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Stablecoins versus tokenised deposits: implications for the singleness of money

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Stablecoins versus tokenised deposits: implications for the singleness of money

Key takeaways

- *Private tokenised monies that circulate as bearer instruments, like stablecoins, may entail departures in their relative exchange values away from par in violation of the "singleness of money".*
- *In contrast, tokenised deposits that do not circulate as bearer instruments but rather settle in central bank money are more conducive to singleness.*
- *Tokenised deposits may enable expanded functionality by building on the capacity of programmable ledgers to introduce contingent execution and composability of transactions.*

Introduction

A cornerstone of the modern monetary system is the "singleness of money". Singleness ensures that monetary exchange is not subject to fluctuating exchange rates between different forms of money, whether they be privately issued money (eg deposits) or publicly issued money (eg cash). With singleness of money, there is an unambiguous unit of account that underpins all economic transactions in society.[1]

Ruling out exchange rates between different forms of money allows money to serve its role as a coordinating device for economic activity. In this context, "approximate singleness" is an oxymoron. Small departures from par introduce frictions in trade and exchange that are amplified when they reverberate through economic transactions. Ultimately, such amplifications of frictions can be debilitating for monetary exchange (Morris and Shin (2012), Doepke and Schneider (2017)).

The perspective offered by the singleness of money provides useful guidance in the recent discussions on the tokenisation of privately issued monies. Tokenisation refers to the process of representing claims in a digital form that allows them to be transacted on programmable platforms using smart contracts (a collection of code and data); see Aldasoro et al (2023). The BIS Innovation Hub has actively investigated options for tokenising central bank money using central bank digital currencies (CBDCs) in Projects Helvetia, Jura, Dunbar, mBridge and Mariana.[2] We ask: what is the best way to complement CBDC with private tokenised money?

[1] See CPMI (2003) and Padoa-Schioppa (2004).

[2] Project Helvetia focused on the domestic settlement of tokenised assets in central bank money. Building on this experience, Projects Jura, Dunbar and mBridge explored how wholesale CBDCs can be used for cross-border payments using a common CBDC platform.

Two models of private tokenised money

This Bulletin evaluates two models of private tokenised money. In both cases, private money tokens represent liabilities of the issuer, and the holder has a claim on the issuer for redemption at par value in the sovereign unit of account. However, the transfer process differs in the two cases. In one model, which resembles current asset-backed stablecoins, private tokenised money circulates as a digital bearer instrument. Such a model may not be compatible with singleness for reasons to be outlined below. The second model – that of "tokenised deposits" – does not involve a direct transfer of claims. The model of tokenised deposits envisages participants to be customers of regulated financial institutions (such as banks), and transfers are recorded at the individual bank level and settled automatically using tokenised central bank money (ie CBDC). Under this model of non-transferable liabilities, a person or firm knows that when they accept a payment from the customer of any bank, the payment will be credited to their own account at face value. Settlement using central bank money is the key feature that promotes singleness.

1. Digital bearer instrument model

In the digital bearer instrument model, private money tokens represent a transferrable claim on the issuer.[3] Their movement transfers the issuer's liability from one holder to another. There is no need to update the issuer's balance sheet when these tokens are transferred. It is only when a holder wishes to redeem a token for cash or a conventional deposit that off-platform balance sheets are updated.

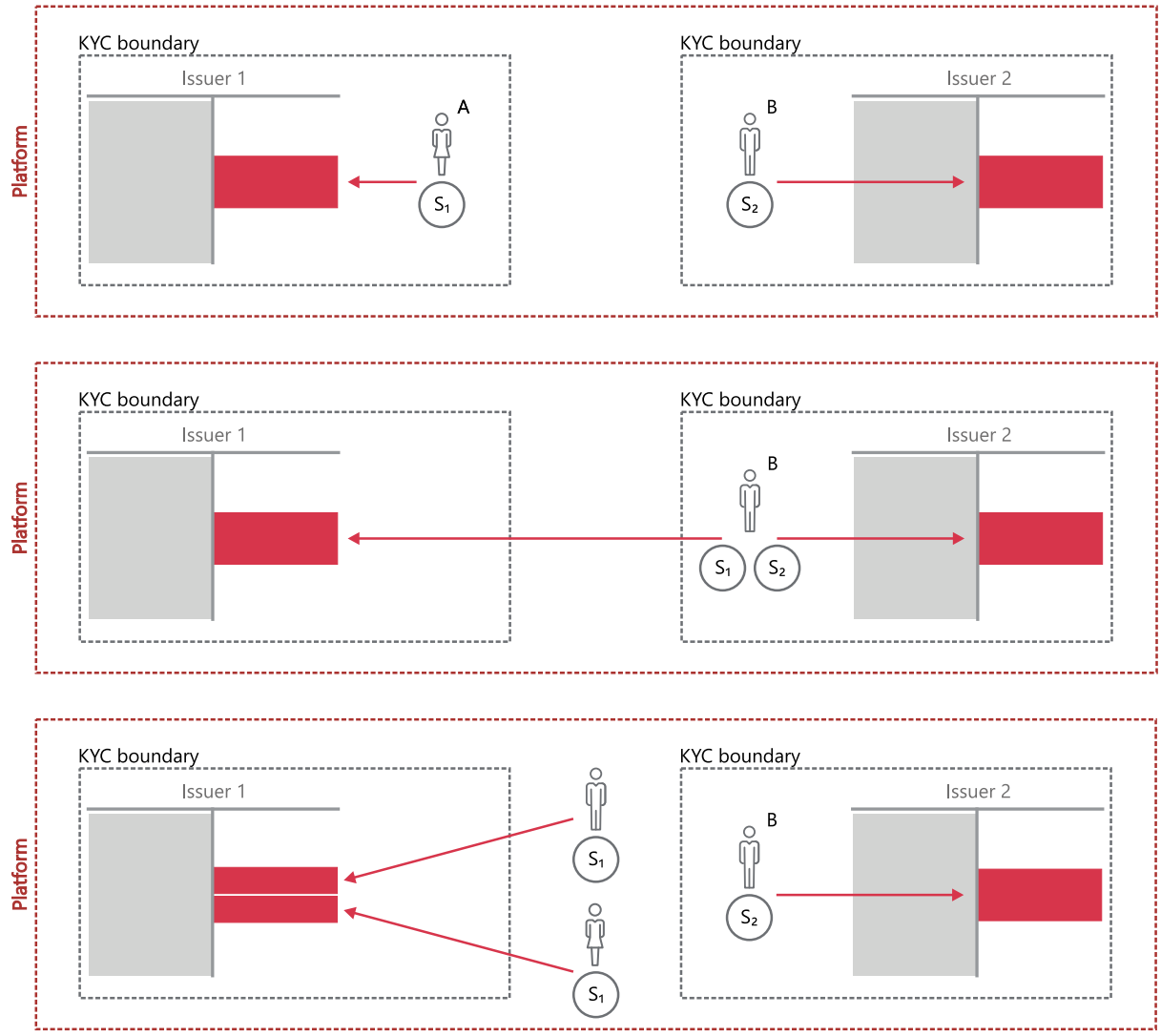
An archetypal example of a digital bearer instrument is an asset-backed stablecoin. Asset-backed stablecoins are transferred by the holder without the need for consent or involvement of the issuer. When a person receives a stablecoin, they become the new owner and holder of the liability of the issuer.

Graph 1 illustrates the transfer of issuer liabilities under the digital bearer instrument model. The top panel shows the initial situation, where Alice (A) holds a money token issued by issuer 1 and Bob (B) holds a money token issued by issuer 2 (the red arrows point to the issuer of a tokenised liability and the red bar shows the liability on the issuer's balance sheet). A transfer of the token from Alice to Bob transfers Alice's claim on issuer 1 to Bob. This is shown in the middle panel of Graph 1. Notice that Bob now holds liabilities of both issuer 1 and issuer 2 even though he is a customer of only issuer 2.

The fact that tokens circulate as transferable issuer liabilities render them financial assets with a prevailing market price. In general, any asset that can be traded will have an exchange rate and this exchange rate can fluctuate away from par for various reasons. Divergence from par could reflect differences in settlement frictions related to the cashing out process. In the digital bearer instrument model, money transfers are not automatically settled in central bank money. Settlement in central bank money occurs only when tokens are redeemed for cash or conventional deposits. In either case, there may be costs or delays imposed by the token issuer. Discounting could also occur due to differences in perceived credit risk of the issuers, fluctuations in holders' risk-bearing capacity or the higher order uncertainty associated with doubts about whether *others* harbour doubts about the value of the token (Morris and Shin (2012)). In large part, the value of private tokenised money depends on the credibility of the issuer-specific promise to redeem it for cash. However, creditworthiness will typically not be sufficient to maintain singleness, as singleness rests on the *commonly shared* confidence in the value of money among all users. Even a small seed of doubt (whether justified or unjustified) has the potential to reverberate through monetary exchange and could undermine the role of money as a medium of exchange. In this respect, "moneyness" is more than simply the absence of credit risk. Finally, market power by large issuers could also be wielded to discount the tokens of small issuers.

[3] There are typically three properties to a bearer instrument: (i) the holder of the instrument is the owner; (ii) ownership is transferred by transferring the instrument; and (iii) the issuer keeps no record of ownership. Here we focus on the first two properties. Depending on the design of the platform, the issuer may or may not be able to follow the chain of ownership in the applications we consider.

Digital bearer instrument model of private tokenised money Graph 1



Source: Authors' elaboration.

Historical evidence on privately issued monies that were traded as bearer instruments in past eras shows that the singleness of money can break down. Digital bearer instruments that circulate widely share some points of contact with private banknotes that circulated during the free banking era of the United States before the establishment of the Federal Reserve. During this period that spanned the middle part of the 19th century, privately issued banknotes were discounted by as much as 20% in distant locations (Gorton and Zhang (2023).[4]

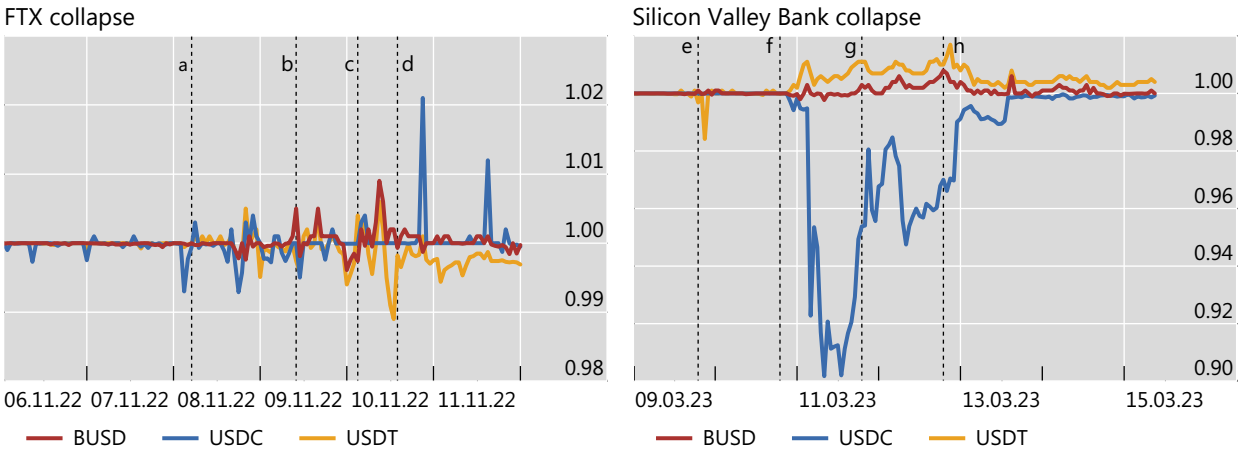
We can also look at the recent experience with asset-backed stablecoins that are traded on permissionless platforms. Departures from par value are common in the stablecoin world, despite market interventions by the issuers to prevent them. While such departures can be small during normal times, even a small departure runs counter to the norm of singleness and introduces a wedge that can be magnified greatly during periods of stress.

[4] Banknotes that are issued by commercial banks but backed by the central bank can preserve singleness; this has occurred in the United Kingdom and Hong Kong SAR.

Departures from singleness are often triggered by events in the crypto market. Graph 2 shows fluctuations in popular stablecoin prices around the time of the FTX and Silicon Valley Bank collapses.

FTX and Silicon Valley Bank collapses coincide with volatility in stablecoin prices

US dollar — Graph 2



[a] FTX strikes an acquisition deal with Binance for its non-US business. [b] Binance backs out of the deal. [c] FTX CEO Sam Bankman-Fried apologises on Twitter. [d] Bahamas securities regulator freezes FTX assets. [e] Silicon Valley Bank announces that it will raise additional capital by selling stock. [f] SVB Financial seeks a buyer. A few hours later, a California regulator shuts Silicon Valley Bank and appoints the Federal Deposit Insurance Corporation (FDIC) as receiver to take control of its parent company. [g] Employees of Silicon Valley Bank offered 45 days of employment at 1.5 times their salary by the FDIC. [h] "Depositors will have access to all of their money starting Monday, March 13," the US Treasury, Federal Reserve and FDIC say in a statement, adding that no losses associated with the resolution of Silicon Valley Bank will be borne by the taxpayer.

Sources: CryptoCompare; BIS.

While not the primary focus of this Bulletin, it is also worth bearing in mind that the digital bearer instrument model also has know-your-customer (KYC) compliance weaknesses. Following the transaction shown in the middle panel of Graph 1, Bob holds the liability of issuer 1 even though his identity was verified only by issuer 2. Issuer 1 must rely on the KYC practices of issuer 2 (or any other issuer whose customers receive their tokens.) In fact, the KYC problem can be much worse under the digital bearer instrument model as issuer liabilities may be transferred to individuals who have not had their identities verified by anyone (bottom panel).[5]

2. Non-bearer instrument model

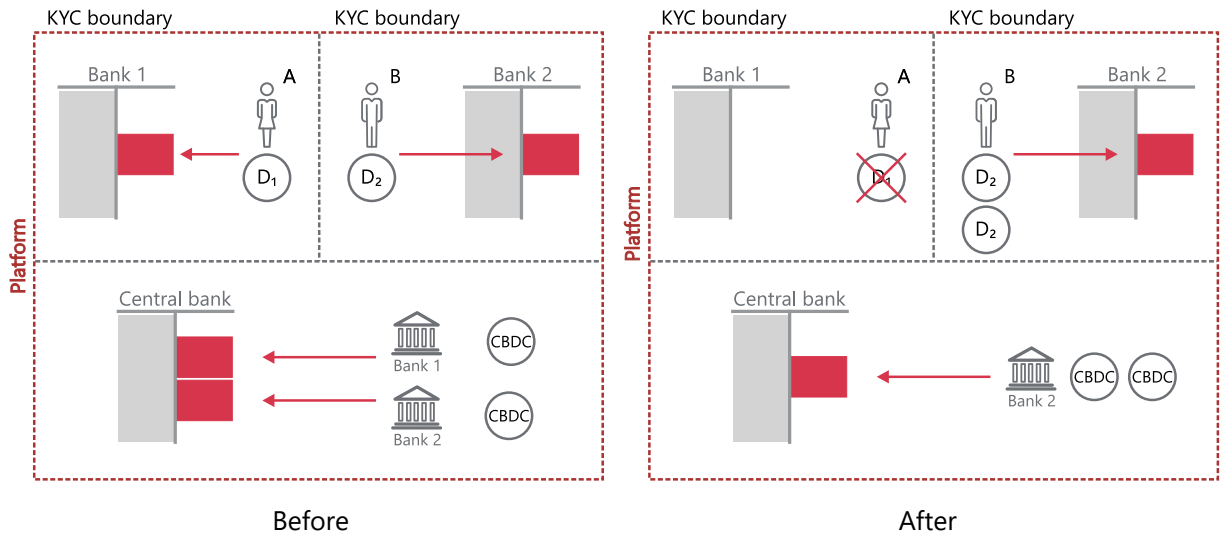
In the non-bearer instrument model, tokens that represent an issuer's liability are not directly transferable to individuals who are outside the KYC boundary of the issuer.[6] Instead, the payment process mimics the practice in the current two-tier monetary system of debiting the account of the sender and crediting the account of the receiver, together with settlement on the central bank's balance sheet. Specifically, the payment is put into effect by reducing the sender's token balance at their issuing institution and creating a new tokenised liability for the receiver that is issued by their institution. Meanwhile, there is a concurrent transfer of central bank money using a wholesale CBDC. This model requires that both public and private forms of tokenised money are available on the same platform.

[5] This concern was raised in Barr (2022).

[6] The non-bearer instrument model would allow customers of the same issuer to transfer tokens amongst themselves, as is done in private tokenised money projects such as JPM Coin. Such "on-us" transfers do not raise singleness issues and hence are not highlighted in this Bulletin.

Graph 3 illustrates a particular method of implementing the non-bearer instrument model using processes and terminology that are familiar to distributed ledger technologies. The left-hand panel shows the situation before a payment is made from Alice to Bob. The platform has three partitions indicated by the grey dotted lines, representing the respective domains of the "unified ledger" maintained by the two private tokenised money issuers (ie banks 1 and 2) and the central bank.[7] The red arrows indicate the issuers of the liabilities. The right-hand panel shows what happens when a payment is made from Alice to Bob. Notice that the D_1 token held by Alice is deleted ("burned") and a second D_2 token is assigned ("issued") to Bob by bank 2. The deletion and creation of private money tokens has an associated movement of CBDC in the central bank's partition. This is shown by the fact that in the right-hand panel both CBDC tokens belong to bank 2. CBDC tokens can be transferred (ie they do not need to be burned and issued), as both banks are customers of the central bank.[8]

Burn/issue model of private tokenised money — Graph 3



Before — After

Source: Authors' elaboration.

A key feature of the non-bearer instrument model is that payments across individuals alter liabilities between banks and their customers but do not introduce credit exposures across institutions. Rather, intermediaries offset changes in their liabilities by making payments in central bank money. There is no transfer of private liabilities, as occurs in the digital bearer instrument model. The fact that settlement takes place using central bank money means that the wholesale leg of the payment from one intermediary to another is executed using central bank money. Thus, any doubts about the exchange value are eliminated, and the transfer takes place at par. This feature is key for maintaining singleness.

What remains is to address the issue of singleness across each form of private tokenised money and cash. Singleness between private tokenised money and cash would be supported in the same way it is now for commercial bank deposits, provided all private tokenised money issuers comply with the same regulatory standards and have access to the same safeguards (including access to the lender of last resort). This is, of course, most easily achieved in the case of private tokenised money issued in the form of tokenised deposits by existing commercial banks. However, singleness between the private tokenised money issued by non-banks and cash could also be maintained under the proper circumstances. Broader

[7] See the discussion of the unified ledger concept in Carstens (2023).

[8] This picture captures our interpretation of Citigroup's RLN proposal, which is currently the subject of a proof-of-concept study at the New York Innovation Center – which is a strategic partnership with the BIS Innovation Hub.

access to the lender of last resort for non-banks coupled with proper regulation and supervision would be conducive to the benefits flowing from competition and greater financial inclusion.

To be clear, singleness of money does not rule out varying credit risk across intermediaries. The value of private liabilities as stores of value could differ across intermediaries, in much the same way that in the current two-tier monetary system bank bonds or negotiable certificates of deposit (CDs) can trade at varying spreads. Singleness is an attribute of the *payment*, rather than private liabilities as a *store of value*.

As a final point, it should be underlined that private tokenised money can adhere to the non-bearer instrument model and still fully capture the benefits of tokenisation. Sticking with the burn/issue implementation described in Graph 3, the simple payment between Alice and Bob could be initiated by Alice or bank 1 on Alice's behalf. Once initiated, the burn/issue process and the movement of the settlement asset would be automatic, and these flows could be transparent to the parties involved. This eliminates the need for external messaging systems to interact with payment infrastructures.[9]

Concluding remarks

Private tokenised money should be properly configured so that it does not represent a return to the free banking era. Before the introduction of central banks and the use of a central bank-issued settlement asset, clearing houses emerged to support par exchange for the notes issued by its members (for example, the Suffolk Bank). Similar arrangements could emerge for stablecoins or other tokenised monies that trade as digital bearer instruments; however, this seems very much like a step backwards. This problem has already been solved by the two-tier monetary system. There is no need to abandon what works.

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[9] There could also be less potential for operational risk having to do with the interaction of multiple individual bank systems and the payment infrastructure.

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