market disruptions, new behavior
 - Effectiveness: transmission through the normal channels? ("currency wars"?)
- Bank profits
 - Too much focus on negative rates on excess liquidity. This matters for the technical lower bound (when will banks convert to cash?)
 - The negative rate is *not* a tax on bank reserves
 - The funding side on bank balance sheets is more interesting. This is where we see non-normal effects of negative rates (deposit rates to households are not reduced below zero)
- Be careful with causality
 - Which problems are caused specifically by negative rates? By low policy rates?
 - Which problems are caused by low interest rates? I.e. by low long-run real rates, by low growth, and low inflation (and expectations about these)?
 - Examples:
 - Life insurers and pensions funds → search for yield vs. money market funds
 - Flatter yield curves and banks' business models

Money, QE, central bank finances, ...

Questions

- What is money?
 - "Monetary base"?
 - "Central bank money"?
- Can a central bank go bankrupt?
 - When are central banks financially independent?

Money and operational frameworks

What is monetary policy?

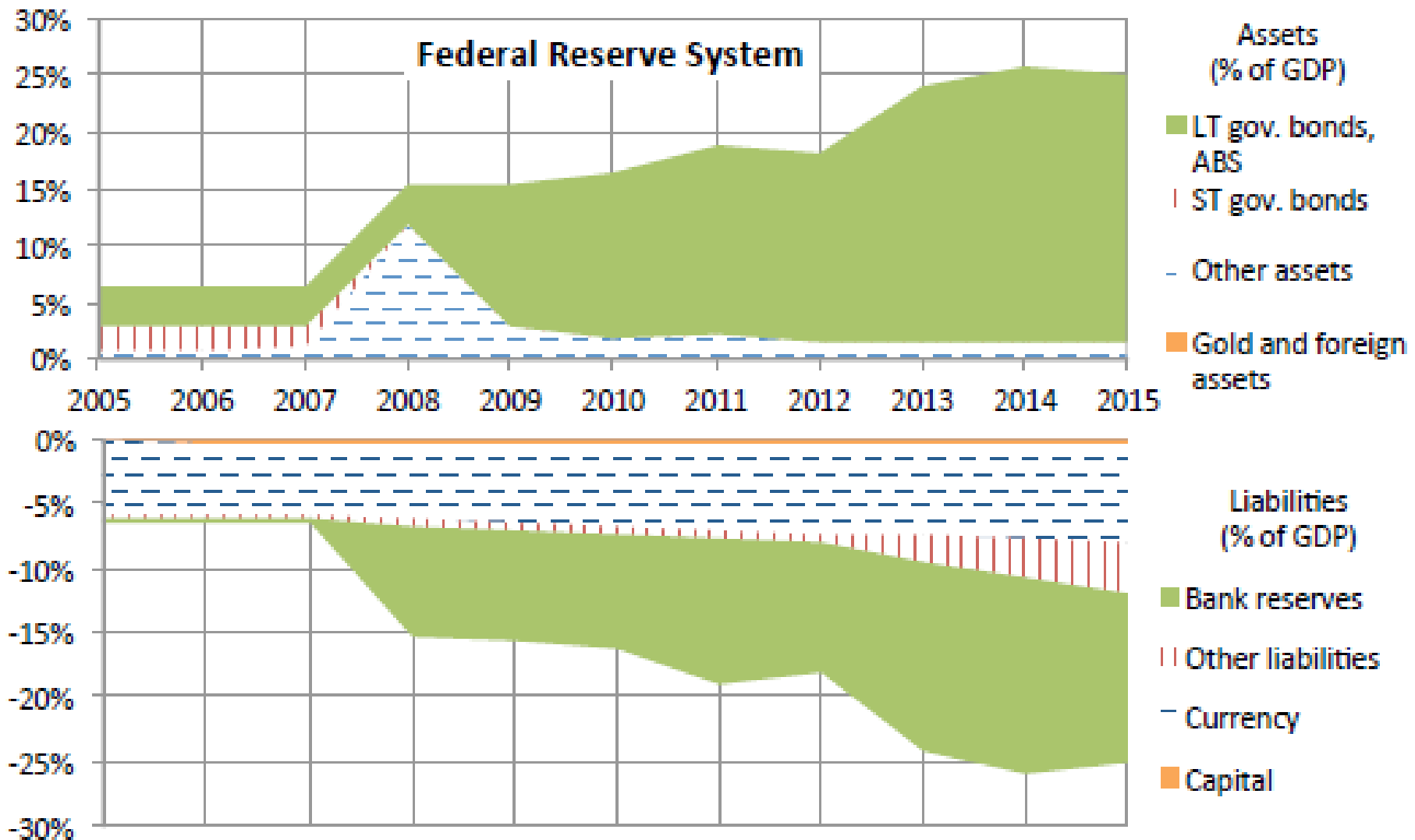
(Goodfriend, 2009)

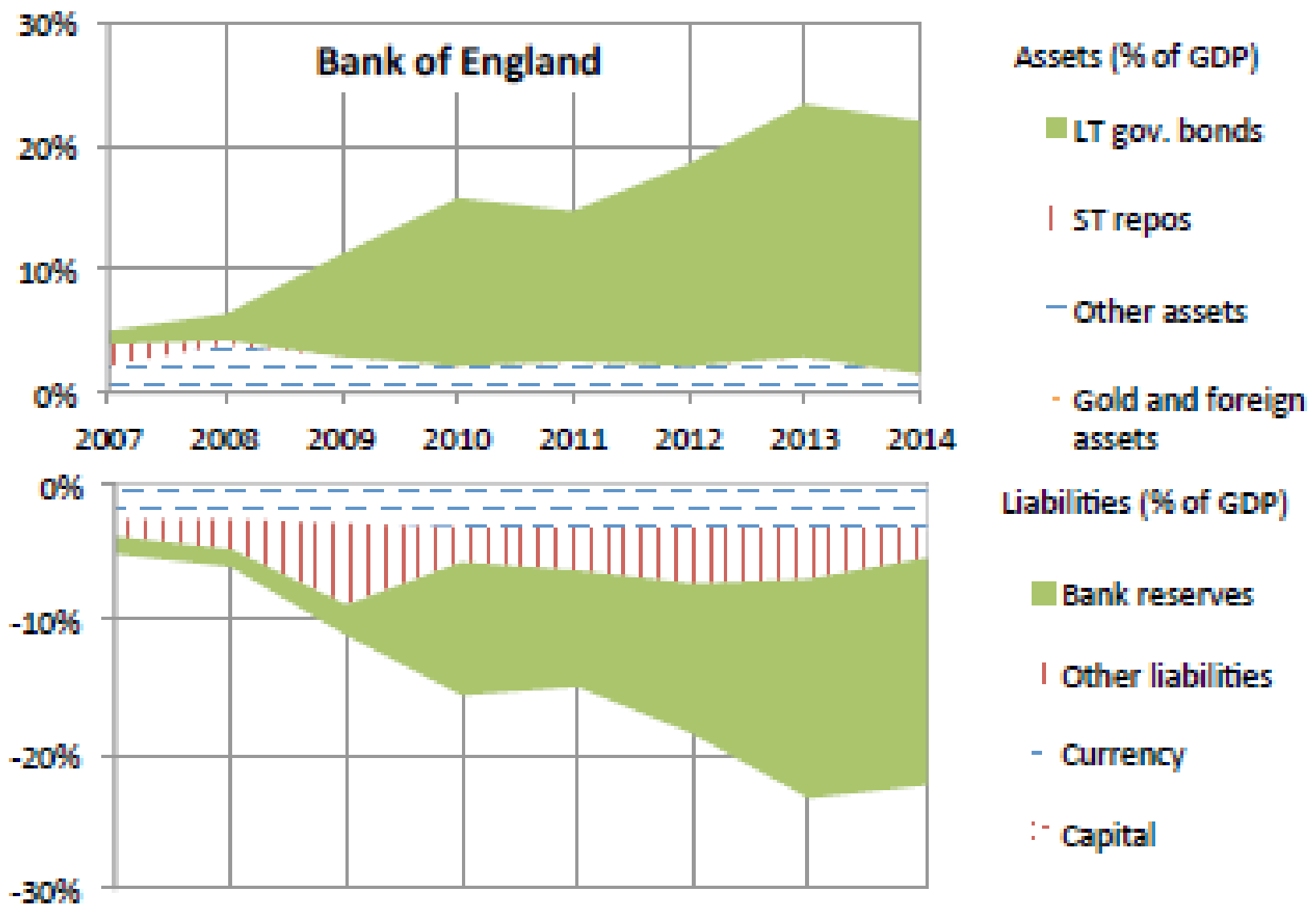
Required + voluntary reserves?

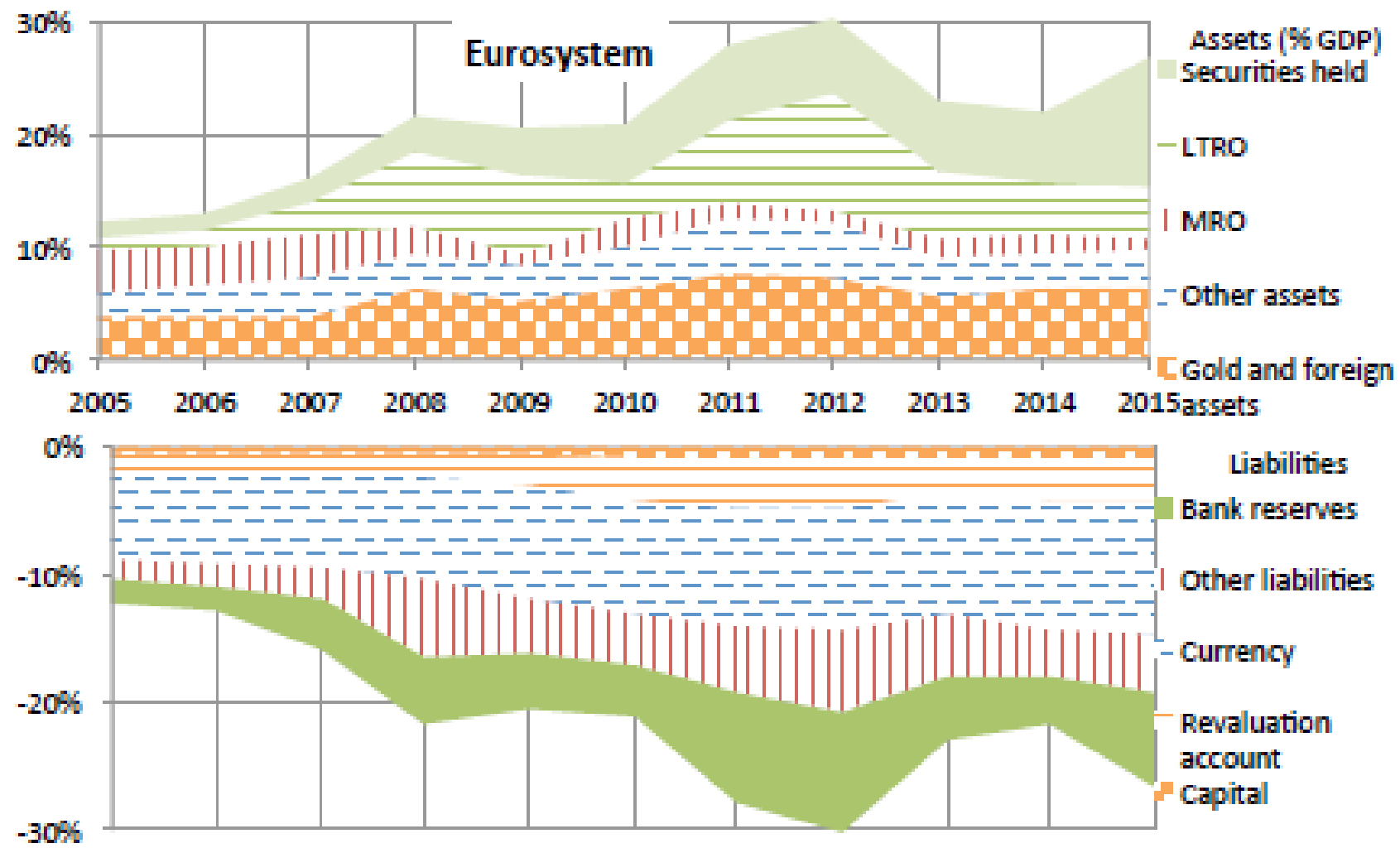
”Monetary policy consists of open market operations that expand or contract high-powered money (bank reserves plus currency) by buying or selling treasury securities.”

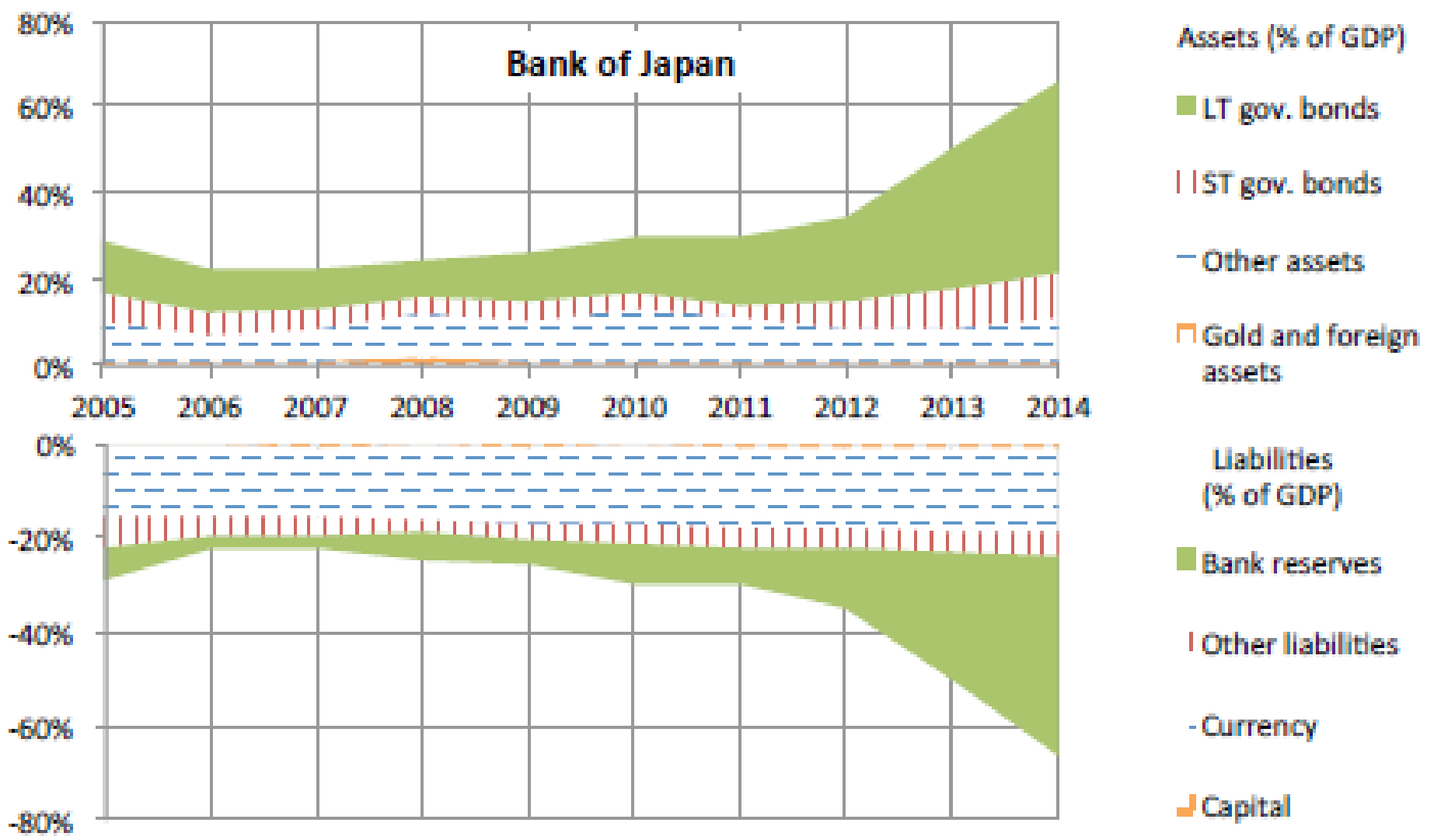
”Pure monetary policy works by varying the aggregate quantity of bank reserves to influence the spread between the federal funds rate and interest paid on reserves.”

”Interest on reserves policy consists of varying interest that a central bank pays on bank reserves, holding monetary policy ... fixed.”

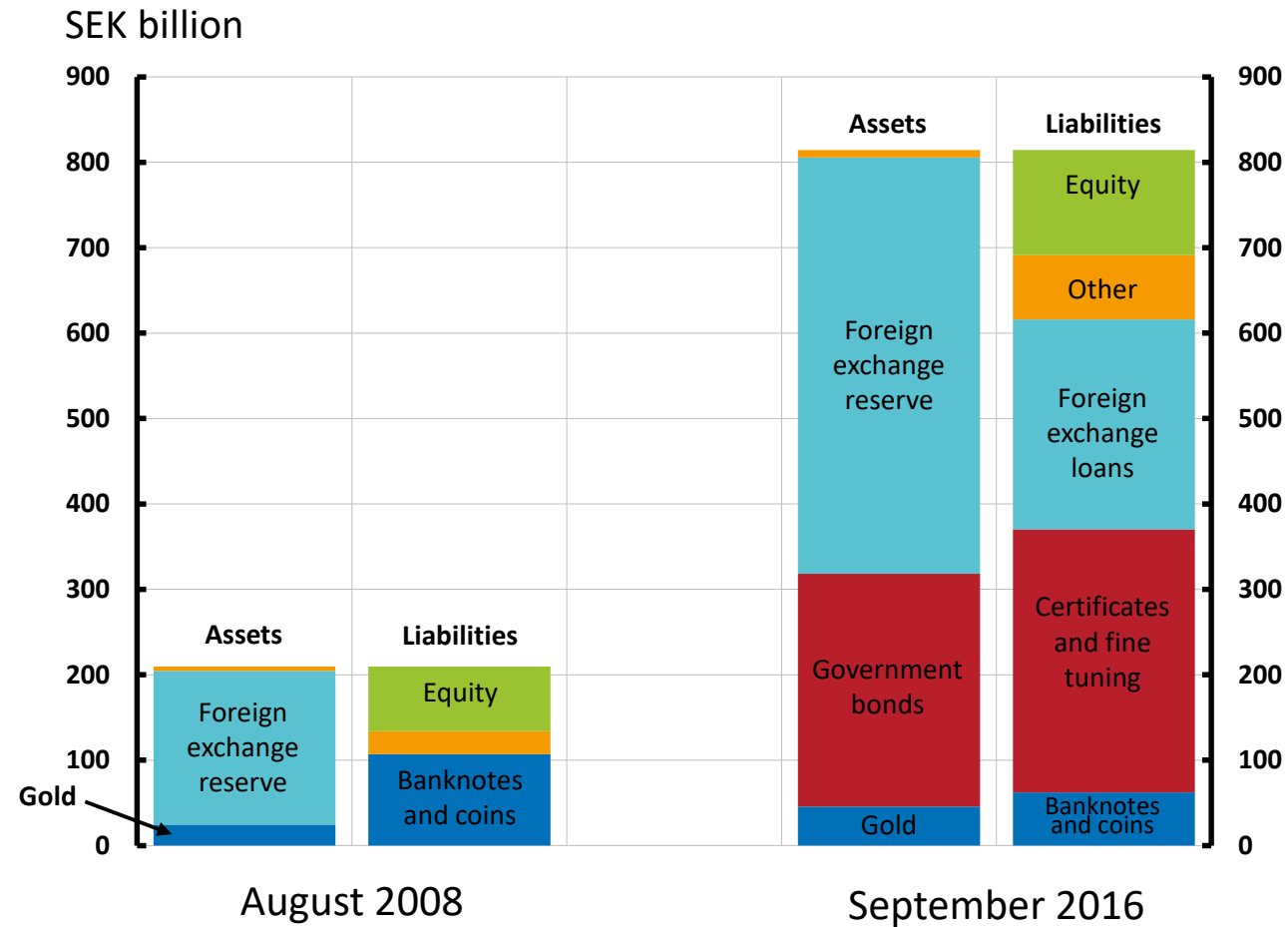








The Riksbank's balance sheet



Interest on reserves

- Let i denote the central bank's policy rate and let i^m denote interest paid on the monetary base
- If $i^m = 0$ and $i > 0$
 - A change in i must be accompanied by a change in high-powered money (open market operations), and vice versa
- If $i^m = 0$ and $i = 0$
 - High-powered money can vary even if i is held constant at zero
- If $i^m \equiv i \geq 0$
 - High-powered money and i can be determined separately

The Riksbank's operational framework

- No reserve requirement
- $i^m = i$ on excess liquidity ("voluntary" reserves)
- Little demand for cash

Neutrality of QE, helicopter money, ...

QE vs helicopter money

- QE: Central bank purchases assets
 - Domestic assets (QE), foreign assets (QEE)
- Helicopter: Central bank reduces its equity

Effect on central bank balance sheet

QE		Helicopter money	
Assets	Liabilities	Assets	Liabilities
FX reserves	Notes and coins	FX reserves	Notes and coins
Gold	Bank reserves ↑	Gold	Bank reserves ↑
Domestic assets ↑	Equity	Domestic assets	Equity ↓

Neutrality of QE

- Money demand: $\frac{M}{P} \geq L(i, Y), \quad \frac{M}{P} = L(i, Y) \text{ if } i > 0$
- Think of M here as cash or non-interest reserves
- In a liquidity trap (i.e. when $i = 0$), an arbitrarily large M can be implemented
- Suppose we do QE to temporarily raise M in the liquidity trap. This should have no effect on prices or output, precisely because we are in a liquidity trap
- But note that M cannot be decided independently of the interest rate when $i > 0$

Neutrality of QE (2)

- Note that M cannot be decided independently of the interest rate when $i > 0$
- Suppose we do QE to *permanently* raise M
 - This is only possible if we also plan to change the path for interest rates – a higher M outside of the liquidity trap is only possible if the interest rate is then lower
 - Rather than (or equivalently to) doing QE, we could announce that the policy rate will be lower in the future (forward guidance, ...)
- In practice, of course, there can be differences if households or other agents *think* that those policies are different

Neutrality of QE – interest on reserves

- What about QE by expanding reserves that pay interest?
- QE then exchanges one asset for another with similar return and default risk, but typically with different maturity
 - Riksbank certificates have one-week maturity, pays the repo rate, can be traded and used as collateral
 - Does maturity transformation matter?
- Similar to "Operation Twist" (Fed 1961, 2011-2012)

Effect on central bank balance sheet

Riksbank QE		Operation Twist	
Assets	Liabilities	Assets	Liabilities
FX reserves	Notes and coins	Gold	Notes and coins
Gold	Certificates (and fine tuning) ↑	↓ Treasury bills	Bank reserves
↑ Government bonds	Equity	↑ Treasury bonds (long-term)	Equity

Neutrality of helicopter money (?)

- Ignore uncertainty, assume constant real interest rate, suppose only 1-period debt. Let f denote (real) fiscal surplus and d (real) central bank dividends
- Government budget constraint:

$$\frac{B_t}{P_t} \leq \sum_{j=0}^{\infty} (1+r)^{-j} (f_{t+j} + d_{t+j})$$

- Central bank per-period budget constraint:

$$s_t + v_t = (1+r)v_{t-1} + d_t$$

where s is real seignorage ($s_t = (M_t - M_{t-1})/P_t$) and v is voluntary reserves

- Central bank budget constraint:

$$(1+r)v_{t-1} = \sum_{j=0}^{\infty} (1+r)^{-j} (s_{t+j} - d_{t+j}) + \lim_{j \rightarrow \infty} (1+r)^{-j} v_{t+j}$$

Neutrality of helicopter money (2)

- Money demand: $\frac{M_t}{P_t} \geq L(i_t, y), \quad \frac{M_t}{P_t} = L(i_t, y) \text{ if } i_t > 0$
- For given path of nominal interest rates, income and prices, let $\sigma_t = \sum_{j=0}^{\infty} (1 +$

Neutrality of helicopter money (3)

- Impose the no-Ponzi condition on the central bank's issued reserves
- The combined government and central bank balance sheets is then

$$\frac{B_t}{P_t} + (1 + r)v_{t-1} \leq \sigma_t + \sum_{j=0}^{\infty} (1 + r)^{-j} f_{t+j}$$

- This is just a standard Ricardian equivalence (Modigliani Miller?) type of result
 - Extra dividends from the central bank to the government (helicopter money) gives the government more disposable resources in the short run but also reduces the central bank's future dividends
 - But helicopter money could have an effect if, for some reason, the government responds to the extra dividends by changing its behavior (lower f), or if someone's expectations are affected

Neutrality of helicopter money (4)

- Should the no-Ponzi condition be imposed on the central bank's balance sheet?
- Is there a difference between government debt and central bank debt?
- Buiter: no-Ponzi should not be imposed. Reis: it should be imposed.
 - I think the conclusion is still basically the same.
 - Reis' budget constraint is in real terms. The no-Ponzi condition can (and will be) enforced through higher inflation
 - An extreme liquidity trap where the nominal interest rate is expected to remain at zero for all future (as discussed in Buiter) can therefore be avoided
- Difference between gvt and cb debt: government more likely to do outright default, cb more likely to default through inflation

Two helicopter examples

- Consider the central bank's dividend policy and strategy for managing its equity
- If the central bank avoids losses, or if it tries to restore its equity whenever it has suffered losses, **it imposes the no-Ponzi condition on itself**
- Then its "helicopter drops" will fail
- If, on the other hand, it tries to ignore the no-Ponzi condition the market should force the bank to default through inflation

Example 1: If CB imposes no-Ponzi condition, then "Ricardian equivalence"

- Suppose that the central bank pays its profit flow to the treasury as dividends
- Suppose that the central bank initially has assets = A_0 and liabilities equal to $V_0 + E_0$. Its per-period profits (and dividends) are $D_1 = i(A_0 - V_0) = iE_0$, and the NPV of the dividends are (if $i > 0$)

$$\sum_{j=0}^{\infty} (1+i)^{-j} iE_0 = (1+i)E_0$$

- Suppose that the CB pays an extra dividend in the first period, $\widehat{D}_1 = iE_0 + \delta$ where $\delta > 0$ (this is the helicopter drop). Its per-period profits will then fall by $i\delta$ so that $\widehat{D}_t = iE_0 - i\delta$ for $t \geq 2$.
- The NPV of the sum of the dividend and future profits is again $(1+i)E_0$:

$$\sum_{j=0}^{\infty} (1+i)^{-j} \widehat{D}_{t+1+j} = iE_0 + \delta + (1+i)^{-1} \sum_{j=0}^{\infty} (1+i)^{-j} (iE_0 - \delta) = (1+i)E_0$$

- The NPV of future dividends will thus fall by the same amount as the dividend if the central bank sticks to its dividends policy
- The treasury's (NPV) budget will therefore not be affected. This is similar to Ricardian equivalence. The helicopter drop will fail if the treasury understands this mechanism and chooses to not raise spending in response to the dividend payment from the central bank.

Example 2: CB violates the no-Ponzi condition

- But suppose instead that the central bank continues paying dividends $\widehat{D}_t = iE_0$ for all $t \geq 2$ in spite of profits now being lower. The NPV of all dividends are then $(1 + i)E_0 + \delta$.
- But then equity develops according to $E_t = E_0 - (1 + i)^{-(t-1)}\delta$
- For $i > 0$, this implies that $\lim_{t \rightarrow \infty} E_t = -\infty$ and $\lim_{t \rightarrow \infty} (1 + i)^{-(t-1)}E_t = -\delta$
- So the central bank cannot restore its equity. It will remain "insolvent" forever, also in present-value terms. So it will violate the no-Ponzi condition. But that need not be a problem, at least not in theory...

Helicopter money

- In practice, there may be a number of constraints:
- Legal (e.g. Maastricht treaty)
 - Institutions are built to prevent too high inflation
- Mandate, tools
 - Who decides on dividends?
- Reputational

Sweden



- The Riksbank's dividends to the "treasury" are decided by parliament after recommendation from the general council (*not* the executive board)
- Dividends normally set according to a predetermined rule (80% of profits)
- If the Riksbank makes losses, e.g. as a consequence of our QE, dividends will be lower in the future

Conclusions and reflections

- Again, much of this boils down to expectations
 - In a strict theoretical sense, helicopter money should only work outside permanent liquidity traps if the central bank is prepared to let its equity explode towards negative infinity
 - But if the central bank is prepared to do that, prices and/or interest rates should respond, and maybe the central bank need not deliver. We need a richer model with endogenous prices and interest rates to analyze this (maybe also endogenous consumption and production).
- In practice, helicopter money would most likely work in spite of these theoretical, Ricardian, objections
- Is there really a fundamental difference between money and public debt?
 - Does the government really have to respect the no-Ponzi restriction?
 - Some would probably argue that it need not. Fiscal theory of the price level...
 - I see a difference: It is more likely that a government defaults on its debt payments than that a central bank “defaults”. High public debt may result in high nominal interest rates both because of default risk and inflation risk. Helicopter money is more likely to only affect the inflation outlook.

Fiscal theory of the price level

Fiscal theory

Leeper & Leigh (Handbook of Macro, 2016):

“Nominal debt is much like government-issued money: it is merely a claim to fresh currency in the future. The government may choose to raise taxes to acquire the requisite currency or it may opt to print up new currency, if currency creation is within its purview. Because the value of nominal debt depends on the price level and bond prices, the government really does not face a budget constraint when all its debt is nominal.”

Fiscal theory

- Key equation:

$$\frac{B_{t-1}}{P_t} = \sum_{j=0}^{\infty} (1+r)^{-j} (f_{t+j} + d_{t+j})$$

- And Fisher equation
- The fiscal surplus and nominal interest rate are policy variables. The policy rules for these variables jointly determine (or not) the price level

Fiscal theory

Regime M

- Monetary Policy: targets inflation by raising nominal interest rate
more than one-for-one with inflation
- Fiscal Policy: raises taxes when real government debt rises by enough
to cover real debt service and to eventually retire
the increase in principal
- Label: *Active Monetary and Passive Fiscal Policy*
-

Regime F

- Monetary Policy: adjusts nominal interest rate weakly in response to inflation to ensure
that interest payments on government debt do not destabilize debt
- Fiscal Policy: makes taxes unresponsive to state of government indebtedness
and the price level
- Label: *Passive Monetary and Active Fiscal Policy*
-

Policy Rules

- Monetary Policy: $i_t = \bar{i} + \alpha(\pi_t - \pi^*) + \varepsilon_t^i$
- Fiscal Policy: $T_t = \bar{T} + \gamma(b_{t-1} - b^*) + \varepsilon_t^T$

$|\alpha| > 1, |\gamma| > 1$: active monetary/passive fiscal policies “Regime M”

$|\alpha| < 1, |\gamma| < 1$: passive monetary/active fiscal policies “Regime F”

Fiscal theory and the lower bound

- Suppose that monetary policy is constrained by the effective lower bound (ELB)
- We are then arguably in a regime with passive monetary policy
- The price level will/can then be determined by fiscal policy. To regain control over the price level, we then need fiscal policy to move to the active regime!

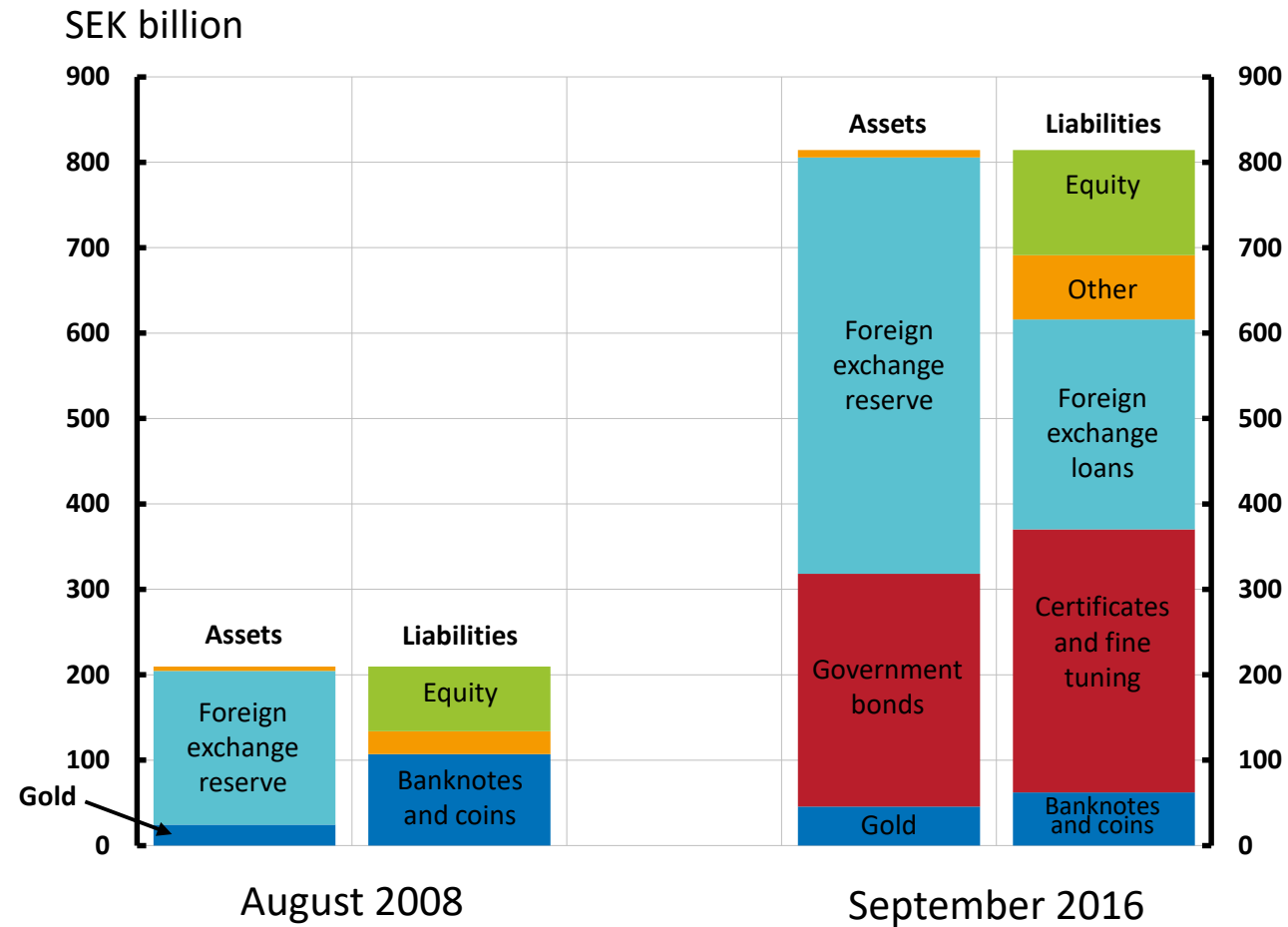
More on central bank finances

QE and low interest rates: implications for the Riksbank's finances?

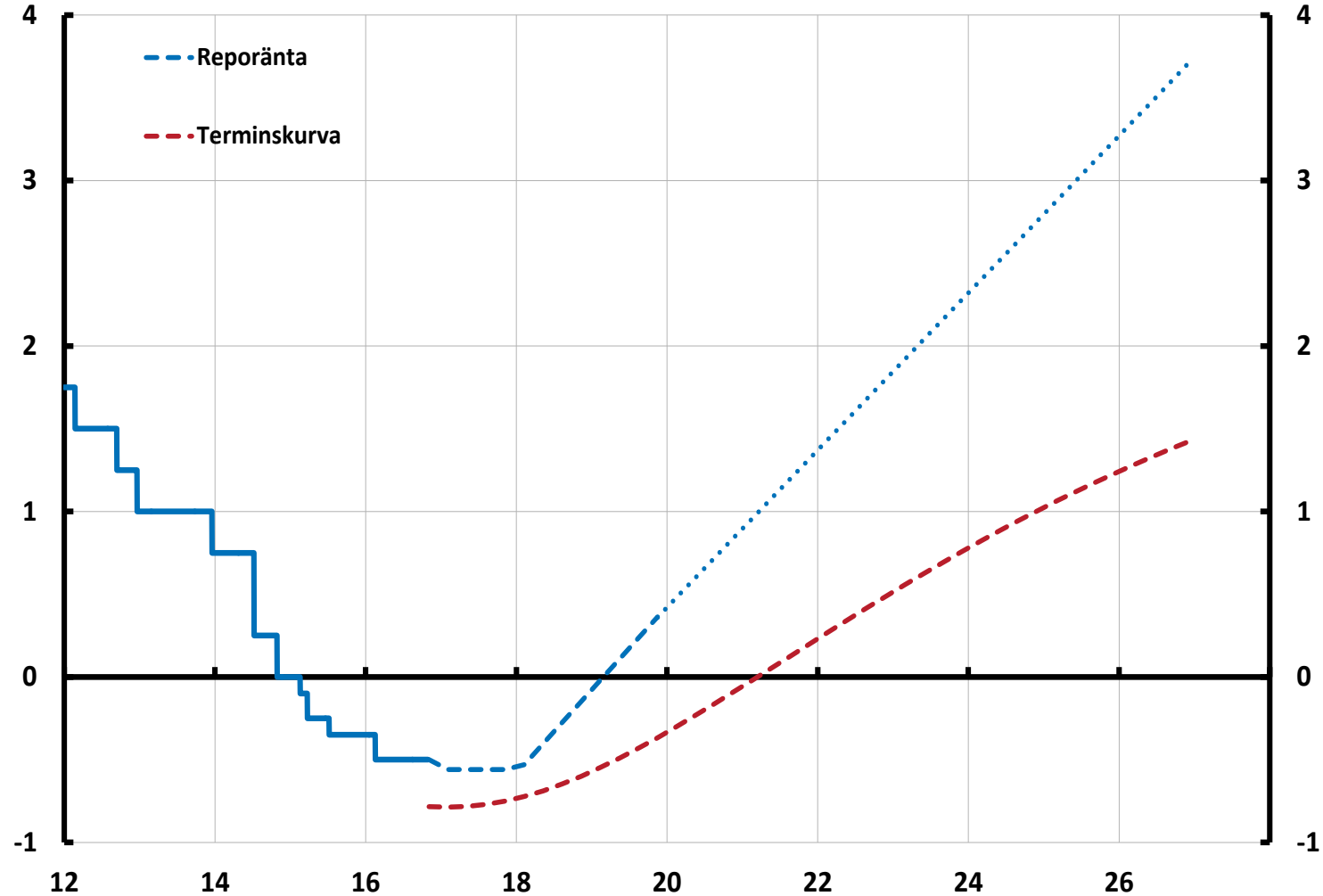


- Lower interest rates means lower "profits", lower return on our assets
 - QE leads to interest-rate risk
 - So far, lower interest rates have strengthened our balance sheet
 - But likely that losses will follow
-
- Many central banks today have much more risk (interest rates, exchange rates, default, valuations) than before the GFC!

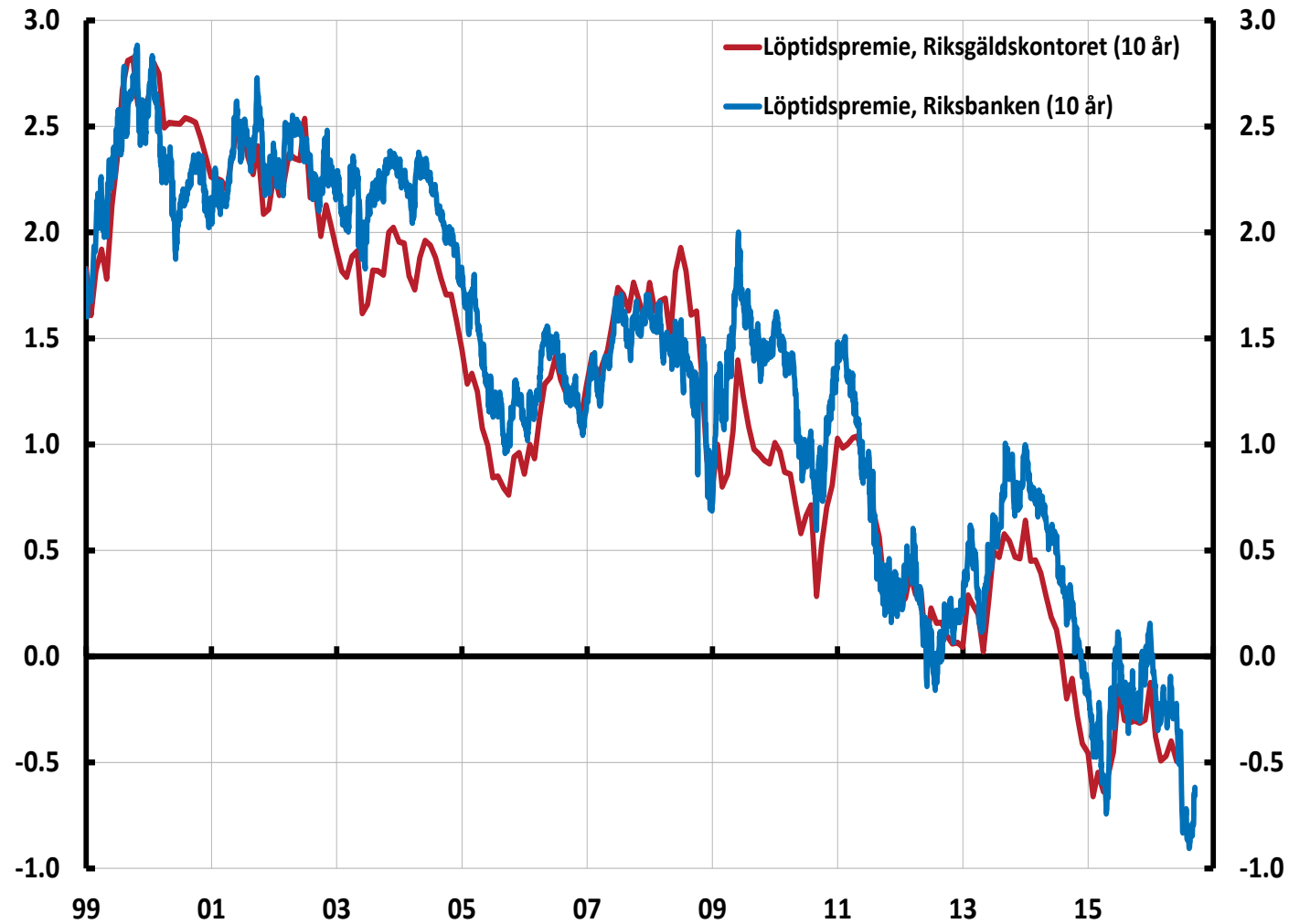
The Riksbank's balance sheet



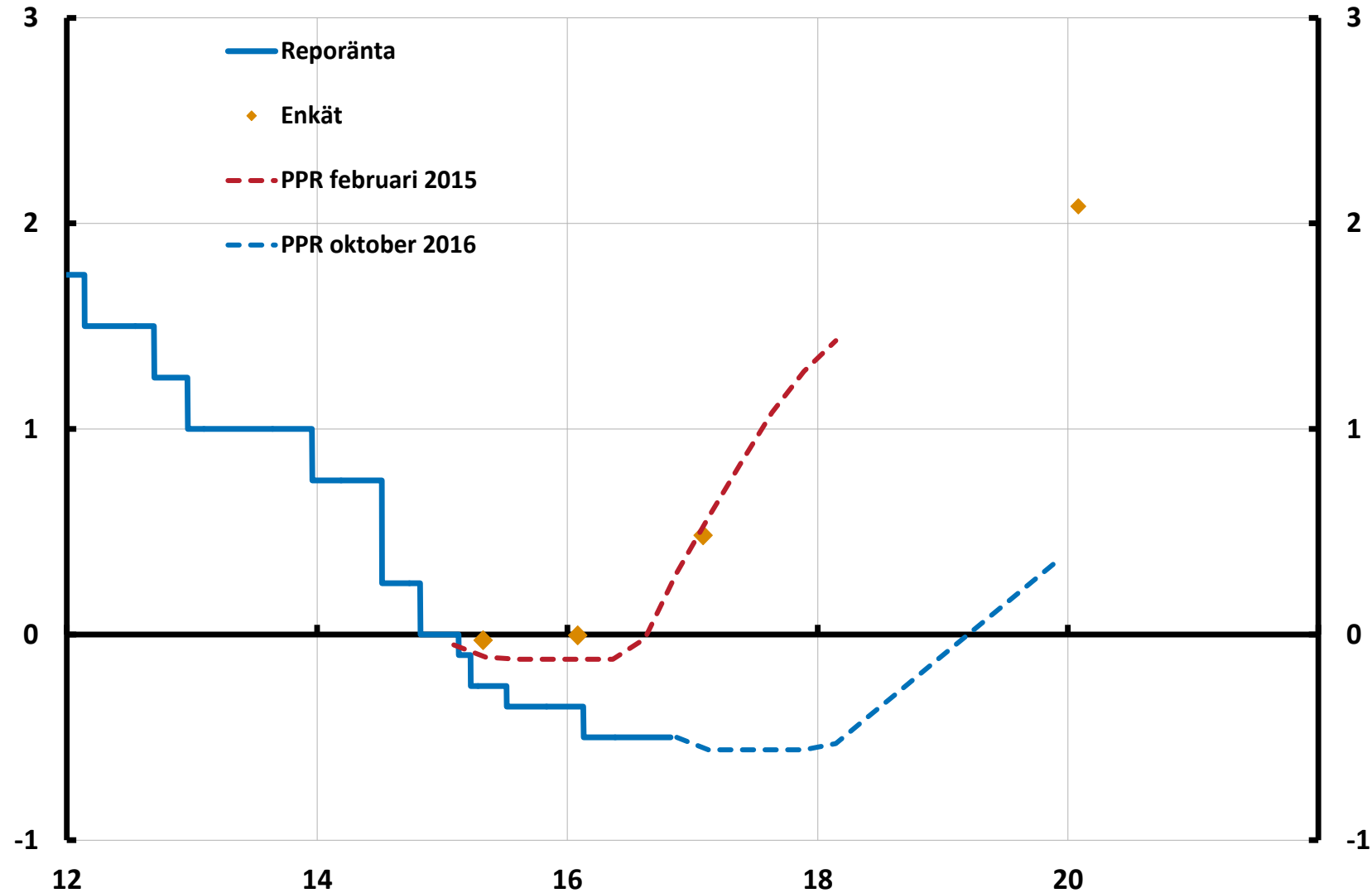
Riksbank QE: yield in accordance with the yield curve (red) but funding at the repo rate (blue)



Estimated term premia on Swedish government bonds



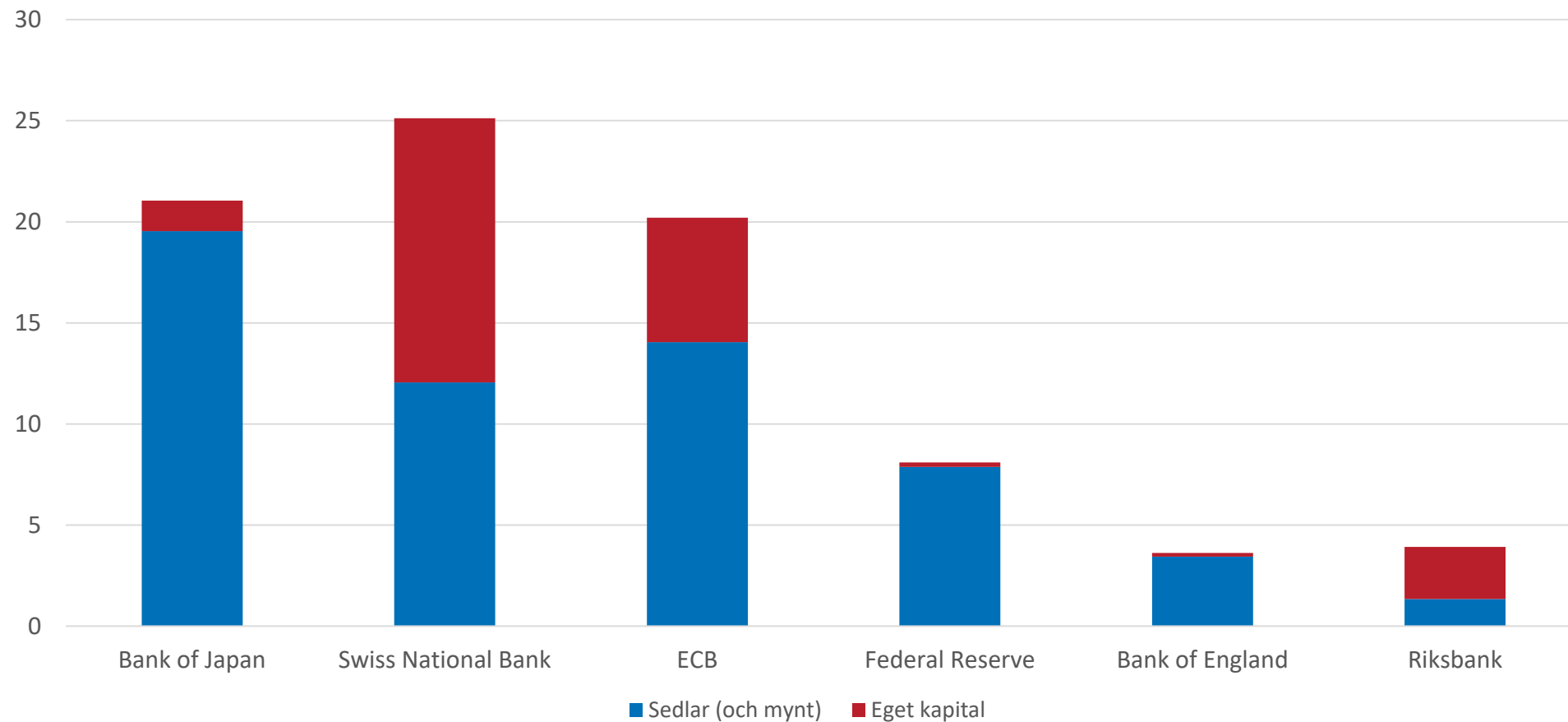
Actual and expected interest rate developments



Can a central bank have negative equity?

- Equity is not particularly relevant for typical central banks
- Equity + banknotes more relevant
 - No funding costs for banknotes
 - In countries where there is large demand for banknotes, central banks can generate sufficient income to fund their activities even if equity is/becomes negative
- Little demand for banknotes in Sweden, so the Riksbank needs some equity to remain financially independent
 - Riksbank annual expenses ~SEK 900 mn

Centralbanks' free funding: banknotes (blue) and equity (red)



Note: Percent of GDP

Sources: Own calculations based on Riksbank, respective central bank, and IMF WEO