

## Digital Money: Private versus Public

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The financial system is undergoing fundamental change. Fintechs and bigtechs push the technological frontier, redefine business models and force banks to adapt. In parallel, new forms of money and alternative payment systems emerge. Alipay, Apple Pay, Bitcoin and new types of digital central bank money compete with traditional bank deposits. What are the macroeconomic consequences of these new means of payment? We address five key concerns that are frequently put forward:

(1) Aren't digital currencies just a hype, now that crypto "currencies" like Bitcoin have proved too volatile and expensive to serve as reliable stores of value or mediums of exchange? This confuses things. Central Bank Digital Currency (CBDC) is like cash, only digital; Alipay, Apple Pay, WeChat Pay etc. is like deposits, only handier; and crypto currencies are not in any way linked to typical currencies, but they live on the blockchain.

(2) Doesn't CBDC or "Reserves for All" choke investment by cutting into bank deposits? No, because new central bank liabilities (namely CBDC) would fund new investments, and this would not in any way imply socialism or a stronger role of government in investment decisions.

(3) Wouldn't CBDC cut into the profits that banks generate by creating deposits? Less money creation by banks would certainly affect their profits. But if this were deemed undesirable (by the public, not by shareholders and management) then banks could be compensated.

(4) Wouldn't "Reserves for All" render bank runs more likely, undermining financial stability? We argue that, in fact, the opposite seems more plausible.

(5) Aren't deposit insurance, CBDC, "Vollgeld"/sovereign money, or the Chicago plan all alike? There are close parallels indeed between the different monetary regimes. In a sense, "money is changing and yet, it stays the same."

Let us be more explicit.

### **Crypto is Private Digital Money, but Different**

Apple Pay, Alipay, M-Pesa and other monies issued by fintechs and bigtechs typically constitute claims to central bank money, or claims to claims to central bank money, or ... In this respect, they parallel traditional bank deposits, which also represent commitments to deliver central bank money. Most crypto currencies are different. They do not promise euros, dollars, or Swiss francs (unless their issuers actually invest in fiat currencies and render the crypto stuff redeemable). In fact, the prices of crypto currencies fluctuate wildly relative to the prices of monies issued by central banks. This makes crypto currencies much less useful as means of payment but maybe more useful for hedging purposes (or as easy-to-hide stores of value). From a macroeconomic point of view, crypto currencies pose similar challenges to policy makers as dollarization: The national currency loses its singularity and as a consequence, the central bank part of its influence over domestic monetary conditions.

While crypto currencies are quite different from the money issued by banks they are even more different from central bank issued money. What would happen, then, if central banks were to issue digital money for the general public, “Reserves for All,” as suggested for example by Tobin (1985, 1987)?

**“Reserves for All” would neither Choke Investment nor Herald Socialism**

True, if people would swap some of their bank deposits into CBDC then banks would lose a source of funding. But the central bank would gain funds, and these would have to be invested somewhere. The central bank could start funding real investment—an experiment in “socialism,” and likely a bad one because private banks arguably are better equipped to screen loan applications and monitor projects (and better insulated against political pressure). Alternatively, and preferably, the central bank could pass the funds through to commercial banks, effectively leaving the environment for banks completely unchanged. The important point to note is that a substitution of monies (CBDC for deposits) only requires new sources of bank funding, not new ownership and control over real assets.

Figure 1 illustrates the effects of the pass-through operation on the balance sheets of banks, the central bank, and households.

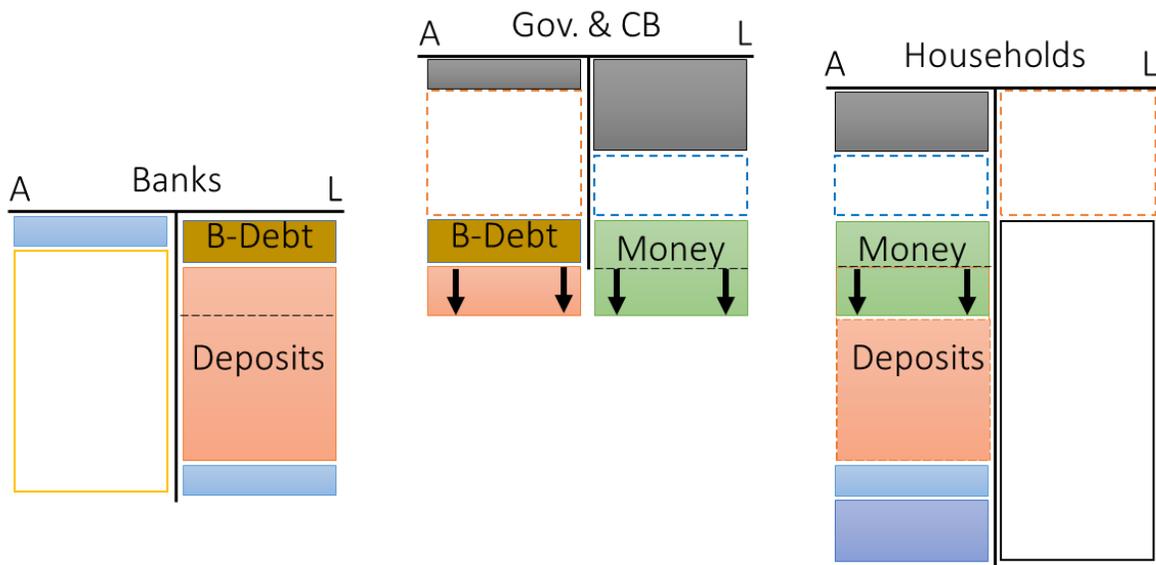


Figure 1: The arrows in the green rectangles indicate that households hold fewer deposits but more central bank issued money, e.g. in the form of CBDC. The central bank passes the funds through to banks by holding more deposits, as depicted by the arrows in the red rectangle on the asset side of the central bank’s balance sheet.

**Banks can be Compensated**

When issuing deposits in exchange for loans or other assets banks typically borrow cheaply and lend dearly. (Today, there are some exceptions to this rule as some central banks charge negative interest on the reserves banks hold with them while deposits mostly pay non-negative interest.) Deposit holders go along with this because bank money is useful not only as a store of value but also as a means of payment—money has liquidity value. By creating this value out of “thin air” (subject to limitations) banks generate seignorage profits. Less bank money creation would eat into those profits.

Some may consider that unfortunate, because they like bank shareholders or are worried about banks' capital base. Others might like it. In any case, the distributive implications of replacing commercial bank by central bank issued money are manageable: Banks could easily be compensated if this were so desired.

### **“Reserves for All” may not Increase the Risk of Bank Runs**

A frequently made argument against the introduction of CBDC points to the danger of increased run risk. According to this argument, CBDC would not foster “traditional” bank runs where non-banks try to withdraw deposits and convert them into cash. Instead, it would give rise to a novel form with volatile deposit withdrawals in response to swings in sentiment and shifts into safe-haven CBDC since such swaps would be very easy to conduct and nearly costless.

It is far from obvious, however, whether the introduction of CBDC would make bank runs “more likely.” First, when the central bank issues CBDC and passes funds through to private banks then the central bank becomes a large, possibly the largest, depositor. But a large depositor that pursues an optimal policy internalizes the run externalities and therefore might refrain from running itself. As a consequence, the incentives for the remaining small depositors to run also fall. Hence, CBDC combined with pass-through funding can make runs less rather than more likely.

Second, with CBDC the central bank gains an informational advantage because it immediately learns from fund inflows when a run is about to start. The central bank therefore can engage more quickly as a lender of last resort; it can more easily prevent costly fire-sales; and it can better prevent a liquidity problem to morph into a solvency crisis. If the remaining depositors are aware of this ability to intervene earlier, and more effectively, then they may become less wary themselves which again reduces the risk of a deposit run.<sup>1</sup>

A related question is whether the central bank would lose control over its balance sheet once CBDC is introduced. Indeed, a central bank that passes through funds from non-banks to banks lengthens its balance sheet, and if the volume of funds varies over time, so does the length of the balance sheet. There is no reason, however, to be concerned with the length of the central bank's balance sheet per se (especially if some items on the asset and liability side net out) except for the implications on credit risk exposure. This exposure can be minimized with the appropriate collateral policy.

If today, deposits are perfectly liquid and risk-free because of unconditional deposit insurance backed by government guarantees and a lender of last resort, then CBDC combined with pass-through funding would simply make implicit government guarantees explicit. If deposits are risky, in contrast, then a newly introduced CBDC would have to be accompanied by transfers or taxes in order to exactly replicate outcomes under the contemporaneous regime. In either case, the net wealth and liquidity positions of agents would remain unchanged even if their gross positions reflected in balance sheets might change.

### **Chicago Plan, Narrow Banks and Sovereign Money (“Vollgeld”)**

The Chicago Plan from the 1930s (Knight et al. 1933, Fisher 1935, 1936) which argues in favor of narrow banks simply amounts to an introduction of CBDC that fully replaces deposits. As described above, one

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<sup>1</sup> The central bank may also set an unattractive (possibly negative) interest rate on CBDC accounts to avoid that CBDC is more attractive than cash as a safe-haven asset. Of course, the central bank has to be careful that changes in the CBDC interest rate do not serve as a coordination device for households to start a run.

way to end fractional reserve banking without changing equilibrium outcomes would be for the central bank to supply deposits— at the same price and conditions as depositors currently do—to banks. This is not what the proponents of the sovereign money (“Vollgeld”) proposal envision. According to their proposal, banks should no longer issue deposits but fund themselves from different sources instead. Banks would lose a source of profits—seignorage rents from liquidity creation—and change their policies, with potential implications for macroeconomic outcomes. Of course, it is not clear how the abolition of money creation by banks could ever be enforced in the first place.

### **Money is Changing and Yet, it Stays the Same—An Equivalence Benchmark**

In a recent paper (Brunnermeier and Niepelt, 2019), we make this discussion precise. We show formally that as long as CBDC can serve as a (not necessarily efficient) means of payment for some transactions currently conducted with deposits, a swap of the former for the latter does not have macroeconomic consequences as long as certain conditions are satisfied. Our equivalence result should be construed as a benchmark result that helps to organize one's thinking about complex economic relationships, in the spirit of Modigliani and Miller (1958), Barro (1974), and many other equivalence results in economics. There may exist only few circumstances under which the sufficient conditions for equivalence literally apply; nevertheless, they give a clear sense of possible sources of non-equivalence in real-world settings.

Maybe the most restrictive condition for the irrelevance of a swap relates to politics (Niepelt 2018). Irrelevance would require, for example, that political decision makers are willing to compensate bank owners for the losses they suffer due to reduced seignorage profits. We doubt that voters would accept this. In fact, one important motivation for the “Vollgeld” (sovereign money) initiative recently rejected by Swiss voters was to shift rents from banks to taxpayers.

Whether a *non*-neutral monetary reform would be towards the better or the worse is a question that our equivalence result cannot address. Answering this would require an explicit characterization of equilibrium in model economies, as well as serious quantitative and welfare analyses. For policy discussions about monetary reform, our paper therefore does not propose a set of definite answers, but an analytical framework and a robust road map.

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