Seven Issues Facing Central Banks Today*

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The central bank is a fiscal and financial agent of the government, its beneficial owner. Their accounts should be consolidated and there should be no private ownership of central bank equity. Central banks should have a symmetric profit and loss-sharing or recapitalisation arrangement with the government. Central bank money is a liability in name only. This should be recognised in the intertemporal budget constraints of the central bank and of the consolidated State. The fiscal theory of the price level is a logical fallacy. Average inflation targeting is potentially costly and has no support from economic theory. Operationally independent central banks will monetise public debt to prevent sovereign default and associated serious financial instability, even when this is incompatible with the price stability mandate. The effective lower bound must be eliminated by abolishing paper currency and creating an interest-bearing retail central bank digital currency, usable in online and offline transactions, and without caps on the size of accounts or transactions.

Journal of Economic Literature (JEL) codes: E42, E52, E58

Keywords: central bank profits and losses, central bank money, price level, inflation, inflation targeting, fiscal dominance, negative interest rates

1. Introduction

This paper discusses seven issues that should be of interest to central banks. First, the central bank is a fiscal and financial agent of the State. The government is its beneficial owner. The central bank's accounts should be consolidated with those of the government. All semi-private formal ownership structures should be terminated and replaced with 100-per cent ownership by the government. Second, central bank money is a liability in name only. This has important implications for the

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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The first version of the English manuscript was received on 20 May 2025.

DOI: https://doi.org/10.33893/FER.24.3.5

intertemporal budget constraints of the central bank and the consolidated State. Third, there should be a symmetric treatment of central bank profits and losses by its beneficial owner. Fourth, the Fiscal Theory of the Price Level is a logical fallacy. Fifth, average inflation targeting is potentially costly economic nonsense. Sixth, there can be fiscal dominance even if the central bank is operationally independent. Preserving financial stability, the primary mandate of any central bank, may force it to monetise government debt on a scale that it knows to be incompatible with price stability. Seventh, it is time to eliminate the effective lower bound (ELB) on nominal interest rates by abolishing zero interest fiat coin and paper currency and replacing them with an interest-bearing retail central bank digital currency (CBDC), usable in both offline and online transactions and without a cap on the size of accounts or transactions.

2. The central bank is a fiscal and financial agent of the State

The central bank is a fiscal and financial agent of the State. In most countries, the central or federal government is the beneficial owner of the central bank. Lower-tier public entities may share the beneficial ownership. The accounts of the central bank should be consolidated with those of its beneficial owner for a proper analysis of the debt sustainability of the State and for proper policy planning. For proper public debt sustainability analysis and policy planning, general government debt held by the central bank (and other central bank claims on the general government) should be netted out. Central bank liabilities other than liabilities to the general government should be added, but it should be recognised that central bank monetary liabilities are liabilities in name only (as discussed in *Section 3*).

Some central banks have bizarre and confusing ownership structures, that may obscure their role as fiscal and financial agents of the government and may appear to justify the exclusion of central banks from the accounts of the government. Examples are the Federal Reserve System whose 12 Federal Reserve Banks are set up as private corporations, the Bank of Japan, the Swiss National Bank, the Banca d'Italia, the National Bank of Belgium and the Bank of Greece, all of which have (some) private shareholders. The only sensible ownership structure – 100 per cent ownership by the government – is found in the Bank of England (BoE) (since 1946), the Bundesbank, the Banque de France, De Nederlandsche Bank, the Swedish Riksbank and most others. Although I know of no central bank whose private shareholders collectively take part in monetary policy decision-making or in microprudential or macroprudential regulation and supervision, it is time to get rid of confusing private shareholdings in central banks. In the US, the fact that the 12 regional Federal Reserve Banks that hold all financial assets and liabilities of the Federal Reserve Systems are private corporations, leads to frequent assertions that the Fed is controlled by private interests (see e.g. *Zarlenga 2023*)

Recognising that the central bank is a fiscal and financial agent of the State (and the liquid window of the Treasury) does not undermine central bank independence. Operational independence and (for some central banks) limited target independence are quite consistent with the Treasury being the beneficial owner of the central bank. Nor does central bank operational independence rule out central bank cooperation with the Treasury or the coordination of monetary and fiscal policy. Operational independence only means that the Treasury (or any other official entity or person) cannot tell the central bank what to do and what not to do. Operational independence likely requires legal institutional independence. It certainly requires personal independence of the members of the committee controlling the monetary policy instruments.

3. Central bank money is a liability in name only

Central bank money is irredeemable: *X* dollars of central bank money is a claim only on *X* dollars of central bank money[1]. Therefore, central bank money, while an asset to its holders, is a liability in name only. When assessing the solvency of the central bank or of the consolidated State, we should focus on its ability to service its *non-monetary liabilities*. A key issue is whether the minimum present discounted value (PDV) of current and future net seigniorage required to ensure the solvency of the central bank (and of the consolidated State) is consistent with price stability.

The true intertemporal budget constraint (IBC) of the central bank (and of the consolidated State) is quite different when central bank money is not treated as a true liability. In the comprehensive balance sheet (or IBC) of the central bank (and of the consolidated State) at any time *t*, there is one fewer liability – the outstanding stock of central bank money. In addition, there is one more asset: the PDV of current and future net seigniorage. The difference this makes to the comprehensive net worth of the central bank can be large. Fed currency in circulation was USD 2.4 trillion at the end of 2024. Reserve balances with Federal Reserve Banks were USD 3.2 trillion. The PDV of net seigniorage could easily exceed the value of the current stock of central bank money (*Buiter 2021a*).

Because central bank money is a liability in name only, a central bank can have significant negative equity on a conventional balance sheet without being at risk of default on its contractual obligations (see *Buiter 2024*). If a central bank has no significant foreign-currency-denominated liabilities or commodity-denominated liabilities that require physical delivery, it can always service its debt by creating additional central bank money and raising the PDV of current and future net seigniorage. However, the magnitude of the additional money issuance required

[1] See *Buiter* (*2007*) and *Buiter* (*2021a*).

to ensure equitable solvency may be inconsistent with its price stability mandate. Recapitalisation of the central bank by the Treasury may resolve this dilemma, if the solvency of the Treasury is not threatened by this.

The conventional balance sheet of the central bank treats central bank money (currency in circulation plus central bank reserves held by commercial banks and other financial institutions) as a liability. Because central bank money is a liability in name only, equitable solvency concerns are present only if the equity of the central bank plus the stock of central bank money is negative. Even if the value of the central bank's non-monetary liabilities exceeds the value of its assets, there is a problem only if (1) the current and future central bank money creation required to maintain equitable solvency is larger than the amount consistent with price stability, and if in addition (2) the central government (typically the Treasury) is unwilling or unable to recapitalise the central bank to the point that central bank net worth (equity) is again consistent with its price stability mandate.

4. The asymmetric treatment by some Treasuries of central bank profits and losses

The treatment of central bank losses by its beneficial owner often is not symmetric with that of profits. The United Kingdom stands out by addressing BoE losses symmetrically in two ways. First, there is a profit and loss sharing agreement with HM Treasury for the Asset Purchase Facility – currently around 79 per cent of the BoE's assets. Second, the BoE has a recapitalisation and income sharing agreement with HM Treasury. It specifies a Target, a Floor and a Ceiling for the loss-absorbing capital (LAC) of the BoE. If actual LAC is above the Ceiling, all net profits are paid to the Treasury. With LAC between the Target and the Ceiling, half of net profits are paid to the Treasury. With LAC between the Floor and the Target, the BoE keeps all the net profits. With LAC below the Floor, the BoE receives a capital injection from the Treasury that returns its capital to the Target. The Sveriges Riksbank has a recapitalisation arrangement with the Swedish parliament.

The Fed has no loss-sharing or recapitalisation arrangement with the US Treasury. There are (capped) US Treasury guarantees (through equity investments) for some of the emergency facilities created by the Fed following the outbreak of the Covid pandemic. The European Central Bank (ECB) likewise does not have loss-sharing or recapitalisation agreements with its beneficial owners – the national central banks of the euro area and, through them, the national fiscal authorities of the euro area member states.

4.1. The deferred asset fudge

The Fed adds any losses that would take its CET1[2] capital or equity below some threshold level, either as a positive "deferred asset"[3] or as a negative liability[4] on its balance sheet[5]. The ECB engages in the deferred asset gimmick. This deferred asset represents the reduction in the central bank's future transfer of profits ("remittances") to the Treasury until its capital is again at or above a threshold level. It is true that the PDV of current and future net payments to the Treasury is a liability on the comprehensive balance sheet (in the IBC) of the central bank. It is, however, not at all obvious that, whenever the central bank makes losses that would reduce its capital below a threshold level, the Treasury will agree to a reduction of equal value in the expected PDV of net remittances from the central bank. This could require positive transfers from the Treasury to the central bank, or even a negative expected PDV of transfers from the central bank to the Treasury. The Fed's and ECB's treatment of the deferred asset assumes that, no matter how large the central bank losses are, there will be no need for an increase in a key asset on the comprehensive balance sheet (or IBC) of the central bank – the expected PDV of current and future net seigniorage – central bank money issuance net of interest paid on the outstanding stock of central bank money. Instead, there is assumed to be a reduction in the PDV of current and future net remittances to the Treasury that preserves the equitable solvency (or cash flow solvency) of the central bank without any central bank recourse to additional seigniorage. This is clear from this statement by the Fed[6]: "A deferred asset has no implications for the Federal Reserve's conduct of monetary policy or its ability to meet its financial obligations".

The deferred asset fudge turns a conventional balance sheet with only legal, contractual assets and liabilities – what I call explicit assets and liabilities – into an *incomplete* and misleading comprehensive balance sheet or IBC. It adds an implicit liability (the PDV of current and future central bank net remittances to the Treasury), but fails to include a key implicit asset (the PDV of current and future net seigniorage). It fails to recognise that central bank equitable insolvency may only be avoided by boosting current or future seigniorage, if the Treasury is unwilling or unable to make large enough positive remittances to the central bank.

[2] Common Equity Tier 1
[3] https://www.federalreserve.gov/aboutthefed/files/quarterly-report-20241122.pdf
[4] https://www.federalreserve.gov/releases/h41/current/h41.htm#h41tab9
[5] The negative liability is Other liabilities and capital (https://www.federalreserve.gov/releases/h41/current/h41.htm#h41tab9), which "includes the liabilities for earnings remittances due to the US Treasury".
[6] https://www.federalreserve.gov/newsevents/pressreleases/other20240112a.htm

5. The Fiscal Theory of the Price Level is a logical fallacy

The Fiscal Theory of the Price Level (FTPL) (see *Cochrane 1999, 2001, 2005, 2023*) is a logical fallacy (see *Buiter 2002, 2021a, 2023*; *Buiter and Sibert 2018*). This is not a question of the FTPL being based on unrealistic assumptions or rejected by empirical evidence. The FTPL takes an identity – the IBC of the consolidated State (a weak inequality that holds for all possible values of the endogenous variables) – and imposes it, holding with equality, as an additional equilibrium condition, without also adding another endogenous variable. The IBC of the consolidated State says that the PDV of current and future real primary (non-interest) State budget surpluses, plus the PDV of current and future real net seigniorage revenue is at least equal to the real value of the outstanding stock of government non-monetary debt (bonds)[7]. Fiscal-financial policies that ensure that the ICB of the State is always satisfied are called Ricardian policies by *Cochrane*, and government fiscal and financial policies that are not required to always satisfy the IBC of the State – fiscal pathologies – are called *non-Ricardian* fiscal-financial policies.

Any economic model that is determinate without the IBC of the State, holding with equality, being treated as an equilibrium condition, becomes overdetermined (logically inconsistent) when the IBC of the State, holding with equality, is imposed as an equilibrium condition. This holds for all old-Keynesian and New-Keynesian models with sticky prices and/or sticky nominal wages. There is, however, a *nominal* indeterminacy associated with standard flexible nominal wage and price models where the monetary authority sets the short (nominal) interest rate, and the nominal money stock is endogenous. In this flexible price model, the real stock of money balances is determinate, but the price level and the nominal money stock are not. With the government pursuing a non-Ricardian fiscal-financial policy, the FTPL uses the IBC of the State, holding with equality, to determine the price level. The price level takes on the value required to ensure that the real value of the outstanding stock of non-monetary nominal government debt is equal to the PDV of current and future real government primary surpluses plus current and future real net seigniorage revenue. The IBC of the State is treated as a government debt valuation equation.

The FTPL does not render the flexible price model with an exogenous nominal interest rate overdetermined, but it creates anomalies that make no sense. First, the price level is again indeterminate if there is no nominally denominated government debt outstanding – if all government debt is index-linked or foreign-currency-denominated. Second, if there is a positive stock of nominal State bonds outstanding, the IBC of the State (holding with equality) determines the price level

[7] Cochrane (like most of the economic literature) treats central bank money as a true liability. The FTPL remains a logical fallacy.

(the reciprocal of the price of money) even if there is no money in the model either as a store of value or medium of exchange – money is a pure numeraire, like phlogiston. Third, if there is both nominal debt and index-linked debt (or foreign currency debt) outstanding, the price level determined by the IBC of the State can be negative[8]. Fourth, why restrict the debt valuation equation to the State? Households and firms have IBCs, and many could (and do) default on their debt. Why not have the Mrs Jones IBC Theory of the Price Level instead of the FTPL? Fifth, if the price level always assumes the value required for the IBC of the State to hold with equality, why are there sovereign defaults in the real world?

I am not arguing that it is inappropriate to treat the IBC of the State, holding with equality, as an equilibrium condition – a government debt pricing equation. It is inappropriate only if a suitable additional endogenous variable is not added as well. In *Buiter* (*2002*), I show that the additional endogenous variable is the "bond revaluation factor", the ratio of the market value of government bonds when there can be sovereign default, to their contractual value (what the market price would be if the IBC of the State were always satisfied). When the bond revaluation factor is introduced, the nominal indeterminacy reappears, even when the IBC of the State holds with equality.

That the FTPL is a logical fallacy matters for monetary and fiscal policy makers, because the FTPL may encourage reckless fiscal and financial behavior. No matter how large the stock of nominal public debt outstanding, and no matter how small the expectation of the PDV of current and future real primary surpluses and net seigniorage, there is never any risk of sovereign default. The general price level always takes on the value required to make the real value of the outstanding stock of nominal State bonds equal to what it must be for the IBC of the State to hold with equality. This could encourage fiscal profligacy and excessive public debt issuance.

6. Average inflation targeting is potentially costly economic nonsense

In August 2020, the Fed adopted a form of "average inflation targeting", called FAIT – flexible average inflation targeting (see *Clarida 2021* and *Buiter 2021b*). This followed an extended period (from late 2008 until early 2021), when inflation had been regularly below target (a 2-per cent annual rate for the core PCE index), and the Federal Funds Rate target zone was at or close to the ELB. FAIT implies that, to get the average inflation rate closer to the target, the Fed, following a period of below-target inflation, deliberately pursues a period of above-target inflation.

[8] Even if there is only a (positive) stock of domestic-currency-denominated public debt outstanding, the price level will be negative if the PDV of current and future real government primary surpluses plus current and future real net seigniorage revenue is negative.

Past inflation is a bygone and does not belong in the objective function of the central bank. Central bankers with a stable prices mandate should target current and anticipated future inflation. Of course, past inflation can influence current and future inflation and current expectations of future inflation. Price and wage contracts with lagged indexation clauses are one example. Past inflation can also impact expected future inflation, and thus actual future inflation. These indexation and expectation formation mechanisms should be modelled carefully and explicitly in the central bank's inflation models, even when the policy makers only target current and anticipated future inflation.

However, it was not plausible to argue in late 2020, that the only way to get inflation expectations on target following an extended period of below-target inflation, is by deliberately planning a period of above-target inflation. It surely matters why, in late 2020, inflation had been below-target for so long. The reason was a major weakening of the Fed's capacity to boost economic activity and inflation. This was caused by its inability to set the Federal Funds Rate (FFR) at a negative level potentially well below the ELB on nominal interest rates. The FFR instrument could only influence economic activity through forward guidance on additional FFR cuts in future periods when the ELB would no longer be a binding constraint. Only relatively ineffective instruments like Quantitative Easing remained available to stimulate economic activity and inflation. The Fed should be able to explain to most if not all economic actors, that the reason for the extended period of below-target inflation was that the ELB had been a binding constraint on the Fed's ability to boost economic activity and inflation. The Fed should also be able to explain that there is no Effective Upper Bound on the FFR. If inflation were to move above target (or threaten to do so), the FFR could always be raised to the level necessary to prevent serious and lasting overshooting of the inflation target. It makes no sense to compensate for an unavoidable past policy failure with an avoidable future policy failure. To argue that, following an extended period of ELB-driven undershooting of the inflation target, the only way to get inflation expectations on target is by deliberately overshooting the inflation target, makes sense only if either the relevant economic actors are not smart enough to understand the asymmetry in monetary policy effectiveness created by the ELB, or if the communication and explanatory skills of the Fed are seriously impaired. Fed Chairman Jerome Powell announced in his recent speech at Jackson Hall that as part of its 2025 wide-ranging 5-year Review of Monetary Policy Strategy, Tools, and Communications, the Fed will abandon FAIT (*Powell 2025*).

This issue would not have arisen, if there were no ELB. *Section 8* below explains why now is the time to abolish the ELB and how to do so.

7. The United States is on the road to fiscal dominance even with an operationally independent Fed

I consider it likely that before the end of President Trump's four-year term, inflation will be materially above the Fed's 2-per cent target. In this scenario, the Fed will knowingly set its policy rates below the level consistent with its price stability mandate. It will also knowingly engage in monetised purchases of US federal debt on a scale incompatible with its price stability mandate. This "fiscal dominance" will not be the result of a loss of Fed operational independence, or of a formal, legislated change in the monetary policy mandate of the Fed. Instead, fiscal dominance will be the result of the financial stability mandate of an operationally independent Fed taking precedence over its unchanged triple monetary policy mandate – maximum employment, stable prices and moderate long-term interest rates. The threat to financial stability would be material sovereign default risk triggered by increasingly unsustainable federal government debt and deficits.

There are three distinct drivers of fiscal dominance: brute force; a formal legal change in central bank objectives; and the central bank being able to meet its financial stability mandate only by knowingly engaging in a monetary policy that is more expansionary than is consistent with price stability.

7.1. Fiscal dominance through brute force

Fiscal dominance through brute force is unlikely in most advanced economies, including the United States. It occurs when the operational independence of the central bank is impaired or destroyed. The fiscal authority, backed by the president or prime minister, forces the supposedly operationally independent central bank decision-makers to keep policy rates lower and/or monetised public debt purchases higher than the central bank considers appropriate. One brute force mechanism is the fiscal authority replacing the central bank's operationally independent decision-maker(s) with appointees that will obey the fiscal authority even when this violates the mandate of the central bank.

Subject to one qualification involving foreign exchange market intervention, I consider the loss of operational independence by the Fed to be unlikely. It is, however, possible that the Treasury could force the Fed to set or target a path for the exchange rate that would be incompatible with the Fed's price stability mandate.

Foreign exchange rate targets (if there are any) are under the authority of the Treasury. The US Treasury states[9] that "The Secretary of the Treasury has the sole authority to establish the exchange rates for all foreign currencies ….".

[9] https://fiscaldata.treasury.gov/datasets/treasury-reporting-rates-exchange/treasury-reporting-rates-of-exchange

The Fed[10] confirms this: "The Department of the Treasury is the lead agency setting US international economic policy, including policies regarding the dollar." It then qualifies this by stating that "…neither the US Treasury nor the Federal Reserve targets a level for the exchange rate." This is correct today, but not during the Bretton Woods exchange rate regime (from the mid-1940s to the early 1970s), or earlier under the gold standard. It may not be true in the future.

For the US Treasury (on behalf of the President) to impair the operational independence of the Fed would require a majority of the 12 voting members of the Federal Open Market Committee (FOMC) to take orders from the White House. The voting members of the FOMC are the seven members of the Board of Governors of the Federal Reserve System and five of the presidents of the 12 regional Reserve Banks. Getting rid of the Chair of the Board of Governors would not give the President control over the Fed's monetary policy decisions.

Neither the President nor the Congress can fire (or appoint) any of the presidents of the regional Reserve Banks. The Board of Governors has the authority (never exercised) to terminate the appointment of a Reserve Bank president.

If departures from the Board of Governors are driven only by the legal term limits, two new members of the Board can be nominated by President Trump and confirmed by the US Senate.

The Federal Reserve Act[11] makes it clear that the President can remove any member of the Board of Governors of the Federal Reserve System "for cause".[12] "For cause" is a fuzzy legal concept meaning "because of inefficiency, neglect of duty, or malfeasance in office"[13]. Presumably, an independent third party (ultimately the Supreme Court) would have to decide whether the "for cause" clause has been met. There has never been a removal "for cause" of a Board member. If Trump fires Powell, the President can only appoint a successor (both as Board member and as Chair of the Board) with the consent of the Senate.

Firing Powell would still not give the President control over a majority of the 12 voting members of the FOMC. It could require firing (and replacing) a majority of the FOMC members (net of the two (soon to be three) current Board members that are significantly more dovish on inflation than Powell).

[10] https://www.federalreserve.gov/faqs/economy_12763.htm
[11] https://www.federalreserve.gov/aboutthefed/section10.htm
[12] Federal Reserve Act, Section 10, paragraph 2: https://www.federalreserve.gov/aboutthefed/section10.htm.
[13] https://columbialawreview.org/content/the-three-permissionspresidential-removal-and-the-statutory-limits-of-agency-independence/

7.2. Fiscal dominance through a formal change in the central bank's mandate

Fiscal dominance could also be achieved with an operationally independent central bank, if the targets or objectives of the central bank are not set by the central bank itself, that is, as long as there is no target independence. Qualitative objectives, such as full employment, price stability and financial stability, are generally set through legislation and can be changed only by a legislative majority. The FOMC did not explicitly set a numerical target for "stable prices" until January 2012. No numerical targets have been specified for maximum employment or moderate long-term interest rates. The ECB's Governing Council decides on the numerical interpretation of the Treaty-based price stability mandate. The Bank of Japan also sets its numerical inflation target. In the United Kingdom, the numerical target for the rate of inflation is set by the Chancellor of the Exchequer. Fiscal dominance through the legislature imposing a significantly more inflation-tolerant new mandate on the central bank is possible, but unlikely in most advanced economies, including the USA.

7.3. "Voluntary" fiscal dominance driven by fear of financial instability

Fiscal dominance when the central bank is operationally independent and has stable prices as one of its monetary policy objectives is possible when there is a threat of a systemic financial crisis. Financial stability is (and should be) the primary objective of the central bank. This is not always explicitly stated in the legislation that establishes the central bank and defines its objectives. The Bank of Japan Act[14] assigns the financial stability objective before the price stability objective — although it does not rank them. In the UK, the BoE is charged "to protect and enhance the stability of the financial system" (Bank of England Act 1998, Section 2a[15]). It also has several lexicographically ranked monetary policy objectives, with price stability ranked first (Bank of England Act 1998, Section 11[16]).

The Federal Reserve Act only mentions financial stability once, when it refers to the Financial Stability Act of 2010. The most recent statement of the financial stability responsibilities of the Fed can be found in the Financial Stability Act of 2010. It mentions the "Federal Reserve" 179 times.

The ECB's objectives, defined in Article 127(1) TFEU, are ordered lexicographically with price stability first. There are only two underwhelming references to financial stability in the Treaty. In its Financial Stability Review of November 2021, the ECB addressed the role of financial stability in the ECB's new monetary strategy.

[14] https://www.japaneselawtranslation.go.jp/en/laws/view/3788/en
[15] https://www.legislation.gov.uk/ukpga/1998/11/contents
[16] https://www.legislation.gov.uk/ukpga/1998/11/contents

A key statement[17] (missing from the Treaty) is "Financial stability is a precondition for price stability and vice versa."

A recent example of the primacy of the central bank's financial stability mandate was the (short-lived) malfunctioning of the UK's gilt market in the autumn of 2022. On 23 September 2022, Prime Minister Liz Truss and Chancellor of the Exchequer Kwasi Kwarteng proposed a "mini-budget" with wildly excessive government deficits. This triggered a sharp rise in long-term government bond yields which inflicted heavy losses on defined-benefit pension plans with liability-driven investment (LDI) strategies. On 28 September 2022, the BoE announced[18] it would engage in temporary purchases of long-dated UK government bonds to restore orderly market conditions. The key sentences in the announcement were: "The purpose of these purchases will be to restore orderly market conditions. The purchases will be carried out on whatever scale is necessary to effect this outcome." The willingness to intervene, if necessary, on any scale, made the BoE's intervention effective. The effectiveness, modest actual purchases and short duration of this financial-stability-driven intervention were no doubt boosted by the termination of the appointment of the Chancellor on 14 October 2022, after 38 days in office, and the resignation of the Prime Minister on 20 October 2022, after 45 days in office. The unprecedented early departure of the two most senior politicians responsible for the wildly unsustainable fiscal policies announced in the "mini budget" helped restore the credibility of more sustainable fiscal policies announced by their successors.

Unsustainable budgetary policies increase the likelihood of fiscal dominance as the independent central bank's least bad choice. I do not believe any central bank other than possibly the pre-euro era Bundesbank could credibly threaten not to engage in monetised purchases of sovereign debt on a scale that would cause materially above-target inflation, if not engaging in such monetised public debt purchases was likely to result in sovereign default.

The consolidated federal government and Fed non-monetary debt-to-GDP ratio at the end of 2024 was 87.3 per cent. The federal deficit in calendar year 2024 was around 6.8 per cent of GDP – a very high number, given that the economy was at full employment in peacetime. I expect a federal deficit for 2025 of well over seven per cent of GDP and rising in subsequent years. These public debt and deficits are unsustainable unless the neutral real rate of interest returns to its post-Great Financial Crisis (GFC) and pre-Covid levels of 0.5 per cent or less[19]. If fiscal unsustainability is not addressed promptly and effectively, monetised Fed purchases

[17] https://www.ecb.europa.eu/press/financial-stability-publications/fsr/focus/2021/html/ecb.fsrbox202111_08~d3131413c2.en.html
[18] https://www.bankofengland.co.uk/news/2022/september/bank-of-england-announces-gilt-market-operation#:~:text=On%2028%20September%2C%20the%20Bank,grounds%20at%20an%20urgent%20pace
[19] https://www.newyorkfed.org/research/policy/rstar

of US federal debt on whatever scale is necessary to restore orderly markets and prevent sovereign default could be huge and enduring, even though they are known by the FOMC to be inconsistent with the 2-per cent inflation target.

The fiscal unsustainability problems of the United States do not go away when instead of focusing mainly on government debt, we instead, as we should, focus on government net worth (see *Ball et al. 2024*). The balance sheet of the US federal government[20] as of 30 September 2024 shows total assets of USD 5.7 trillion. Total liabilities, however, are USD 45.5 trillion. The two largest liabilities are Federal debt and interest payable (USD 28.3 trillion), which is included in the conventional debt and cash-focused government accounts, and Federal employee and veteran benefits payable (USD 15.0 trillion), which is not included in the conventional government accounts. The total net position (net worth) of the federal government is −USD 39.9 trillion, −136.6 per cent of 2024 GDP.

If the real commercial assets of the federal government were managed well and valued properly (as the expected PDV of their current and future earnings), the net worth of the federal government would certainly be less disastrous. Despite DOGE, both more efficient management and better valuation of real commercial assets are unlikely in the foreseeable future.

Unless the dysfunctional political system of the US undergoes major reforms that result in some combination of material increases in tax revenues, reductions in public spending and more efficient management of public real assets, the likelihood of fiscal and financial turmoil will increase rapidly. There is also a small risk of a "technical" and short-lived sovereign default if the US Congress fails to raise, extend or revise the federal debt limit on time. Congress has acted 78 times since 1960[21] to prevent a violation of the debt limit and most likely will do so again when required. A US federal solvency crisis, if it occurs, will be driven by the fundamentals of fiscal unsustainability, even if the debt ceiling were abolished.

If a debt crisis occurs, and if there is no Truss-Kwarteng-style early resolution of the worst fiscal excesses, the Fed will have to choose between persistent large-scale monetised purchases of public debt that will cause above-target inflation and sovereign default followed by a domestic and global financial crisis. They will opt for above-target inflation.

[20] https://www.fiscal.treasury.gov/reports-statements/financial-report/balance-sheets.html
[21] https://home.treasury.gov/policy-issues/financial-markets-financial-institutions-and-fiscal-service/debt-limit

8. Time to become positive about (potentially deeply) negative interest rates

It is time to undertake the one financial reform required for the central bank to be able to set possibly deeply negative policy rates. This is necessary, because the drivers of appropriate future central bank policy rates are likely, at times, to point again to the desirability of significantly negative policy rates – rates that cannot be achieved as long as the ELB is in effect. The removal of the ELB may also eliminate one of two obstacles to operationalising the targeting of price stability by setting an inflation target of zero per cent rather than two per cent (in most advanced economies) or higher (in some emerging markets). When there is an ELB for the policy rate, a higher inflation target makes it less likely that this ELB will become a binding constraint on the central bank's ability to stimulate aggregate demand and boost inflation. The other argument for a target inflation rate higher than zero per cent is that real world price indices overstate the true increase in the cost of living. The CPI, for instance, considers the change in the average price of a fixed bundle of goods and services, thus omitting substitution effects. It is also unlikely that any price index fully captures quality improvements. The "inflation bias" argument for targeting a positive rate of inflation remains valid even if the ELB is eliminated. Whether the "inflation bias" is two per cent remains an open question.

The argument that negative interest rates are ineffective is wrong for three reasons. First, we have not seen deeply negative nominal interest rates. The Swiss National Bank and Danmarks Nationalbank had policy rates at –0.75 per cent. The Sveriges Riksbank's lowest policy rate was –0.50 per cent, although its lowest deposit rate was –1.25 per cent. The ECB set a Deposit Rate of –0.50 per cent. The Fed never cut the FFR target zone below 0.00 per cent to 0.25 per cent. The Bank of England's lowest Bank Rate was 0.10 per cent.

Second, the reason these de minimis negative central bank policy rates were not fully passed through to private borrowing and lending rates was the ELB, created by the existence of central bank paper currency – an alternative liquid asset with a zero nominal interest rate and modest carry costs of paper currency.

Third, the argument that negative nominal interest rates have a negative impact on private sector confidence has no robust empirical foundations. It would be irrational. There is nothing unnatural about negative nominal interest rates. Negative real interest rates have been a common phenomenon (see *Rogoff et al. 2022*). The near absence of negative nominal rates is an ELB-driven anomaly.

The argument that quantitative easing (QE) at the ELB can be as effective as more deeply negative interest rates in stimulating aggregate demand is unconvincing. QE was often accompanied by (changes in) forward guidance about the policy

rate. The identification of the impact of central bank asset purchases alone, is therefore difficult. It likely did contribute to significant bubbles in risk asset markets and encouraged excessive federal debt issuance. In small, open economies with a floating exchange rate, asset sales and purchases through foreign exchange market interventions can be viewed as another form of QE. When the monetary authorities wish to weaken the domestic currency and the domestic policy rate is at the ELB, the authorities can engage in purchases of foreign exchange and sales of the domestic currency of any desired magnitude. Whether such "international QE" is more effective than standard domestic QE is an open question.

Negative nominal policy rates can be desirable for a combination of four reasons: (1) a low neutral real rate; (2) weak economic activity (a negative output gap); (3) below-target inflation; and (4) an excessively strong exchange rate. The first three drivers of the appropriate policy rate are summarised neatly in the Taylor Rule (*Taylor 1993*): the nominal policy rate equals the neutral real rate plus the target rate of inflation, plus a constant (typically set at 0.5 or 1.0) times the proportional output gap, plus a constant (typically set at 1.5) times the difference between the actual and the target inflation rates.

The Taylor Rule omits the strength of the exchange rate as a driver of a lower policy rate. For the US, this may not be an issue. For a small and wide-open economy, such as Switzerland, Denmark or the Czech Republic, the exchange rate is a key driver of the central bank's policy rate. The Taylor Rule also does not allow for any impact of financial stability considerations on the policy rate.

How likely is it that the Taylor Rule will call for nominal policy rates below the deepest negative level that can be achieved when there is an ELB? *Rogoff et al.* (*2022*) establish a persistent downward trend (spanning over seven centuries) in long-maturity real interest rates for the advanced economies they study. Taylor's estimate of two per cent for the neutral real interest rate in 1992 is generally thought to be materially higher than its value in the decade following the GFC; 1.0 per cent (or even 0.5 per cent) would not be an unreasonable benchmark.

The US output gap[22] was deeply negative on several recent occasions (–5.3 per cent in 2009 Q1 and –9.1 per cent in 2020 Q2). The US annual PCE inflation rate[23] has been below the 2.0-per cent target for many quarters between 2008 and 2021, and even below 1.0 per cent and 0 per cent on some occasions.

Based on these data, our version of the Taylor Rule could easily generate a policy rate of –3.5 per cent or even –5.0 per cent.

[22] https://fred.stlouisfed.org/graph/?g=f1cZ

[23] https://apps.bea.gov/iTable/?reqid=19&step=3&isuri=1&1921=survey&1903=11#eyJhcHBpZCI6MTksInN0ZXBzIjpbMSwyLDMsM10sImRhdGEiOltbIk5JUEFfVGFibGVfTGlzdCIsIjQyNCJdLFsiQ2F0ZWdvcmllcyIsIlN1cnZleSJdLFsiRmlyc3RfWWVhciIsIjIwMDciXSxbIkxhc3RfWWVhciIsIjIwMjQiXSxbIlNjYWxlIiwiMCJdLFsiU2VyaWVzIiwiTSJdXX0=

I propose the elimination of the ELB through the abolition of fiat physical currency and its replacement by an interest-bearing retail central bank digital currency (CBDC) which allows for online and offline transactions and does not impose limits on the size of CBDC deposits or transactions. There are no valid economic arguments against this. It could well reduce private demand for commercial bank deposits (checking accounts). If this is deemed to be a problem (because it reduces potentially valuable financial intermediation by commercial banks), this can be addressed by the central bank depositing with commercial banks the receipts from CBDC issuance in excess of the pre-CBDC issuance of paper currency.

A political argument against getting rid of coins and paper currency is based on the privacy they offer. There is merit to this concern, although the privacy and anonymity of physical fiat currency encourage criminal and illegal activities (*Rogoff 2017*). It would be possible for a CBDC to provide the limited anonymity provided by Bitcoin and other cryptocurrencies. If the interest-bearing CDBC were put on a permissionless blockchain, the identity of the beneficial owners of the wallets on the blockchain would be private, although the transactions would not be.

Another argument in favour of retaining physical fiat currency is that some people are unbanked and rely on paper currency as their only means of payment. Cash cards and mobile wallets that support online and offline transactions can provide adequate means of payment for those who rely on physical currency.

It is incomprehensible that leading central banks, including the Fed and the ECB, have said that, if they introduce a retail CBDC, it will be non-interest-bearing, and that there will be a cap on the size CBDC accounts. They also promised that central bank paper currency would not be abolished. Could central banks be scared of imposing deeply negative interest rates on households and firms? This would indeed hurt savers. Fear of hurting borrowers, however, has not stopped central banks from setting steeply positive policy rates. I believe this position of the leading central banks is deeply misguided. They reject the opportunity to eliminate the ELB.

9. Conclusions

The paper develops seven propositions:

1. The central bank is a fiscal and financial agent of the government, its beneficial owner. Their accounts should be consolidated for fiscal sustainability analysis and policy design. There should be no private ownership of central bank equity because this can create confusion about whose interests are served by the central bank.

2. Central bank money is a liability in name only.

3. Central bank profits and losses should be treated symmetrically by the government. Central banks can be equitably solvent even when they have persistent negative conventional equity. Very deeply negative conventional equity may require recapitalisation by the government, if avoiding central bank equitable insolvency would require central bank money creation of a magnitude inconsistent with the price stability mandate.

4. The fiscal theory of the price level is a logical fallacy.

5. Average inflation targeting is potentially costly and questionable from an economic perspective.

6. Central banks may monetise public debt to prevent sovereign default and financial instability even when this is incompatible with price stability.

7. The effective lower bound must be eliminated by abolishing paper currency and creating an interest-bearing retail central bank digital currency.

Both the economics and the politics of central banking remain fascinating subjects.

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