

Central Bank Digital Currencies: Much ado About Nothing?

Sergio Rossi 

University of Fribourg, Fribourg, Switzerland

ABSTRACT

Central bank digital currencies (CBDCs) are increasingly becoming a subject matter for a variety of stakeholders in the economy as a whole. In this paper, we will first analyse the nature of CBDCs to show that it is essentially a digital liability of central banks, like today's settlement balances that banks use in their own transactions. Such a 'wholesale' CBDC may exist along a 'retail' CBDC, which is the digital version of banknotes that, to date, any non-bank agents can use for their small-value payments. In this perspective, CBDCs are therefore 'much ado about nothing', as they just represent the most recent evolution of the form of money. However, in this paper we will also show that such an evolution could have some relevant consequences for monetary policy objectives like financial stability and banks' solvency if 'retail' CBDCs replace banknotes in advanced economies, thereby providing an interesting alternative to bank deposits — particularly if these CBDCs are going to be remunerated by the issuing central banks. The last section will expand on this issue, focusing on the possible reaction of the banking sector, whose aim is and will remain the maximization of banks' profits over the short run.

ARTICLE HISTORY

Received 30 August 2024
Accepted 17 December 2024

KEYWORDS

Central bank digital currencies; monetary policy; payment systems

JEL CODES

E42; E52; E58

1. Introduction

The Atlantic Council's (2024) 'Central bank digital currency tracker' shows that, at the time of writing, 134 countries (representing 98 percent of global output) are working on the introduction of a central bank digital currency (CBDC) (they were only 35 in 2020). All G20 countries are exploring the launch of a CBDC and 13 countries are already in a pilot stage (notably in China, where the digital yuan is the largest CBDC pilot, but also in Brazil, Japan, India, Australia, Russia, and Turkey). The Bahamas, Jamaica, and Nigeria have fully launched a CBDC, while the digital euro is an ongoing CBDC pilot (see also Auer, Cornelli, and Frost 2020; Bibi and Canelli 2024; Kosse and Mattei 2022). Further, all the original member countries of the BRICS (Brazil, Russia, India, China, and South Africa) are piloting a CBDC, while a cross-border 'wholesale' CBDC project (Project Agorá) launched by the Bank for International Settlements is

CONTACT Sergio Rossi  sergio.rossi@unifr.ch  Department of Economics, University of Fribourg, Boulevard de Pérolles 90 (mailbox 22), Fribourg, CH-1700, Switzerland

© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

involving 7 central banks actually, ‘representing the five top international reserve currencies: the Bank of France (representing the Eurosystem), the Bank of Japan, the Bank of Korea, the Bank of Mexico, the Swiss National Bank, the Federal Reserve of New York (through its New York Innovation Center) and the Bank of England’ (Bank for International Settlements 2024, Internet).

This mushroom growth of interest in CBDCs results from various issues that central banks have been confronted with during the recent years, such as the rise of fintech and cryptoassets, and the international development of privately issued digital currencies (so-called ‘stablecoins’), whose existence would give rise to a parallel and unregulated financial system, which makes monetary policy decisions and implementation a much more difficult problem to solve (see Allen, Gu, and Jagtiani 2022).

As we will explain in the next section, there are two kinds of CBDCs (wholesale and retail) and three types of CBDC architectures (see Bank for International Settlements 2020; Committee on Payments and Market Infrastructures 2018).¹ On one hand, some CBDCs can be used only by banks and non-bank financial institutions that bank with the central bank: these are called ‘wholesale’ CBDCs. Indeed, as Panetta (2022, Internet) explains, a wholesale CBDC ‘refers to the settlement of interbank transfers and related wholesale transactions in central bank reserves’. As a matter of fact, ‘central banks supply the ultimate means of payment for financial institutions’ (Panetta 2022, Internet), so that payment finality can occur between the paying bank and the receiving bank (see Rossi 2007, Chs 2–3 for analytical elaboration). On the other hand, many other CBDCs are meant to be used by all economic agents, including households and any kinds of firms. These so-called ‘retail’ CBDCs are a substitute of both cash and deposits with commercial banks. As Bibi and Canelli (2023, p. 2) point out, this idea ‘is often traced back to James Tobin (1987), who suggested converting central bank reserves from wholesale money into retail money, accessible to everyone — in this way constituting the precursor of the CBDC.’

Actually, the motivations for issuing a retail CBDC are manifold, as shown by a survey carried out in 2021 by the Bank for International Settlements involving 81 central banks — 25 in advanced economies (AEs) and 56 in emerging market and developing economies (EMDEs).

Overall, the retail CBDC work in AEs is driven mainly by domestic payments efficiency, payments safety and financial stability considerations. [...] Domestic payments efficiency, payments safety and financial stability are also important drivers for the retail CBDC work in EMDEs. However, their CBDC engagement is, above all, driven by financial inclusion-related motivations. Also, compared with AEs, EMDEs assign a higher weight to monetary policy implementation as a reason to explore or develop a CBDC. (Kosse and Mattei 2022, p. 6)

To be sure, the issuance of a CBDC is an antidote to a surreptitious privatization of the monetary system, as Fantacci and Magurno (2023, Internet, our translation) observed,

¹Within the broad categorisation of retail and wholesale, CBDCs can assume a variety of design options. CBDCs can be designed either as token-based or account-based, namely as cash or commercial bank deposits, respectively (see, among others, Auer et al. 2022); they can be characterised by specific design features that (1) facilitate their adoption and use (such as, fully anonymity, no fees and interoperability), extending the risks to monetary policy or (2) constrain their adoption (such as, caps, limits to transactions, full disclosure) that can reduce potential risks for monetary policy’ (Bibi and Canelli 2024, p. 6, fn. 5).

pointing out that ‘the creation of a CBDC would avoid this problem by ensuring that the currency retains the character of a public good and preserving monetary sovereignty’. In the next section we will analyse the nature of CBDCs to show that it is essentially a digital liability of central banks, like today’s settlement balances that banks use in their own transactions. Such a ‘wholesale’ CBDC may exist alongside a ‘retail’ CBDC, which is the digital version of banknotes that, to date, any non-bank agents may use for their (usually small-value) payments. In this perspective, CBDCs are therefore ‘much ado about nothing’, since they just represent the most recent evolution of the form of money. However, in the third section we will show that such an evolution could have various relevant consequences for monetary policy objectives like financial stability and banks’ solvency, if ‘retail’ CBDCs replace banknotes in advanced economies, thereby providing an interesting alternative to bank deposits — particularly if these CBDCs are going to be remunerated by the issuing central banks, even though the majority of the latter may limit the amount of savings in this form. The fourth section will expand on this issue, focusing on the possible reaction of the banking sector, whose aim is and will remain the maximization of banks’ profits. The last section concludes, providing some political-economy considerations from a monetary macroeconomics perspective. These conclusions show that although CBDCs are not going to affect the two-tiered structure characterizing any banking system, they could affect both the transmission mechanism of monetary policy and the banks’ strategies as regards the granting of credit lines for purely speculative transactions.

2. The Nature and Scope of Central Bank Digital Currencies

Heterodox economists have been pointing out since the early 1980s (and in some cases even earlier: see notably Davidson 1972; Davidson and Weintraub 1973; Schmitt 1972) that money is an endogenous magnitude with regard to economic activity. As Moore (1988, p. 46) famously observed, the supply of money is ‘credit-driven and demand-determined’. This amounts to saying that banks do not need to have some pre-existent savings in order to open any credit lines they deem profitable. Indeed, they do so even though a relevant volume of these loans finance ‘non-GDP-based transactions’ (Werner, 2011, p. 29). This (endogenous) nature of money exists for every kind of money, be it issued by a commercial bank or by a central bank, because money is a means of final payment necessary to make sure the ‘seller of a good, or service, or another asset, receives something of equal value from the purchaser, which leaves the seller with no further claim on the buyer’ (Goodhart 1989 [1975], p. 26). As Hicks (1967, p. 11) noticed cogently, ‘[e]very transaction [to wit, every payment] involves three parties, buyer, seller, and banker.’ Logically, this three-pole payment occurs also when both the buyer and the seller are banks: all operations across the interbank market involve indeed banks as either buyers or sellers of a variety of financial assets. Now, as nobody can pay (finally) by issuing one’s own acknowledgement of debt, this means logically that all interbank market transactions must be paid in central bank money. To be sure, ‘[i]f a simple promise of payment could perform the role of final payment, buyers would be endowed with a seigniorage privilege, namely with a right of withdrawing goods from the market without giving anything in exchange’ (Graziani 2003, p. 60).

Hence, central bank money is instrumental in order for all interbank transactions to be paid finally, thereby making sure no settlement risk exists eventually, so much so that all so-called ‘advanced’ economies have set up by the late 1980s a real-time gross-settlement system, making sure that each payment order entered into such a system will be carried out as soon as the relevant settlement balances are available (see Rossi 2007, pp. 67–79).

Now, if the nature of money has always been the same — as it stems from the capacity of banks to provide loans *ex-nihilo* (that is, starting from scratch), since bank ‘loans make deposits’ as famously depicted by Schumpeter (1954, pp. 1110–17) — there has been an evolution of monetary forms, making them more and more immaterial (starting from an array of physical items like stones, empty shells, and metals), particularly as a result of an accounting system based on double-entry records (assets and liabilities): all these scriptural forms of money exist in banks’ book-keeping, which has been digitalized since the widespread use of computers and information technologies (see Bibi and Canelli 2023). Currently, digital book-keeping accounts for the vast majority of both small-value and large-value payments. From this perspective, the introduction of a ‘wholesale’ CBDC is merely the latest evolution of the form in which central bank money exists: bank reserves, namely, settlement balances, have been recorded so far in the central bank’s ledgers; by now, these ledgers being digitalized, the same settlement balances are in a digital form. If so, then ‘wholesale’ CBDCs, which can be accessed only by those financial institutions that have an account with the central bank, are the digital form of what once upon a time were called ‘bank reserves’. Hence, so far, CBDCs are much ado about nothing indeed.

However, this is not the end of the story, since an increasing number of central banks in both advanced and emerging economies have been studying — and in some cases already adopting — a ‘retail’ CBDC. The most famous case is the digital yuan. Indeed, China is the first country issuing a CBDC widely available to the general public, as an alternative to banknotes likely to replace them eventually (see Auer and Böhme 2020; Keister and Sanches 2023; Niepelt 2020). In contrast with ‘wholesale’ CBDCs — which do not raise any major issue on economic grounds — a ‘retail’ CBDC might give rise to some relevant changes with regard to money and banking. Three types of ‘retail’ CBDC architectures could be set up, depending on ‘the active operational role played by the central bank and by commercial banks and on the relationships between these actors in managing the CBDC’ (Bibi and Canelli 2023, p. 3). The first type is the direct issuance architecture, where the central bank keeps track of ‘all retail transactions and issues the CBDC directly to end users’ (PricewaterhouseCoopers Advisory 2020, p. 12). Another possibility is offered by a two-tiered architecture, which reproduces the two-tier structure of the banking system, where non-bank agents settle all transactions through the banking sector, while all banks pay and are paid finally through the central bank (see Rossi 2007, Ch. 2): in this case, the CBDC is not really a claim towards the central bank but towards commercial banks (PricewaterhouseCoopers Advisory 2020, p. 13). There is also a third architecture, called ‘hybrid’: in this case, ‘the claim remains against the Central Bank, but there is the participation of Private Institutions to support [the CBDC payments] system operations’ (PricewaterhouseCoopers Advisory 2020, p. 13).

These three architectures are of extreme importance, as the choice concerning their adoption will shape the future of the banking and financial system, as well as their relationships. Overall, in all three options, the central bank issues the CBDC; key differences among the architectures concern the structure of legal claims, the records of all transactions kept by the central bank, and the presence of other institutions, i.e., commercial banks and financial intermediaries. (Bibi and Canelli 2024, p. 7)

To be sure, in a not-too-distant future the financial system could be confronted with some significant interoperability problems, in light of the increasing number of CBDC pilots and implementations. The proliferation of different CBDC models is indeed creating a new urgency for the definition of relevant international standards (see Bank for International Settlements 2022a, 2022b). This is particularly relevant in the case of ‘retail’ CBDCs, because of their likely impact on the monetary policy transmission mechanism. Let us expand on this in the next section.

3. Some Possible Monetary Policy Impacts of a ‘Retail’ CBDC

The introduction of a ‘retail’ CBDC for all kinds of economic agents, notably firms and households, could increasingly affect the transmission mechanism of monetary policy as well as banks’ business strategies — both of which have an impact on financial stability. In this regard, much is likely to depend on three characteristics, namely, (1) the amount of savings agents decide to keep in the form of a ‘retail’ CBDC, (2) the interest rate on a ‘retail’ CBDC, and (3) the (fixed or variable) transformation costs between the CBDC and bank deposits.

The amount of savings that economic agents (namely, firms and households) decide to keep in the form of a ‘retail’ CBDC depends on different variables, notably:

- the limit of the amount these agents may save in this form, which is decided and upgraded by either the government or the central bank;
- the remuneration of CBDCs with regard to banks’ remuneration of the relevant (sight or demand) deposits;
- the fragility of the banking sector, with particular attention to systemically relevant banks;
- the fees and other charges that banks ask depositors to pay for keeping their accounts as well as for carrying out their payment orders within the domestic payments system or across their country’s borders.

These factors could explain why the demand for ‘retail’ CBDCs ‘may be volatile on a daily basis, as inflows and outflows result from payment between CBDC and non-CBDC holders’ (Committee on Payments and Market Infrastructures 2018, p. 13). In particular, shortly after the introduction of a ‘retail’ CBDC this volatility could increase the number of liquidity-injecting and liquidity-absorbing open-market operations by the central bank (*ibid.*). If so, then policy rates of interest could have to be modified more frequently than has been usually the case to date, as a result of the need to carry out open-market operations on a daily basis to adjust the monetary policy operational framework, including repeated increases in reserve requirements to avoid bank runs — which are much more rapid today than once upon a time, owing to the digitalization of money as

explained in the previous section. To be sure, in case of financial turmoil or a banking crisis, a relevant number of depositors will transform their savings into ‘retail’ CBDCs, thereby impacting on banks’ balance sheets negatively, possibly generating a systemic financial crisis analogous to the global financial crisis observed in 2008 after the bursting of the so-called subprime bubble in the United States. Central banks should therefore design their ‘retail’ CBDCs in order to be able to avoid that such a crisis will happen again. A possible solution consists in replicating the two-tier structure of banks (namely, a central bank on top of the banking sector), so that non-bank agents continue paying with commercial bank money, while only banks pay finally with a central bank money issued in digital form: in this case, the ‘retail’ CBDC is not really a claim that non-bank agents have towards the central bank, as it is managed by commercial banks (PricewaterhouseCoopers Advisory 2020, p. 13). This solution could reduce a central bank’s operational burden and increase the interoperability between the CBDC and all other payment systems available to both banks and non-bank agents (see Mastromatteo and Rossi 2023). Such a solution, indeed, is supported by a number of authors. Let us briefly summarize the most relevant analyses in this regard.

According to Kosse and Mattei (2022), the launch of ‘retail’ CBDCs represents merely an evolution of cash, since the use of the latter has been decreasing for different reasons, notably after the Covid-19 pandemic, when ‘social distancing measures, public concerns that cash may transmit the Covid-19 virus and new [...] payment schemes have further sped up the shift toward digital payments’ (Auer, Cornelli, and Frost 2020, p. 3). In this perspective, Meaning et al. (2021, pp. 4–5) consider that a ‘retail’ CBDC is simply a form of digital cash replacing banknotes and coins eventually. This substitution may take several years, so that banknotes and digital cash would coexist initially, as the European Central Bank (2020, p. 2) intends to do across the euro area, without specifying the time horizon for this coexistence: ‘A digital euro would be introduced alongside cash, it would not replace it.’ Be that as it may, ‘retail’ CBDCs could prevent the fragmentation of the monetary system induced by the growing interest in so-called ‘cryptocurrencies’ or ‘stablecoins’, which are a particular category of ‘cryptocurrencies’, usually linked to a basket of national currencies or to precious metals such as gold (see Beretta and Gorini 2025). Indeed, as pointed out in the introduction, a number of central banks, including the US Federal Reserve, the European Central Bank and the Swiss National Bank, have been investigating whether banknotes (and coins) must be replaced by a ‘retail’ CBDC or co-exist with the latter, and what are its impacts for the transmission mechanism of their monetary policy decisions. For instance, Bordo and Levin (2017, p. 2) investigate five key questions in this connection:

- (1) Should CBDC payments involve transfers between accounts held at the central bank, or digital ‘tokens’ that can be transferred directly from payer to payee?
- (2) Should cash be abolished, or should the central bank establish a schedule of fees for transferring funds between CBDCs and paper currency?
- (3) Should CBDCs be interest-bearing or indexed to an aggregate price level rather than having a constant nominal value like cash?
- (4) What are the implications of CBDCs for the central bank’s monetary policy strategy and operating procedures?

(5) How will CBDCs affect the interactions between the central bank and the fiscal authorities?

In this regard, Böser and Gersbach (2020, p. 2) analyze the welfare implications of the launch of a ‘retail’ CBDC with no deposit insurance and ‘provide a welfare comparison with today’s monetary system, where bank deposits, as the principal form of money, are insured through governmental guarantees’. Using simulations, Davoodalhosseini (2022, p. 1) shows that ‘[h]aving both cash and a CBDC available may result in lower welfare than in the cases where only cash or only a CBDC is available.’ Further simulations carried out by Chen and Siklos (2022) suggest that CBDCs do not affect the monetary policy objective of price stability in the market for produced goods and services. The authors also point out that financial stability issues are not necessarily overcome by the introduction of a CBDC (see also Temperini, D’Ippoliti, and Gobbi 2024). ‘Indeed, the regulatory and institutional environments will dictate the eventual inflation and macroeconomic effects of CBDC’ (Chen and Siklos 2022, p. 3).

Cova et al. (2022, pp. 7–8) elaborate on this to ‘find that in a digital-currency economy, where the stablecoin is a significant means of payment, the domestic and international macroeconomic effects of a monetary policy shock can be smaller or larger than in a (benchmark) mainly-cash economy, depending on how the assets backing the stablecoin supply respond to the shock. The benchmark transmission of the monetary policy shock can nonetheless substantially be restored in the digital-currency economy (1) if the stablecoin is fully backed by cash or (2) if the CBDC is a relevant means of payment.’

To address a number of the issues pointed out above, central banks may introduce (fixed or variable) limits on the amounts held in a ‘retail’ CBDC form, providing thereby a cap to the maximum amounts that depositors can withdraw from the banking sector and transform into a ‘retail’ CBDC. If so, the central bank could avert that a digital bank run gives rise to a banking crisis, thus reducing (but not fully eliminating) day-to-day deposits’ volatility across the banking sector. The central bank may also adopt a tiered remuneration system in order to make sure that only a predefined amount of ‘retail’ CBDCs is remunerated at an interest rate decided by it, while all the amounts above this threshold are not going to be remunerated or might even have to pay a penalty rate of interest analogous to the negative interest rate policy (NIRP) adopted by a number of central banks in the aftermath of the global financial crisis (see Rossi 2019). This is so much so when a ‘retail’ CBDC does not coexist with cash but replaces it: in such a case, no economic agent can avoid being impacted by a zero interest rate policy (ZIRP) or NIRP, since it is impossible to transform any bank deposits into banknotes, once the latter no longer exist. In this case, ‘[monetary] policymakers would be able to push market interest rates below zero in response to a severe adverse shock, and hence the central bank would be able to provide an appropriate degree of monetary accommodation without resorting to measures aimed at modifying the size or composition of its balance sheet’ (Bordo and Levin 2017, p. 16). In this regard, however, two issues arise:

- a ZIRP or a NIRP could be rather inefficient, if the banking sector does not reduce the interest rates it pays to a variety of its own depositors, in order for several banks not to lose a relevant volume of deposits, which banks use to refinance their credit lines;

- a ‘normalization’ of policy rates of interest (namely, a central bank’s decision to pay a positive rate of interest on settlement balances) could reduce the volume of ‘retail’ CBDCs, particularly if the latter are not remunerated, once the banking sector pays some interest rate to its depositors.

To date, there is no empirical evidence to assess whether or not these issues could be relevant in a not-too-distant future, once ‘retail’ CBDCs will be a reality in ‘advanced’ economies. So far, some model-based simulations show that ‘introducing a [‘retail’] CBDC can lead to an increase of up to 0.15 per cent in consumption for Canada and up to 0.34 per cent for the United States, compared with their respective economies if only cash is used’ (Davoodalhosseini 2022, p. 2). These simulations — based on the hypothesis that ‘the cost of carrying a CBDC relative to cash is around 0.25 per cent of the transaction value’ (Davoodalhosseini 2022, pp. 2–3) — suggest that the introduction of a ‘retail’ CBDC can increase the effectiveness of monetary policy decisions, as the latter could influence agents’ behavior as regards the financial institution(s) where they decide to keep their own savings (in the form of bank deposits or ‘retail’ CBDCs). As Bordo and Levin (2017, p. 2, italics in the original) point out, ‘[a]n interest-bearing CBDC could provide a *secure store of value*, with a rate of return in line with other risk-free assets such as short-term government securities. The CBDC interest rate could serve as the main tool for conducting monetary policy.’ The effectiveness of monetary policy can indeed be supported by a ‘retail’ CBDC as far as ‘it is interest-bearing and universally accessible’ (Davoodalhosseini and Rivadeneyra 2020, p. 95), which is not the case of settlement balances at the central bank. With a ‘retail’ CBDC ‘the conduct of monetary policy does not require the intermediation of financial institutions’ (Davoodalhosseini and Rivadeneyra 2020, p. 100). This is meant ‘to improve safety in the payment infrastructure’ (Morales-Resendiz et al. 2021, p. 2), thereby contributing to safeguard the central banks’ objectives of both monetary and financial stability. In this connection, however, ‘a deposit-like CBDC causes an increase in [bank] deposit and loan rates, and a contraction in bank lending to firms’ (Agur, Ari, and Dell’Ariccia 2022, pp. 63–64), which may curtail investment and output. Davoodalhosseini (2022) elaborates on this, proposing a model-based simulation where both cash and a ‘retail’ CBDC is available to the general public in an ‘advanced’ economy like Canada or the United States. His findings show that ‘if the cost of carrying a CBDC relative to cash is around 0.25 per cent of the transaction value, introducing the [‘retail’] CBDC can lead to an increase in consumption of 0.04–0.07 per cent for Canada and 0.12–0.21 per cent for the United States’ (pp. 2–3).

This conclusion, however, contrasts with those of Cova et al. (2022), who observed that a change in the policy rate of interest by 100 basis points has a lower impact in a digital-currency economy where both a ‘retail’ CBDC and ‘stablecoins’ exist than in a mainly cash-using economy. According to their own model simulations, ‘[t]he macroeconomic effects of a monetary policy shock are smaller if households have a larger preference for private digital currency than for government currencies (physical cash and [a ‘retail’] CBDC)’ (Cova et al. 2022, p. 24). By contrast, the authors note that ‘the transmission of a monetary policy shock in the digital-currency economy is close to the one in the mainly-cash economy provided the central bank issues [‘retail’] CBDCs and there is a sufficiently large household’s demand for them’ (Cova et al. 2022, p. 24). This implies

that private digital currencies (like ‘stablecoins’) should be forbidden in order to make sure that the monetary policy transmission mechanism works properly when ‘retail’ CBDCs will be introduced and largely used by any kinds of economic agents.

In this connection, much will depend on the central banks’ decision to pay an interest on their ‘retail’ CBDCs or not. If the latter are remunerated, central banks can decide what is the relevant interest rate to pay, in order to preserve (and even to strengthen) financial stability across the whole economic system. Indeed, to avert that bank depositors move a relevant volume of their savings out of the banking sector (into ‘retail’ CBDCs), thus inducing a digital bank run that could destabilize a number of banks (as observed during the crash of Credit Suisse, see Rossi 2023), the central bank should introduce a ceiling on the amount of ‘retail’ CBDCs any economic agents may hold (Agur, Ari, and Dell’Ariccia 2022; Bindseil 2020). Alternatively, it could remunerate ‘retail’ CBDCs with an interest rate that is lower than those on bank deposits, or pay no interest at all — making thereby a ‘retail’ CBDC similar to banknotes. In this connection, ‘if the objectives of the policymaker were to improve payment efficiencies and financial inclusion, it is not essential that a CBDC pays interest’ (Meaning et al. 2021, p. 8). This is so much so that any ‘retail’ CBDCs imply neither the risks nor the costs of holding cash. In practice, ‘[t]his would simultaneously ensure for users the safety of having the central bank money and the convenience of a bank deposit’ (Temperini, D’Ippoliti, and Gobbi 2024, p. 26). Indeed, as pointed out by Alsterlind et al. (2015, pp. 1–2), for both firms and households, cash ‘must be stored in a secure manner, which costs money. Some also find it awkward to have to pay their bills by going to the bank instead of paying them over the internet at home. It is also not free to pay bills over the counter using cash.’ Further, ‘[f]or banks, it is certainly less expensive to keep reserves at the central bank than to hold large amounts of cash’ (Armelius et al. 2018, p. 45). Since storing cash is expensive, Cesaratto and Febrero (2022, p. 45) point out that ‘the rate on deposits (bank or reserves) can be brought into negative territory to the extent that the cost of holding a deposit is lower than that of holding cash.’ Now, since a non-interest bearing ‘retail’ CBDC has no costs for all its owners, ‘this would impose an effective zero lower bound’ on the central bank’s policy rates of interest (ibidem). As a matter of fact, since a ‘retail’ CBDC is nothing else than the digitalization of cash, it does not make sense to remunerate ‘retail’ CBDCs, particularly if there is no limit on the amount of CBDCs that any economic agents may possess. To be sure, an interest-bearing ‘retail’ CBDC could give rise to ‘a massive shift from bank deposits, obliging banks to raise the remuneration of deposits, likely translating into higher lending rates [of interest]’ (Cesaratto and Febrero 2022, p. 29). If so, then the volume of banks’ new credit lines could be reduced, notably with regard to firms’ investment decisions and, as a result, with a negative impact on the labour market. Such a situation could also induce a number of banks to increase their lending volumes for ‘non-GDP-based transactions’ (Werner, 2011, p. 29), as the latter are usually expected to provide higher yields (since they imply higher risks) than ‘GDP-based transactions’. Hence, since central banks are in charge of contributing to make sure that financial stability prevails, it would be better not to remunerate holdings of ‘retail’ CBDCs — or to put a cap on these holdings if they are remunerated, possibly with a lower rate of interest than those paid by banks to their depositors (Cesaratto and Febrero 2022, p. 29). If so, then monetary policy rates of interest and their transmission mechanism could work analogously to the current

situation, where the majority of small-value payments are carried out with cash. By contrast, if the volume of ‘retail’ CBDCs is relevant, ‘[t]he central bank would in fact be obliged to replenish the bank’s reserve accounts with the liquidity lost as a result of the deposit migration to CBDC (a liability substitution for banks). This implies that the central bank can influence the banks’ lending rate by fixing the interest rate on reserves, and not by acting through the interest rate corridor or the floor systems’ (Cesaratto and Febrero 2022, p. 29).

In this regard, the workings of the existing transmission channels of monetary policy with a ‘retail’ CBDC remain a conundrum. Mancini-Griffoli et al. (2018) argue that such a CBDC could strengthen the interest rate channel if it is remunerated, particularly since it contributes to financial inclusion of ‘non-banked’ agents. By contrast, Carstens (2019) is sceptical in this regard, as it is difficult to imagine how CBDCs can affect the transmission mechanism of monetary policy because of the uncertainty surrounding the demand for central bank money and its reaction to interest rate changes. In any case, the introduction of ‘retail’ CBDCs has some important implications for the banking sector, particularly as regards their financial transactions. Let us focus on this issue in the next section.

4. The Impact of a ‘Retail’ CBDC on the Banking Sector

The banking sector, namely, commercial banks and the like, could be confronted with a series of structural changes and strategic issues resulting from the adoption of a ‘retail’ CBDC in highly-financialized economic systems such as those of ‘advanced’ countries at the time of writing. To be sure, such a CBDC could give rise to an increasing process of bank disintermediation, inducing thereby a relevant number of depositors to convert a share of their bank deposits into a ‘retail’ CBDC, particularly as regards small banks — which have little market power.² ‘Given its superior hierarchy in the money spectrum — since it would entail a direct financial user relationship with the central bank — CBDC adoption could trigger a strong or mild conversion from deposits’ (Bibi and Canelli 2024, pp. 2–3). As Bibi and Canelli (2023, p. 4) point out cogently, ‘the degree of disintermediation is strictly linked to the architecture adopted and to the intrinsic features of the CBDC, especially in terms of interest returns’. Indeed, if the CBDC is remunerated and its amount is not limited for any bank depositors, the latter might decide to move their savings into a ‘retail’ CBDC (see Bibi and Canelli 2023, 2024 for analytical elaboration in light of endogenous money theory). If so, then banks might fear losing their market share, inducing a number of them to increase their lending rates of interest in order to pay higher interest rates on the deposits of their customers, to avoid that the latter transform their savings into a ‘retail’ CBDC.³ Such a decision, however, could rapidly affect the balance sheet of a number of their borrowers, thereby impacting negatively on financial stability, particularly if there is also a

²When banks have more market power in lending (also reflected in the steepness of the demand curve for deposits), they can better insulate their profits by passing the deposit rate hike on to loan rates. Banks with little market power adjust more aggressively in quantity, exhibiting a larger contraction in deposit and loan volume’ (Mancini-Griffoli et al. 2018, 21–22).

³As Mancini-Griffoli et al. (2018, p. 23) note in this regard, ‘banks with a larger share of retail deposits will face tougher competition following the introduction of CBDC and may not be able to raise lending rates to preserve profits.’

negative impact on firms' investment decisions as well as on households' loans for real-estate market transactions. All this is then likely to give rise to a 'flight to safety', that is, a flight to a 'retail' CBDC that could thus exacerbate financial instability, so much so if a financial crisis is expected to occur. As Andolfatto (2021, p. 537) mentions, '[t]he run-inducing incentives put in place by CBDC would [...] require a heroic expansion of lending by the central bank in a financial crisis.' In particular, '[i]f, during a period of stress or financial uncertainty, households and businesses saw CBDC as less risky than commercial bank deposits [...], that rush to safety could trigger broader systemic instability' (Bank of England 2020, p. 37). Such a scenario, however, depends on different variables, as Kumhof and Noone (2021) have pointed out, notably with regard to what they call the 'core principles' of a 'retail' CBDC, to wit, whether there is a quantity rule or an interest rate rule for holding a 'retail' CBDC. In particular, Bibi and Canelli (2023, p. 5) note that there exist some possible strategies to limit this process of transmigration, notably 'by introducing a notice period for large CBDC withdrawals (it is currently done with cash); by not remunerating CBDC holders if their balances are above a certain limit; by imposing fees on balances above certain thresholds or introducing daily transfer limits' (see also Meaning et al. 2021, p. 33). Cesaratto and Febrero (2022, p. 27) expand on this, considering that a risk could nevertheless exist for those countries introducing a 'retail' CBDC with a weak domestic currency, where a large amount of bank deposits would be replaced by this CBDC. As a matter of fact, neither the central bank nor any other banks are in a position to impede that bank deposits are transformed into a 'retail' CBDC — at least within the pre-defined cap — once such a digital currency exists in a given monetary space. Therefore, 'following a bank run, bankers may face a liability vis-à-vis the central bank that exceeds their collateral capacity as determined by the central bank. In this case, the bank becomes illiquid and defaults' (Böser and Gersbach 2020, p. 3). As the authors propose, the introduction of a 'retail' CBDC should be accompanied with a monetary policy tightening, namely, increasing the collateral requirements to banks in a way that induces them to reduce their illiquidity risks by limiting considerably the total amount of loans they provide for 'non-GDP-based transactions' (Werner, 2011, p. 29), as these transactions are associated with higher risks across global financial markets. If so, then a 'retail' CBDC could be a factor of financial stability. It could even induce an important number of banks to support economic activities that create new employments, thereby increasing both gross domestic product and the employment level, with also an ensuing favourable impact on public finance as it can reduce public deficits by both the reduction of the number of poor and unemployed people needing public assistance and the increase of fiscal revenues collected by the general government sector.

Such an optimistic scenario, however, contrasts with the actual situation of a number of so-called 'advanced' economies, where there is a lack of effective demand owing to an array of economic and (geo)political factors that have been exacerbated recently, since the Russian invasion of Ukraine (see Mastromatteo and Rossi 2024). In this regard, the introduction of a 'retail' CBDC associated with higher collateral requirements for most banks would induce them to reduce the volume of loans across the 'real' economy, as for them this is usually a much less profitable activity than carrying out their speculative transactions across financial markets. This appears to be particularly the case with a so-called 'direct issuance' CBDC architecture, which implies that banks

are cut out of the monetary circuit involving the payer and the payee when a ‘retail’ CBDC is used.⁴ If so, then a ‘retail’ CBDC would be a factor of financial instability much more than the opposite, as it would induce banks’ managers to focus on financial speculation more than this occurs to date (see Temperini, D’Ippoliti, and Gobbi 2024). Further, some of these banks could also be induced to set up their own ‘cryptocurrencies’ or ‘stablecoins’, to attract a number of depositors, particularly if these alternative digital currencies pay an interest rate higher than the remuneration of a ‘retail’ CBDC. In this regard, which to date is only a theoretical scenario, depositors could be attracted by these private digital currencies if they fear that a ‘retail’ CBDC is associated with a loss of their privacy, particularly in connection to the traceability of all their transactions by some public authorities. Paradoxically, this would then imply that a ‘retail’ CBDC inflates the volume of transactions in the so-called ‘shadow’ economy — be it for fiscal elusion or illegal transactions.

Another structural change that could affect the banking sector and thereby the economic system as a whole is banks’ decision to focus more on global transnational corporations than on small and medium-sized firms, particularly by the systemically relevant banks across the global economy. Indeed, the introduction of ‘retail’ CBDCs as explained in the previous sections could contribute to making loans to small and medium-sized firms less interesting for banks, if the clients of these banks move their savings into a ‘retail’ CBDC based on a ‘direct issuance’ architecture, thereby reducing banks’ capacity to refinance their loans in general. For such a reason, banks could neglect (or even ignore) small and medium-sized firms’ borrowing needs, focusing even more than to date on global transnational corporations’ needs for ‘initial finance’, that is, the opening of the monetary circuit (see Graziani 1990, 2003). Hence, as Bellofiore (2004) pointed out cogently, the issue in this regard is not so much the closure of such a circuit, but its opening: if the latter does not occur, then firms will not produce and could even dismiss several wage earners; in any case, there will be less produced output, hence a lower gross domestic product, with all negative consequences also for public finance and financial markets at large. This is so much so, because global transnational corporations borrow from banks in order to carry out financial transactions rather than to open a new monetary circuit for production purposes. This is the so-called ‘financialization’ of the global economy (see Epstein 2005): banks, indeed, provide an increasing volume of loans to finance ‘non-GDP-based transactions’ (Werner, 2011, p. 29) since the financialization process has been expanding from the late 1980s in so-called ‘advanced’ economies, where ‘the increasing role of financial motives, financial markets, financial actors and financial institutions’ (Epstein 2005, p. 3) induced firms to put a downward pressure on the wage level of their workers in order to reduce their production costs and thereby maximize profits as well as their shareholders’ value. All in all, central banks should be very careful when they decide to launch a ‘retail’ CBDC, as banks could be induced thereby to adopt an even riskier business strategy oriented to financial markets at large, where they expect to maximize their profits over the short run.

⁴In this regard, it would be better to adopt either a ‘two-tiered’ issuance architecture or an ‘hybrid’ one, since in both cases commercial banks or other (non-bank) financial intermediaries will keep track of retail payments carried out with a CBDC across the domestic economy. See Bibi and Canelli (2024, pp. 6–9) for analytical elaboration.

5. Conclusion

The analysis presented in this paper has shown that CBDCs are much ado about nothing if the latter are merely the most advanced digital form of settlement balances that banks need to pay their own debt on the interbank market finally. These ‘wholesale’ CBDCs, however, may be inducing an increasing number of central banks to introduce also some ‘retail’ CBDCs largely available to the general public, namely, firms and households. If so, then both central banks and the banking sector as a whole could be impacted by such a decision, which therefore must be the result of some deeper and accurate investigation about the merits and drawbacks of adopting a ‘retail’ CBDC in a given economic space like a country or a set of countries such as the euro area — even though, to date, neither firms nor households have shown their interest in using ‘retail’ CBDCs in their daily transactions or in keeping their savings within the banking system.

As regards monetary policy decisions, their effectiveness in a digital-currency economy is a matter of rules and regulations about the amount of ‘retail’ CBDCs that any kind of agents may hold, the remuneration of them with regard to the rates of interest that banks pay on their customers’ deposits, and the transformation fees the former ask the latter to pay in order to put their savings in a ‘retail’ CBDC form. As regards the banking sector as a whole, and particularly commercial banks and systemically relevant banks, issuing a ‘retail’ CBDC could induce them to reduce the volume of credit lines for ‘GDP-based transaction’ (Werner, 2011, p. 29) carried out by small and medium-sized firms, since it is more rewarding for them to provide loans for purely financial transactions, notably in the interbank market.

From a political economy perspective, and in light of central banks’ dependence on the banking sector (see Rossi 2022), one may conclude that CBDCs, particularly those in a ‘retail’ form, have less advantages than disadvantages for the common good. They can be used by banks as an instrument to maximize their profits, thereby further increasing financial instability of the banking sector as a whole. This is so much so in ‘advanced’ economies, where the banking sector has been exploiting its ‘too-big-to-fail’ position to privatize its profits and socialize the costs of a bank’s bail-out by the government, with the support of the central bank acting as a lender of last resort.

Time will tell if CBDCs represent a technical progress for the common good or are merely another financial innovation satisfying some very well consolidated private interests of the so-called ‘financial industry’ against the common good. Much will depend on the design and regulations of ‘retail’ CBDCs by both monetary and supervisory authorities, which should have learned some lessons from the global financial crisis that burst in 2008. What has occurred since then, however, does not allow to have an optimistic feeling unfortunately: the (apparently) stringent banking regulations in light of the so-called ‘Basel III’ agreements and the like have not avoided other banking crises, such as the failure of some regional banks in the United States and the collapse of Credit Suisse in 2023.

To be sure, the economics of central banking and CBDCs are too important to be left in the hands of monetary authorities alone: it is time to reflect upon a democratization of these authorities, so that central banking becomes an activity for the people and by the people, instead of leaving it to the banking community, where there exists a number

of conflicts of interest that affect the common good negatively (Rochon and Vallet 2022, expand on this issue).

Acknowledgements

The author is grateful to Louis-Philippe Rochon for his kind invitation to contribute a paper to this joint symposium with the *International Journal of Political Economy*. He also thanks two anonymous referees for their very useful comments, which have all been considered in this revised version of the paper. The usual disclaimer applies.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

ORCID

Sergio Rossi  <http://orcid.org/0009-0002-5926-5356>

References

- Agur, I., A. Ari, and G. Dell’Ariccia. 2022. ‘Designing Central Bank Digital Currencies.’ *Journal of Monetary Economics* 125: 62–79.
- Allen, F., X. Gu, and J. Jagtiani. 2022. ‘Fintech, Cryptocurrencies, and CBDC: Financial Structural Transformation in China.’ *Journal of International Money and Finance* 124:102625.
- Alsterlind, J., H. Armelius, D. Forsman, B. Jönsson, and A.-L. Wretman. 2015. ‘How far Can the Repo Rate be cut?’ *Sveriges Riksbank Economic Commentaries* 11:1–5.
- Andolfatto, D. 2021. ‘Assessing the Impact of Central Bank Digital Currency on Private Banks.’ *The Economic Journal* 131 (634): 525–540.
- Armelius, H., P. Boel, C. Claussen, and M. Nessen. 2018. ‘The e-krona and the Macroeconomy.’ *Sveriges Riksbank Economic Review* 3: 43–62.
- Atlantic Council. 2024. ‘Central Bank Digital Currency Tracker.’ Accessed December 15, 2024. www.atlanticcouncil.org/cbdctracker/.
- Auer, R., and R. Böhme. 2020. ‘The Technology of Retail Central Bank Digital Currency.’ *Bank for International Settlements Quarterly Review* 25 (1): 85–100.
- Auer, R., G. Cornelli, and J. Frost. 2020. ‘Rise of the Central Bank Digital Currencies: Drivers, Approaches and Technologies.’ Bank for International Settlements Working Paper 880.
- Auer, R., J. Frost, L. Gambacorta, C. Monnet, T. Rice, and H. S. Shin. 2022. ‘Central Bank Digital Currencies: Motives, Economic Implications, and the Research Frontier.’ *Annual Review of Economics* 14 (1): 697–721.
- Bank for International Settlements. 2020. *Central Bank Digital Currencies: Foundational Principles and Core Features*. Basel: Bank for International Settlements.
- Bank for International Settlements. 2022a. *Options for Access to and Interoperability of CBDCs for Cross-Border Payments*. Basel: Bank for International Settlements. Accessed December 15, 2024. www.bis.org/publ/othp52.htm.
- Bank for International Settlements. 2022b. ‘CBDCs in Emerging Market Economies.’ Bank for International Settlements Paper 123.
- Bank for International Settlements. 2024. ‘Private Sector Partners Join Project Agora.’ Accessed December 15, 2024. www.bis.org/about/bisih/topics/fmis/agora.htm.
- Bank of England. 2020. *Central Bank Digital Currency: Opportunities, Challenges, and Design*. Discussion Paper. London: Bank of England.
- Bellofiore, R. 2004. ‘As if its Body Were by Love Possessed’. Abstract Labour and the Monetary Circuit: A Macro-Social Reading of Marx’s Labour Theory of Value.’ In *Money, Credit and*

- the Role of the State: Essays in Honour of Augusto Graziani*, edited by R. Arena and N. Salvadori. Farnham, UK: Ashgate.
- Beretta, E., and R. Gorini. 2025. 'Cryptocurrencies.' In *Elgar Encyclopedia of Central Banking*, edited by L.-P. Rochon and S. Rossi. 2nd ed. Cheltenham, UK: Edward Elgar, forthcoming.
- Bibi, S., and R. Canelli. 2023. 'The Interpretation of CBDC Within an Endogenous Money Framework.' *Research in International Business and Finance* 65:101970.
- Bibi, S., and R. Canelli. 2024. 'Is CBDC Undermining the Process of Money Creation?' *Review of Political Economy* 36:919–952.
- Bindseil, U. 2020. 'Tiered CBDC and the Financial System.' European Central Bank Working Paper 2351.
- Bordo, M., and A. Levin. 2017. 'Central Bank Digital Currency and the Future of Monetary Policy.' National Bureau of Economic Research Working Paper 23711.
- Böser, F., and H. Gersbach. 2020. 'Monetary Policy with a Central Bank Digital Currency: The Short and the Long Term.' Centre for Economic Policy Research Discussion Paper 15322.
- Carstens, A. (2019), 'The Future of Money and Payments.' speech at the Central Bank of Ireland Whitaker Lecture, 22 March. Accessed December 15, 2024. www.bis.org/speeches/sp190322.htm.
- Cesaratto, S., and E. Febrero. 2022. 'Private and Central Bank Digital Currencies: A Storm in a Teacup? A post-Keynesian appraisal.' Universidad de Castilla-La Mancha Department of Economics and Finance Working Paper No 2022/1.
- Chen, H., and P. L. Siklos. 2022. 'Central Bank Digital Currency: A Review and Some Macro-Financial Implications.' *Journal of Financial Stability* 60:100985.
- Committee on Payments and Market Infrastructures. 2018. *Central Bank Digital Currencies*. Basel: Bank for International Settlements.
- Cova, P., A. Notarpietro, P. Pagano, and M. Pisani. 2022. 'Monetary Policy in the Open Economy with Digital Currencies.' Banca d'Italia Temi di Discussione 1366.
- Davidson, P. 1972. *Money and the Real World*. London: Macmillan.
- Davidson, P., and S. Weintraub. 1973. 'Money as Cause and Effect.' *The Economic Journal* 83 (332): 1117–1132.
- Davoodalhosseini, S. M. 2022. 'Central Bank Digital Currency and Monetary Policy.' *Journal of Economic Dynamics and Control* 142 (C):104150.
- Davoodalhosseini, S. M., and F. Rivadeneyra. 2020. 'A Policy Framework for e-Money.' *Canadian Public Policy* 46 (1): 94–106.
- Epstein, G. A. ed. 2005. *Financialization and the World Economy*. Cheltenham, UK: Edward Elgar.
- European Central Bank. 2020. *Report on a Digital Euro*. Frankfurt: European Central Bank. Accessed December 15, 2024. www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf.
- Fantacci, L., and J. Magurno. 2023. 'CBDC: nuova arena per le banche centrali', Istituto per gli Studi di Politica Internazionale, 3 March. Accessed December 15, 2024. <https://www.ispionline.it/it/pubblicazione/cbdc-nuova-arena-per-le-banche-centrali-119035>.
- Goodhart, C. A. E. 1975 [1989]. *Money, Information and Uncertainty*. 2nd ed. London: Macmillan.
- Graziani, A. 1990. 'The Theory of the Monetary Circuit.' *Économies et Sociétés ("Série Monnaie et Production"*, 7 24 (6): 7–36.
- Graziani, A. 2003. *The Monetary Theory of Production*. Cambridge, UK: Cambridge University Press.
- Hicks, J. R. 1967. *Critical Essays in Monetary Theory*. Oxford: Clarendon Press.
- Keister, T., and D. Sanches. 2023. 'Should Central Banks Issue Digital Currency?' *The Review of Economic Studies* 90 (1): 404–431.
- Kosse, A., and I. Mattei. 2022. 'Gaining Momentum – Results of the 2021 BIS Survey on Central Bank Digital Currencies.' Bank for International Settlements Paper 125.
- Kumhof, M., and C. Noone. 2021. 'Central Bank Digital Currencies – Design Principles for Financial Stability.' *Economic Analysis and Policy* 71 (C): 553–572.

- Mancini-Griffoli, T., M. S. Martinez Peria, I. Agur, A. Ari, J. Kiff, A. Popescu, and C. Rochon. 2018. 'Casting Light on Central Bank Digital Currency.' International Monetary Fund Discussion Note 18/08.
- Mastromatteo, G., and S. Rossi. 2023. 'Central Bank Digital Currencies: A Monetary Macroeconomic Analysis.' *International Economics* 76 (3): 387–416.
- Mastromatteo, G., and S. Rossi. 2024. "'Sellers' Inflation" and Monetary Policy Interventions: A Critical Analysis.' *Review of Political Economy* 36 (4): 1465–1485.
- Meaning, J., B. Dyson, J. Barker, and E. Clayton. 2021. 'Broadening Narrow Money: Monetary Policy with a Central Bank Digital Currency.' *International Journal of Central Banking* 17 (2): 1–42.
- Moore, B. J. 1988. *Horizontalists and Verticalists: The Macroeconomics of Credit Money*. Cambridge, UK: Cambridge University Press.
- Morales-Resendiz, R., J. Ponce, P. Picardo, A. Velasco, B. Chen, L. Sanz, G. Guiborg, et al. 2021. 'Implementing a Retail CBDC: Lessons Learned and key Insights.' *Latin American Journal of Central Banking* 2:100022.
- Niepelt, D. 2020. 'Reserves for all? Central Bank Digital Currency, Deposits, and Their (non)-Equivalence.' *International Journal of Central Banking* 16 (3): 211–238.
- Panetta, F. 2022. 'Demystifying wholesale central bank digital currency', speech at the Symposium on 'Payments and Securities Settlement in Europe – Today and Tomorrow' at the Deutsche Bundesbank, Frankfurt am Main, 26 September. Accessed December 15, 2024. www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220926~5f9b85685a.en.html.
- PricewaterhouseCoopers Advisory. 2020. 'Central Bank Digital Currency', PwC Overview, Milan: PricewaterhouseCoopers Advisory. Accessed December 15, 2024. www.pwc.com/it/it/publications/en-central-bank-digital-currency.html.
- Rochon, L.-P., and G. Vallet. 2022. 'The Institutions of the People, by the People and for the People? Addressing Central Banks' Power and Social Responsibility in a Democracy.' *PSL Quarterly Review* 75 (301): 83–102.
- Rossi, S. 2007. *Money and Payments in Theory and Practice*. London: Routledge.
- Rossi, S. 2019. 'The Dangerous Ineffectiveness of Negative Interest Rates: The Case of Switzerland.' *Review of Keynesian Economics* 7 (2): 220–232.
- Rossi, S. 2022. 'Central Bank Independence from Banks Rather Than Governments.' In *The Future of Central Banking*, edited by S. Kappes, L.-P. Rochon, and G. Vallet. Cheltenham, UK: Edward Elgar.
- Rossi, S. 2023. 'The Banking Crisis of Credit Suisse: Origins, Consequences, and Reform Proposals.' *Investigación Económica* 82 (325): 21–36.
- Schmitt, B. 1972. *Macroeconomic Theory: A Fundamental Revision*. Albeuve, CH: Castella.
- Schumpeter, J. A. 1954. *History of Economic Analysis*. London: George Allen & Unwin.
- Temperini, J., C. D'Ippoliti, and L. Gobbi. 2024. 'Is the Time Ripe for Helicopter Money? Growth Impact and Financial Stability Risks of Outright Monetary Transfers.' *Structural Change and Economic Dynamics* 69 (C): 24–36.
- Tobin, J. 1987. 'The Case for Preserving Regulatory Distinctions.' In *Proceedings of the Economic Policy Symposium*. Kansas: Jackson Hole, Federal Reserve Bank of Kansas City.
- Werner, R. 2011. 'Economics as if Banks Mattered: A Contribution Based on the Inductive Methodology.' *The Manchester School* 79 (2): 25–35.