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Introduction

The original inspiration for this volume was the Frederico Caffè Lectures I gave in Rome on December 13–14, 2011. Quite a lot of water has flown down the Tiber since then and my thinking about the monetary and fiscal policy issues I addressed in the lectures has evolved and, I hope, become more coherent.[1]

The simple idea that motivates most of this book is that central banks make a significant, indeed at times essential, contribution to the fiscal space of the sovereign. This is because the ability to issue monetary liabilities, especially currency, is a source of profits to the central bank. This is the case for two reasons. First, currency carries a zero nominal interest rate and central bank reserves often have policy-determined interest rates below the safe rate of return on non-monetary financial instruments of comparable duration and risk. Unless the economy is at the effective lower bound (ELB), issuing money and investing it in low-risk securities is therefore a profitable business. The second reason is that central bank money is irredeemable. It is an undoubted asset to the holder but not in any meaningful sense a liability to the issuer. This makes monetary issuance profitable even if the economy is at the ELB. We operationalize this by including the present discounted value of the terminal stock of central bank money as an asset in the solvency constraint of the private sector but not as a liability in the solvency constraint of the central bank.

The reason the profits from monetary issuance are a source of revenue to the sovereign is that the central government fiscal authority (Treasury) is the beneficial owner of the central bank. We therefore

[1] I would like to thank three anonymous referees of an earlier version of this manuscript for extensive, detailed and constructive comments and suggestions. Anne Sibert and Ebrahim Rahbari contributed important insights.

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should, in order to understand the fiscal space of the sovereign, consolidate the accounts of the Treasury and the central bank, and do our analyses and forecasts in terms of the accounts of this consolidated entity – henceforth referred to as the State. The profits of the central bank thus help relax the intertemporal budget constraint (IBC) of the State or, equivalently, boost net worth on the comprehensive balance sheet of the State. This is a key feature our analysis shares with Modern Monetary Theory.[2]

A direct implication of the unique position of the central bank as the liquid window of the Treasury is that the central bank is uniquely qualified to fulfill the key financial stability roles of lender of last resort (LLR), to deal with funding liquidity crises, and market maker of last resort (MMLR), to deal with market liquidity crises.

Chapter 1 starts with a brief overview of the facts about the advanced economy central bank balance sheet explosion since the Great Financial Crisis (GFC). The increase in profit remittances by the Fed to the US Treasury during the post-GFC years of extraordinarily low policy rates stands out. The Chapter then delves into the analytics of seigniorage arithmetic and how seigniorage revenues can boost fiscal space. Away from the ELB, when the demand for real base money is constrained by a conventional base money demand function, the real value of the seigniorage (as a share of GDP) that can be extracted at a target rate of inflation of, say, 2 percent is rather small – typically well under 0.5 percent of GDP for most advanced economies. At the ELB, however, seigniorage can be truly massive because the demand for real base money is infinitely interest-sensitive.

Chapter 1 also considers the noninflationary loss absorption capacity of central banks and provides estimates for the Fed, the ECB, the Bank of Japan (BoJ) and the Bank of England (BoE). Even away from the ELB, the present discounted value of current and future seigniorage when inflation is at its target value of, say, 2 percent, can

[2] See Bell (2000), Tcherneva (2002), Forstater and Mosler (2005), Mosler (2010), Wray (2015), Roche (2019) and Fullwiler et al. (2019).

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be a quite impressive number. This means that these central banks can survive large losses without this forcing them into solvency-preserving monetary issuance on a scale that threatens the inflation target.

Another implication of this approach is that the conventional (financial) net worth of a central bank can be significantly negative without this posing a threat to the solvency of the central bank. The key missing asset from the conventional balance sheet is the present discounted value of future seigniorage. This transforms the solvency of the central bank if the central bank (or the national Treasury that is the beneficial owner of the central bank) has discretionary control over current and future issuance of the monetary base. This is the case for the Fed, the Bank of Japan, the Bank of England and the People's Bank of China (PBoC) but not for the nineteen national central banks (NCBs) that, together with the European Central Bank (ECB), make up the Eurosystem. Monetary issuance for each national central bank of the Eurozone is a collective decision made by the Governing Council of the ECB. There is no national discretion. From the perspective of an individual NCB (and its sovereign) all its euro-denominated liabilities are effectively denominated in a foreign currency over which it has no discretionary control. Sovereign default and insolvency of the associated NCB therefore can occur in the Eurozone under circumstances where this could be avoided by a central bank and sovereign that are not part of a monetary union that eliminates national discretionary control over seigniorage.

Chapter 2 derives the comprehensive balance sheet (or intertemporal budget constraint of the central bank and the Treasury (or general government) and of the consolidated State and contrasts these with the conventional balance sheets. We then consider, theoretically and quantitatively, the arithmetic of fiscal sustainability by focusing on the net nonmonetary debt of the consolidated general government and central bank and the seigniorage-augmented primary surplus of the State. The fact that Japan's general government gross debt was 237.6 percent of GDP at the end of 2017, while the net nonmonetary

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debt of the consolidated State was only 67.4 percent of GDP, underlines the importance of our approach. Japan does not yet have a serious public debt stock problem. It has a bit of a public sector flow deficit problem: its general government cyclically adjusted primary budget deficit was 3.8 percent of GDP in 2017. But because it is at the ELB and has been for years, it can extract massive seigniorage – more than 10 percent of GDP each year in the five years leading up to 2017. That suggests that, if Japan ever were to escape the ELB, it could have both a stock and a flow monetary overhang problem.

Chapter 3 considers the analytics of helicopter money drops – monetized fiscal stimuli. These will always boost nominal aggregate demand because central banking is profitable (interest rates on assets exceed those on liabilities and/or central bank money is irredeemable). This Chapter also summarizes some of the key results of the first three chapters in the following seven propositions.

1. A central bank can be solvent with negative conventional equity or net worth.
2. Central bank current and future resources are "tax payers' money," regardless of whether the central bank is fully dependent, operationally independent or operationally and goal independent. All that is required for this is to be true is that the Treasury is the beneficial owner of the central bank.
3. Consider the purchase of additional Treasury debt by the central bank funded by the permanent/irreversible issuance of additional base money equal in present discounted value (PDV) to the purchase of Treasury debt. The cancellation (wiping out/forgiving) of that additional Treasury debt purchased by the central bank is equivalent to the central bank holding that additional Treasury debt forever (rolling it over as it matures). Holding consols (perpetuities) on a permanent basis is another equivalent strategy.
4. A permanent increase in the monetary base used by the central bank to purchase additional private domestic or foreign assets is equivalent to an equal-size permanent increase in the monetary base used by the central bank to purchase Treasury debt.[3]

[3] We assume the rate of return on private domestic and foreign assets is the same as that on Treasury debt.

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5. Quantitative Easing (QE) that is permanent/irreversible in present discounted value terms creates fiscal space for a deferred helicopter money drop.
6. Assume the interest rate on base money is zero. A helicopter money drop today boosts demand even in a permanent liquidity trap, when the nominal interest rate is at the zero lower bound (ZLB) forever. It relaxes the intertemporal budget constraint of the state by an amount equal to the permanent increase in the stock of base money
7. Lack of nominal effective demand is a policy choice or the result of a failure of cooperation and coordination between the central bank and the Treasury, not an unavoidable fate, even for an economy apparently stuck at the ELB. A sufficiently large helicopter money drop will always boost nominal aggregate demand. If necessary, public spending on real goods and services can be boosted by the required amount. Whether the higher nominal aggregate demand manifests itself as higher real aggregate demand or higher inflation depends on the amount of excess capacity in economy.

Chapter 4 reviews how not to use the intertemporal budget constraints of the central bank and the State. It analyses, using a simple two-sector model, why the fiscal theory of the price level (FTPL) is fatally logically flawed. The elementary error is the confusion of the intertemporal budget constraint of the State with a mis-specified equilibrium nominal bond pricing equation. The IBC of the state, holding with equality and with sovereign bonds priced at their contractual values (free of default risk), despite essentially arbitrary (non-Ricardian) fiscal-financial-monetary programs, is used as an equilibrium condition that is supposed to set the general price level at the level required to make the real value of the outstanding stock of nominal government bonds consistent with sovereign solvency. It does so by equating the real value of the outstanding stock of nominal sovereign debt to the present discounted value of current and future augmented primary surpluses of the State.

A fundamental problem with this approach is that this IBC of the State, holding with equality and with bonds priced at their contractual values, has already been used as an equilibrium condition in the form of the IBC of the private sector, holding with equality and with sovereign debt priced at its contractual value. In equilibrium, if

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the IBC of the private sector holds with equality and with sovereign debt priced at its contractual value, this implies that the IBC of the State also must hold with equality and with sovereign debt priced at its contractual value. This private-sector IBC, holding with equality, is necessary to fully characterize optimal private consumption behavior. It cannot be used again disguised as the IBC of the State.

Not surprisingly, the FTPL generates a number of anomalies and inconsistencies.

Anomaly 1: The price level can be negative.

Anomaly 2: If the public debt is index-linked and/or denominated in foreign currency, there is no FTPL.

Anomaly 3: The FTPL can price phlogiston – it can determine the general price level in a model in which money exists only as a numeraire. It is not uncommon in the recent literature to determine the price of money (phlogiston) without there being a stock of money (phlogiston) outstanding, through the simple expedient of assuming there is a nonzero stock of money-denominated (phlogiston-denominated) bonds outstanding. We object to the introduction of this ultimate nondeliverable forward contract for money (phlogiston) when there is no corresponding deliverable market. It is not good economics to be able to determine a price without an associated quantity.

Anomaly 4: If the logic of the FTPL holds, we could have the Mrs. Jones theory of the price level (MJTPL). The IBC of any private agent, holding with equality and with private debt priced at its contractual value, can be used to determine the general price level the same way the FTPL does, if the private agent pursues a non-Ricardian consumption and asset allocation program.

Anomaly 5: When we distinguish properly between the contractual value of government debt (free of default risk) and its market value (which can reflect default risk), that is, when we use the IBC of the State as an equilibrium sovereign debt pricing equation in the proper manner, the FTPL vanishes. The FTPL relies on the fact that, when there is nominal government debt outstanding, the general price level can sometimes appear to perform the role of a "sovereign debt discount factor" or

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sovereign debt revaluation factor – give or take six anomalies and two inconsistencies. The sovereign debt discount factor converts the contractual value of sovereign bonds (absent default risk) into the market value of these bonds (which can reflect default risk). When we introduce the sovereign debt discount factor explicitly (which turns the IBC of the State, holding with equality, into a legitimate sovereign bond pricing equation), the FTPL vanishes.

Anomaly 6: When viewed as an equilibrium selection criterion in a model with multiple equilibria, the FTPL in general produces explosive or implosive solutions for the general price level and the rate of inflation when the nominal money stock is exogenous and constant.

Inconsistency 1: If the FTPL is not viewed as an equilibrium selection rule but is imposed as another equilibrium condition when the nominal money stock is exogenous and the fundamental equilibrium has been selected (a constant growth rate of the nominal money stock supports a constant rate of inflation), then the model is overdetermined.

Inconsistency 2: When the price level is predetermined (as in models with Keynesian nominal wage and price rigidities), adding the IBC of the State (holding with equality and with sovereign bonds priced at their contractual values) as an equilibrium condition, in addition to the IBC of the household sector (holding with equality and with bonds priced at their contractual values), the result is an overdetermined system, even when the nominal interest rate is exogenous.

Chapter 5 uses the model of the previous Chapter to discuss three ways to eliminate the zero lower bound on nominal interest rates: (1) abolish currency, (2) tax currency and (3) introduce a variable exchange rate between currency and bank reserves (deposits) with the central bank. We come down in favor of getting rid of cash as the most robust of these three options. This would have the further advantage of eliminating a preferred store of value and means of payment for illegal activities. There are both economic and political costs associated with the abolition of cash, however. Some of these can be addressed or at least

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mitigated by eliminating only the larger denomination currency notes. This would lower the ELB without eliminating it.

We confirm that helicopter money drops stimulate nominal aggregate demand even when the economy is permanently at the zero lower bound. This is because of the irredeemability of central bank money that causes the intertemporal budget constraint of the State to be relaxed when there is a monetary injection, as long as the growth rate of the nominal money stock in the long run is equal to or greater than the interest rate on the monetary base (zero in the case of currency).

Chapter 6 uses an extension of the comprehensive balance sheet framework of Chapter 2 to demonstrate why the Eurosystem is not an operationally decentralized central bank (like the Fed), but a system of currency boards with twenty independent profit and loss centers that is at risk of collapse because individual national central banks (NCBs) can go bankrupt.

A "regular" NCB of the kind outlined in the earlier chapters (including the Fed, the BoJ, the BoE and the PBoC) can, in principle, issue base money at will. Unless it has significant foreign-currency-denominated or index-linked liabilities, it cannot be forced into default. The ECB and the nineteen NCBs that make up the Eurosystem represent twenty independent profit and loss centers. No individual NCB can decide on the amount of monetary issuance it can engage in. That is a collective decision of the Governing Council of the ECB. An NCB in the Eurosystem is therefore categorically different from the central banks analyzed in the rest of this book. The same applies to the nineteen sovereigns in the Eurozone, none of which can control the monetary issuance of "their" NCB.

The implication is that, from the perspective of an individual NCB (and indeed from the perspective of their sovereigns) it is as if all its euro-denominated debt is foreign-currency denominated. Own-risk activities undertaken by NCBs (that is, activities for which the individual NCB is responsible and for which there is no profit and loss sharing with the rest of the Eurosystem) have vastly increased in scope

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and scale. Individual NCBs therefore can become insolvent even if the consolidated Eurosystem (treating all risk as shared risk) is solvent.

We argue that this is more than a theoretical curiosum. The exposure of the Banca d'Italia to high-risk Italian sovereign debt, both directly (through the Public Sector Purchase Programme) and indirectly, thought its exposure to Italian banks that hold a large amount of Italian sovereign debt, is such that its solvency could be at risk should there be a material Italian sovereign debt restructuring. The Chapter then discusses how to cure this affliction. Reducing or, preferably, eliminating own-risk activities by NCBs is one obvious solution. Another is reducing the riskiness of the assets that some NCBs and the commercial banks in their jurisdictions are exposed to. This could be done through financial engineering, through sovereign risk sharing or through regulatory measures limiting the exposure of banks to any counterparty, including their own sovereign.

A key message of this book is that it is time to move from the conventional balance sheet of the State (and of its constituent entities) to the comprehensive balance sheet or intertemporal budget constraint. The fiscal options open to the State can only be understood if we have a clear understanding of the IBC of the State. The IBC of the State is central to understanding the fiscal space available to the authorities and to designing sustainable countercyclical and structural fiscal policies. This key role of the IBC of the State also makes it all the more important that its improper use in the FTPL be exposed.

Whatever the degree of operational independence of a central bank, it remains the liquid monetary window of the Treasury, which is also its beneficial owner. There is an unavoidable tension between the beneficial ownership of the central bank by the national Treasury and the operational independence of the central bank. Operational independence requires accountability. At the very least, operational independence of a central bank requires that there be clarity and transparency about all its fiscal and quasi-fiscal transactions. Temporary confidentiality may make sense during financial upheavals; full disclosure has to be the rule once financial order has been restored.

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