

# Lecture 4

## Monetary and fiscal interactions

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# Disclaimer

The views expressed in this presentation, and all errors and omissions, should be regarded as those solely of the author, and are not necessarily those of the Bank of England or Qatar Central Bank.

# Accounting

In the background there is a representative household BC (assume real income,  $y$ , is constant)

$$c_t + \frac{M_t}{P_t} + \frac{B_t}{P_t} = y - \tau_t + \frac{M_{t-1}}{P_t} + \frac{R_{Nom,t-1}B_{t-1}}{P_t}$$

- Left hand side: **Uses**

- Real consumption  $c_t$
- Real value of investment in money  $M_t/P_t$
- Real value of investment in nominal bonds  $B_t/P_t$

- Right hand side: **Sources**

- Post tax income  $y - \tau_t$
- Real payoff of previous investment in money  $M_{t-1}/P_t$
- Real payoff of previous investment in nominal bonds  $R_{Nom,t-1}B_{t-1}/P_t$

Could rewrite HH BC to be

$$c_t + \frac{B_t}{P_t} = y - \tau_t - \frac{M_t - M_{t-1}}{P_t} + \frac{R_{Nom,t-1} B_{t-1}}{P_t}$$

Where (see pre-recorded materials) we see **seigniorage** entering as an indirect 'tax' ('direct' taxation is captured in  $\tau_t$ )

The consolidated government budget constraint is given by

$$g_t = \tau_t + \frac{M_t - M_{t-1}}{P_t} + \frac{B_t - R_{Nom,t-1}B_{t-1}}{P_t}$$

where we assume for simplicity that only 1-period maturity *nominally* riskless bonds are issued

- Later we will discuss bond maturity in the context of losses central banks have recently made

We could make this somewhat richer by envisaging the government purchasing assets with a nominal gross return,  $R_{A,t}$

$$g_t + \frac{G_{I,t}}{P_t} = \tau_t + \frac{M_t - M_{t-1}}{P_t} + \frac{B_t - R_{Nom,t-1}B_{t-1}}{P_t} + \frac{R_{A,t}G_{I,t-1}}{P_t}$$

We could imagine specifying the 'fiscal authority's' budget constraint, distinct from the central bank (non-consolidated perspective)

$$g_t^F + \frac{G_{I,t}^F}{P_t} = \tau_t + \frac{R_{A,t} G_{I,t-1}^F}{P_t} + \frac{B_t - R_{Nom,t-1} B_{t-1}}{P_t} + \frac{T_{CB,t}}{P_t}$$

with  $G_{I,t}^F$  being purchases of assets by the 'Treasury' directly and  $T_{CB,t}$  being remittances from the central bank

For the central bank, we have

$$g_t^{CB} + \frac{G_{I,t}^{CB}}{P_t} - \frac{T_{CB,t}}{P_t} = \frac{M_t - M_{t-1}}{P_t} + \frac{R_{A,t} G_{I,t-1}^{CB}}{P_t}$$

Note:  $g_t \equiv g_t^F + g_t^{CB}$  and  $G_{I,t} \equiv G_{I,t}^F + G_{I,t}^{CB}$  (what is  $g^{CB}$ ?)

If we let  $N_t^{CB}$  be the central bank's (beginning of period) net worth or 'equity', its evolution is

$$N_{t+1}^{CB} = N_t^{CB} + R_{A,t} G_{I,t-1}^{CB} - G_{I,t}^{CB} + M_t - M_{t-1} - g_t^{CB} - T_{CB,t}$$

So far, have assumed base money is not interest bearing

- Haven't distinguished cash and reserves (WLOG traditionally)
- But what if interest is paid on reserves?
- Distinguish  $M^C$  and  $M^{RS}$  and note  $R_{t-1}^{RS} M_{t-1}^{RS}$  paid out to 'banks'
- Creating interest-bearing money is not 'costless' (reduces seigniorage)
  - What about cost of creating cash? Implicit in  $g^{CB}$

$$N_{t+1}^{CB} = N_t^{CB} + R_{A,t} G_{I,t-1}^{CB} - G_{I,t}^{CB} + M_t^C - M_{t-1}^C + M_t^{RS} - R_{t-1}^{RS} M_{t-1}^{RS} - g_t^{CB} - T_{CB,t}$$



## Central bank balance sheet (simplest form)

- Liabilities
  - Net worth,  $N_t^{CB}$
  - Money,  $M_t$  (or  $M_t^C$  and  $M_t^{RS}$ )
- Assets
  - Securities purchased,  $G_{I,t}^{CB}$

Let's go back to the consolidated government BC

$$g_t = \tau_t + s_t + b_t - R_{Real,t} b_{t-1}$$

where  $s_t$  is real resources raised through seignorage,  $b_t$  is the real value of bonds issued, and  $R_t \equiv \frac{R_{Nom,t-1}}{\Pi_t}$  as the ex post real return on the *nominally* riskless bond

In fact, let's simplify further, letting  $\tau_t^* \equiv \tau_t + s_t$ , defining the surplus in  $t$  as  $\mathcal{S}_t \equiv g_t - \tau_t^*$ , and rearranging to get

$$b_{t-1} = \frac{b_t}{R_t} + \mathcal{S}_t$$

Let's do the sort of tedious thing that economists often have to do...

$$\begin{aligned}b_{t-1} &= \frac{b_t}{R_t} + S_t \\&= \frac{\frac{b_{t+1}}{R_{t+1}} + S_{t+1}}{R_t} + S_t \\&= \frac{\frac{\frac{b_{t+2}}{R_{t+2}} + S_{t+2}}{R_{t+1}} + S_{t+1}}{R_t} + S_t\end{aligned}$$

which in the end (assuming convergence - i.e. real value of debt isn't on an 'explosive' path) gives us

$$b_{t-1} = S_t + \sum_{j=1}^{\infty} \frac{S_{t+j}}{\prod_{k=0}^{j-1} R_{t+k}}$$

$$b_{t-1} \equiv \frac{B_{t-1}}{P_t} = S_t + \sum_{j=1}^{\infty} \frac{S_{t+j}}{\prod_{k=0}^{j-1} R_{t+k}}$$

The real value of debt today is equal to the present value (suitably defined) of future surpluses

- Apart from our (important) assumption that somehow the real value of debt is prevented from being explosive, there's 'nothing to this'
- It's an identity

One can also take expectations (noting that  $B_{t-1}$ ,  $P_t$  and  $S_t$  are known today

$$\frac{B_{t-1}}{P_t} = S_t + E_t \left[ \sum_{j=1}^{\infty} \frac{g_{t+j} - \tau_{t+j} - s_{t+j}}{\prod_{k=0}^{j-1} R_{t+k}} \right]$$

$$\frac{B_{t-1}}{P_t} = S_t + E_t \left[ \sum_{j=1}^{\infty} \frac{g - \tau_{t+j} - s_{t+j}}{\prod_{k=0}^{j-1} R_{t+k}} \right]$$

So we can see that the real value of debt today is connected to a discounted future path of surpluses

- Thus they encode expectations of future expenditure, direct taxes, seigniorage
- The discounting will reflect expectations about riskless rates over time and risk premia etc.

Consider the simple case of a riskless economy

$$\frac{B_{t-1}}{P_t} = \sum_{k=0}^{\infty} \frac{g - \tau_{t+k} - s_{t+k}}{(1+r)^k}$$

This raises an interesting question of what happens if the government issues more debt

- Should we think of  $P_t$  as pinned by monetary policy, and the government then adjusting fiscal policy to make this hold?
- Or should we think of the fiscal policy *not* adjusting going forward, necessitating a particular  $P_t$ , to ensure a higher  $B_{t-1}$  is consistent with unchanged RHS

Too complicated to get into here - but this relates to the 'fiscal theory of the price level'

# Balance sheet losses

# BOE Estimates Losses on QE Will Cost UK Taxpayer £85 Billion

- Politicians more concerned about drag on public finances
- Chancellor Hunt says he will monitor risks to exchequer

BOE Estimates Losses on QE Will Cost UK Taxpayer £85 Billion. Source: [Bloomberg, 30/4/2024](#)



# Pro Take: Fed Losses, or ‘Deferred Assets,’ Rise, Along With Potential for Political Backlash

The central bank has to stay focused on fighting inflation and not red ink, says a former Fed official

Pro Take: Fed Losses, or ‘Deferred Assets’, Rise, Along With Potential for Political Backlash. Source: [WSJ, 5/1/2024](#)

# CB net interest income

Central bank earns interest on securities it holds

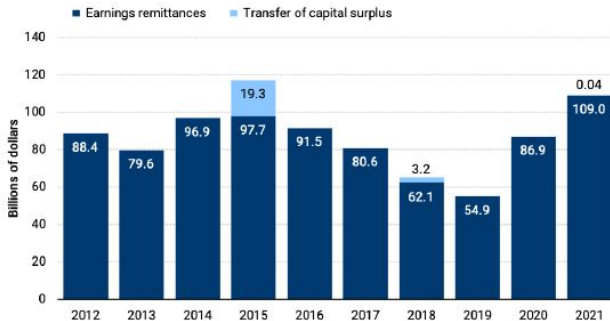
- And after QE - they hold *a lot*

Central banks typically (now) pay interest on reserves

- These rise during normalization (recall 'floor' system)
- Have recently risen rapidly due to inflationary burst
- Similarly, pay interest on 'borrowing' in **reverse repo** operations

These contribute to 'net interest margin' element of CB's income

- This has been very profitable in recent years
- Though **profitability was a 'by product'** of policy motivate by price stability (and max employment) mandate



Federal reserve remittances to the U.S. Treasury. Source: [English and Kohn \(2022\)](#)

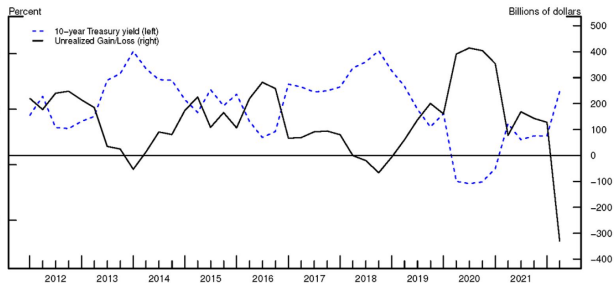
# CB capital gains/losses

The value of the 'bonds' held by central banks fluctuate with the rate environment

- As discount rates rise, future cash flows are discounted more heavily
- This implies an unrealized capital loss (gain if rates fall)

Whether this feeds into income depends on whether the CB sells, or holds to maturity

- Active QE (as in the BoE case) implies such realized losses
- Passive - letting bonds mature - does not, though people may keep track of the unrealized losses
- Archane **accounting treatment** issues come into play here (is it in P&L, is it in equity?)



SOMA Unrealized Gain/Loss Position and 10-year Treasury yield. Source: [Anderson et al \(2022\)](#)

# What makes losses especially substantial?

The longer the maturity of the bonds purchased, the bigger the losses

- A *feature* of QE was to buy long maturity assets
- Notably, BoE bought especially long-dated bonds
- Implies, all else equal, a bigger sting in the tail
- See ex-MPC member, Michael Saunders, [recently in the FT](#)

Losses were expected - see my [old colleagues](#) for an early discussion

- But the scale - owing to the degree and pace of recent rate rises - has been unexpected

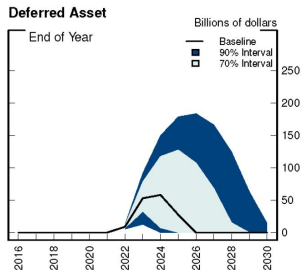
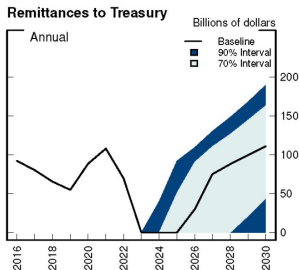
# What makes losses especially substantial?

What happens to these losses?

- Very country-dependent

In the US, any positive profits are remitted to the Treasury by the Fed but losses are accumulated in a 'deferred asset'

- Deferred asset is an accounting trick to capture the future profits that will make good these losses when the Fed starts paying positive remittances
- Why bother? Well, fundamentally it's not a big deal, but given political norms and government accounting treatment, it can be useful not to make explicit the drain on the Treasury



SOMA Projected Fed remittances to Treasury and the corresponding deferred asset value. Source: [Anderson et al \(2022\)](#)



# What makes losses especially substantial?

In the UK, things are more 'awkward'

- Fundamentally, not much is different
- But formalization of the payment flows between the BoE (or its SPV the 'Asset Purchase Facility') and HMT is 'immediate and explicit'
- Note: This is not the same point as the one Saunders was making about BoE buying *especially* long bonds - that made losses bigger, for any given accounting treatment
  - Doesn't *necessarily* mean they were 'wrong' to buy such long bonds...

Also, the BoE is actively selling more bonds than other central banks

- Turns unrealized gains (or losses) into realized
- Was nice for George Osborne - less nice for Jeremy Hunt!
- Again, you could argue this is only 'hidden' by Fed treatment - a lot of accounting games!

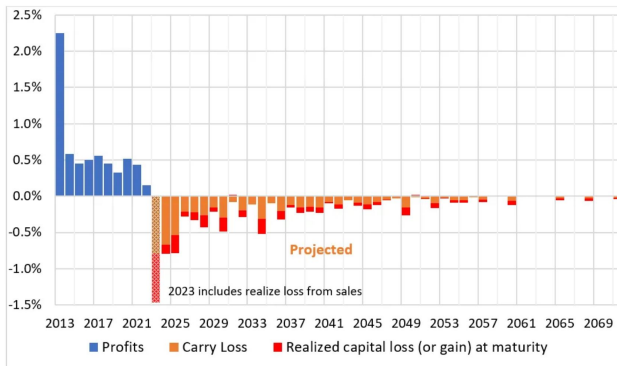
# Types of losses

As noted in one of the core readings (see [here](#)), losses arise from:

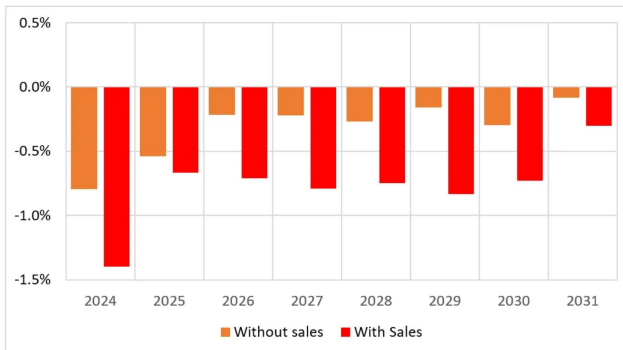
- 1 Bank pays a higher rate on funding (interest on reserves) than it collects from coupon payments on bonds it holds (long bonds from years ago when rate environment was lower)
- 2 For bonds purchased at a **premium**, there are realized losses **at maturity** (the bank bought expensive stuff - like SVB!)
- 3 Bank chooses to sell bonds and realize losses that would **otherwise be classified as (1) and (2) in the future**

Overall, total losses will be similar regardless of how they are split

- But the split *massively* affects the timing and appearance/politics of losses
- Bank/HMT decided **long ago** on who would be making payments period-by-period
- May also interact with inflexible budget rules that prevent additional borrowing to smooth the hit over time
- Also, may not want the payments going out when people are especially poor, when HMT spending is especially effective, or when taxes are especially distortionary...



Bank of England Asset Purchase Facility Net Profits and Losses, 2013 to 2071 (% of GDP)- Held to maturity (after initial period). Source: [Cecchetti \(2024\)](#)



Bank of England Asset Purchase Facility Net Losses with and without sales, 2024 to 2031 (% of GDP). Source: [Cecchetti \(2024\)](#)

**Quick comment:** I've been struck when reading into this at how much 'the grass is greener on the other side'

- Lots of people criticise the Fed (and ECB's) accounting choices and depict UK case as an example of transparency
- Very interesting (but very details-focused) work to be done researching optimal setup
- Will need to take very seriously the complexity of government fiscal arrangements, political economy

# Implications of losses

# Was QE a mistake?

The key point to remember is that the aim of QE was not to make a profit

- The aim was to pursue price stability and, subject to a flexible interpretation of that, real activity stability also

One can question whether there could have been other less costly tools

- Forward guidance?
- Targeted fiscal stimulus?

One can question whether policy was too loose for too long

- Particularly coming out of COVID (see US case with *massive* fiscal impulse)

But losses *per se* are not the sign of a failed policy

- And earlier positive profits were not the sign of a succeeding one



# Fundamental implications

Central banks are not like other institutions:

- If necessary can always create reserves necessary to pay its bills
  - Banks must hold them
  - Maybe not quite so simple where CB has foreign liabilities
- No regulatory minimum capital ratios (indeed their capital may be legally limited on the *upside*)
  - Indeed, may not even need to have positive equity to function
  - Several CBs have operated with **negative equity**

But there *are* ways in which it could endanger policy *effectiveness* without appropriate fiscal framework

- **I will upload a technical note on this (very very difficult)**
- **Fiscal 'backing'**: Does fiscal policy operate such that taxes and spending enable CB to determine the price level
- **Fiscal 'support'**: Does the 'Treasury' stand ready to recapitalize the central bank if necessary **to allow it to attain price stability and avoid exploding liabilities**

# Political implications

There is always the concern that 'politics' will play a role not allowed for in economists' models

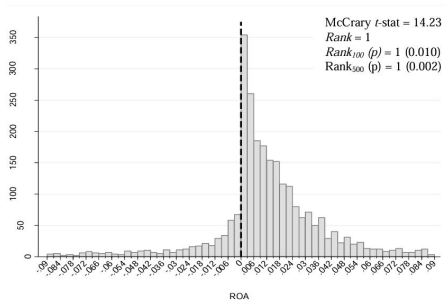
- If the central bank becomes 'unpopular' (even if unfairly) then that can undermine its independence
- Inability to pay its bills **while maintaining price stability** exposes it to political pressure
- Some 'political' constraints are not nefarious - deeply ingrained laws/rules for fiscal conduct may represent important constraints

Communication and explanation vital

- Losses should be netted against past *financial* gains
- More important, should be netted against economic gains (**there is still debate on the effectiveness of QE though...**)

# Political implications

And there is recent research that central banks do appear to care about their profits (even if they say they are unimportant, fundamentally):



Distribution of central bank profits for central banks that incur interest on reserves. Source: [Goncharov et al \(2021\)](#)