

Discussion on: A unified ledger in practice: lessons from Project Hangang

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1 Abstract

This paper briefly recalls the context in which Project Hangang was developed and discusses how the emergence of tokenised deposits supported by a unified ledger can modify the current financial payment landscape.

2 The general context

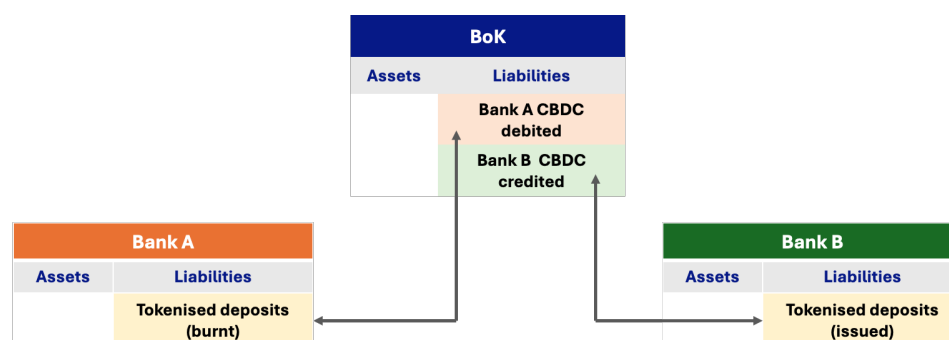
2.1 Project Hangang

Project Hangang is a live experiment conducted by the Bank of Korea (Ryu, Shin, Sung and Yun, 2026). It consists of a distributed ledger that registers and settles transactions between banks through digital central bank reserves. As shown in Figure 1, banks' deposits are represented by tokens. When Bank A wants to send a payment to Bank B, a smart contract implements a so-called “burn-and-issue” protocol that operates as follows: as Bank A's digital reserves at the central bank are transferred to Bank B's digital reserves, tokens in Bank A's deposit account are burnt and Bank B's tokens are issued.

Two important characteristics are worth noting. Firstly, the settlement of interbank transactions occurs through digital central bank money (also called wholesale CBDC). Secondly, the programmable ledger ensures atomic settlement of the transactions. This means that it is not possible to record the first leg of a transaction (say, the decrease in Bank A's deposits and the corresponding decrease in Bank A's reserves at the Central Bank) without the second. As illustrated in Figure 1, either the two black arrows occur or none occurs. Therefore, there is no counterparty risk, or reconciliation task to consider.

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Figure 1: Transaction settlement with a unified ledger



Project Hangang belongs to a series of projects launched by central banks and the BIS to set in place interbank payments with digital reserves, with the objective to develop transactions involving tokenised assets.² These projects illustrate central banks' initiatives to build innovative solutions that hinge on distributed ledgers technologies (hereafter DLT). One key contribution of Project Hangang is to demonstrate the viability of such a settlement system: the project runs in live conditions, despite all the technical issues raised, in parallel to the traditional settlement system.

2.2 The rise of decentralised finance

The general context of this experiment is that of a profound change in the financial services industry, driven by the development of decentralised finance, since the creation of Bitcoin in 2009. Bitcoin is now the largest cryptocurrency, with a market cap of around \$1.3tn.³ Over the past six years, stablecoins have taken off, representing today a market value of around \$300bn⁴, against around \$10bn in 2020.

More recently, we have also seen the rise of blockchain (or DLT)- based initiatives by commercial banks. This so-called tokenised finance activity is still smaller than the decentralised finance (hereafter DeFi) sector, but it is rising fast. Some banks have issued deposit tokens, such as JP Morgan's deposit token JPMD. The fastest growing segment is probably that of tokenised real world assets, or RWAs, as for instance tokenised sovereign bonds, tokenised gold or tokenised money market funds. While still modest, RWAs represent in 2026 around \$30bn, a sixfold increase since early 2025.⁵ Importantly, many of these tokenised assets and services use

² Other projects include the Pontes/Appia project led by the ECB for the euro area, the Agora project by the BIS that involves seven central banks, or the mBridge project supported by the People's Bank of China along with several other central banks.

³ Source: coinmarketcap.com, accessed 9 July 2026.

⁴ Source: rwa.xyz, accessed 9 July 2026. The two largest stablecoin issues are those of Tether (USDT) and Circle (USDC). Overall, 99% of stablecoins are pegged to the US dollar.

⁵ Source: rwa.xyz, accessed 9 July 2026.

public blockchains and rely directly or indirectly on stablecoins for tokens to be traded on chain.

The unified ledger is therefore an infrastructure designed to support the development of tokenised finance while keeping it in the realm of a monetary system supervised by central banks (BIS, 2023). How can a unified ledger, if implemented, support tokenised finance?

The first benefit is certainly a technology improvement over the standard settlement system. The programmable features induced by distributed ledgers are expected to generate efficiency gains by allowing a faster reemployment of collateral, lower verification costs and an overall increase in the speed of transaction settlement. In that respect, the paper does not report how much was gained with the unified ledger compared to the standard settlement system that was still running in parallel. It would be insightful to quantify this benefit. The ability to induce automatic/conditional payment, as exemplified by the burn-and-issue protocol, also suggests that smart contracts, which expand the set of contractual possibilities, can solve problems in environments involving intermediaries. For instance, they can help mitigate counterparty risk or reduce hold up problems by one party when the first part of the transaction has been settled but not the second.⁶ Presumably, this atomic settlement property can benefit many financial markets (like OTC markets or dealership markets).

Secondly, developing a distributed ledger that uses digital central bank money has the potential to enhance the regulated financial sector competitiveness vis-à-vis the fast growing DeFi sector. The remainder of the discussion briefly points out to what extent the emergence of unified ledgers could impact the competition between tokenised deposits and stablecoins, the role of digital public money, and overall financial stability.

3 Competition between tokenised deposits and stablecoins

Stablecoins currently serve several purposes. Their primary use is to settle transactions on chain: they constitute the cash leg of crypto trading, of DeFi lending and, increasingly, of tokenised asset transactions: tokenised money market funds, for instance, are typically traded against stablecoins. They are also increasingly used for cross-border payments, by individuals (e.g. for remittances and for holding dollar-denominated balances in emerging markets) and by corporations (Chemla et al., 2025).

Stablecoins entail several risks. First, they are almost, but not fully stable: in the secondary markets where stablecoins are traded, small deviations from parity are regularly observed, either because of the way redemption is organised (Ma, Zeng and Zhang, 2025) or during stress events. Second, stablecoins are subject to run risk if their reserves turn out to be insufficiently liquid during large-scale redemption events, inducing the issuer to default. Gorton and Zhang (2023) draw the analogy

⁶ See Cong and He (2019) and Duffie and Wang (2025).

with the privately issued banknotes of the US free banking era, which circulated at fluctuating discounts and fuelled recurrent panics until federal regulation imposed uniform standards. A third risk is that, despite know-your-customer regulations, stablecoins circulate on public blockchains and can support illegal transactions.⁷

On all these dimensions, tokenised deposits whose transfers can directly be settled with central bank reserves through a unified ledger⁸ can offer advantages:

- The technology is similar: tokenised deposits offer the same programmability, composability and round-the-clock availability as stablecoins.
- Parity between the tokenised deposits of different banks is ensured by settlement in central bank money, which preserves the singleness of money.
- Tokenised deposits remain within the banking regulatory perimeter: they can pay interest, benefit from deposit insurance and from banks' access to the lender of last resort.

Given all these elements, a natural question is whether tokenised deposits supported by a unified ledger would divert the current demand for stablecoins.

The answer probably depends on the type of usage. The demand associated with crypto trading and crypto native DeFi is unlikely to disappear as long as these activities remain attractive for investment or speculative purposes: stablecoins are the settlement medium on public blockchains. Similarly, part of the retail demand for stablecoins in emerging markets reflects a demand for dollar-denominated assets accessible without a bank account; tokenised deposits, which require a banking relationship, cannot serve this demand. By contrast, firms and institutions could switch to tokenised deposits for cross-border payments or the deployment of tokenised RWAs. Against the benefit of being able to settle transactions immediately, these firms will certainly weigh the interoperability of the unified ledger with the financial service providers they currently use, as well as the ledger's international reach.

On that point, the choice of the ledger governance can matter. Most central bank experiments, including Hangang, run on permissioned ledgers, in which participants have differentiated rights and the central bank acts as the validating authority. This design choice is relevant if a single central bank is involved. Extending a permissioned ledger across borders, however, requires each participating jurisdiction to trust the governance of the others, now and in the future. In contrast, permissionless blockchains do not require such trust.⁹ The choice of the governance structure can therefore affect adoption: permissioned ledgers could lead to

⁷ While the share of illegal transactions is estimated at only 1% of overall crypto transactions, 84% of these illegal transactions involve stablecoins according to the Chainalysis 2026 Crypto Crime Report.

⁸ The discussion is based on the theoretical properties of a unified ledger as, besides Project Hangang, no such settlement system has been deployed yet.

⁹ The trade-off between the costs of decentralisation and the trust requirements of centralised ledgers is analysed in Abadi and Brunnermeier (2022).

fragmentation along jurisdictional lines, with the formation of blocs of allied jurisdictions, or to a narrower reach than public blockchains.

Another issue raised by the governance structure relates to what is observable, and by whom. In the unified ledger system, the central bank observes all positions and transactions, but what other participants observe is not clear. As developed in the banking literature, full transparency might not always be desirable to ensure that banks' liabilities remain information-insensitive (Dang et al, 2017), or that investors are not too sensitive to adverse signals (Bouvard, Chaigneau and de Motta, 2015), a tension also present in the disclosure of bank stress test results (Goldstein and Leitner, 2018). How to govern the ledger's informational structure is an open question.

A last point is that banks themselves can issue stablecoins, or deposit tokens that do not settle through central bank reserves. For example, Qivalis is a consortium of 37 European banks, including BNP Paribas, ING, UniCredit, CaixaBank and BBVA, which has applied for an e-money licence with the Dutch central bank to issue a MiCA-compliant euro stablecoin, with a first issuance expected in the second half of 2026. By choosing to issue stablecoins, these banks give up deposit insurance and the ability to pay interest in exchange for the reach of public, permissionless blockchains with easy interoperability. Another example is the JPMD, a deposit token which is now issued on a public blockchain with access restricted to verified clients. Which banks' activities will be performed on one system or the other is still unclear.¹⁰

4 Retail vs wholesale CBDC

Project Hangang deliberately preserves the two-tier structure of the monetary system: central bank digital money is issued in wholesale form only, and the 80,000 retail participants use tokenised deposits for payments, that is, commercial bank money. Hence retail users never hold a direct claim on the Bank of Korea. This design raises the question whether both a retail and a wholesale digital central bank currency are needed, and what objective each can serve. If the policy objective is to give the public access to digital payments, the combination of tokenised deposits and wholesale CBDC achieves it without the central bank issuing liabilities to households, consistent with the equivalence between two-tier and direct central bank digital money established by Brunnermeier and Niepelt (2019).

The case for a retail CBDC usually rests on three arguments. The first is the decline of cash: according to the ECB, cash represented 52% of transactions at physical shops in the euro area in 2024, down from 79% in 2016. As cash disappears, the public loses direct access to central bank money, which raises the question of whether such access should be recreated in digital form. The second argument is monetary sovereignty: retail payments rely heavily on large US platforms (Visa, Mastercard, Apple Pay), and a retail CBDC can be a way to offer a domestic

¹⁰ For a general discussion on financial institutions' incentives to issue stablecoins or tokenised deposits under several jurisdictions, see Reichlin, Sangers and Zettelmeyer (2025).

alternative and reduce dependence for countries outside the US. The third argument is financial inclusion.

In many contexts, these benefits can be obtained without retail CBDC. Brazil's Pix, operated by the central bank with mandatory participation of financial institutions and zero fees for individuals, became the dominant payment method in the country since its 2020 launch.¹¹ India's UPI processes more than twenty billion transactions a month.¹² By contrast, the European Wero wallet, based on voluntary participation, has experienced slower adoption. Therefore a key aspect to the development of a retail CBDC rests on the ease with which alternative payment systems can be deployed and adopted. In the case of Europe, the digital euro will rely on its compulsory acceptance by merchants in the whole euro area to foster adoption at a pace that could probably not be reached by other payment infrastructures.

It is worth noting that a unified ledger is technologically neutral in this debate: the same platform that hosts wholesale CBDC and tokenised deposits could presumably host a retail CBDC, and its programmability could even allow hybrid designs. The choice between retail and wholesale CBDC is therefore a policy choice about the architecture of the monetary system, as discussed in Cecchetti, Niepelt, Rey and Vives (2026).

5 Financial stability

The development of decentralised finance has modified the channels through which stress can propagate across the financial system. Here are some examples.

The first is the stablecoin reserve channel. Regulations impose that stablecoin reserves are invested in bank deposits and short-term government debt¹³ and the GENIUS Act now allows tokenised money market funds as eligible reserve assets. This creates a contagion channel between the DeFi and traditional finance (TradFi) sectors. The SVB episode illustrates contagion from banks to the crypto sector: the failure of a mid-sized bank triggered the depeg of the second largest stablecoin, inducing intervention by the US authorities to secure deposits (Federal Reserve Board, 2025). Large-scale redemptions would operate in the other direction, forcing fire sales of reserve assets into money markets. Stablecoin flows already have a measurable impact on short-term sovereign debt yields (Chemla et al., 2025).

The second channel comes from the entry of TradFi into DeFi. For example, BUIDL, BlackRock's tokenised money market fund, is accepted as collateral on crypto exchanges and has been trading on Uniswap, a decentralised exchange, since February 2026. Tokenised assets are therefore exposed to specific DeFi risks (smart contract exploits, oracle manipulation, liquidation cascades...) in protocols that hold them as collateral. The interdependence between issuers can reinforce links

¹¹ Source: <https://www.bcb.gov.br/estabilidadefinanceira/pix-em-numeros-estatisticas>.

¹² Source: <https://www.npci.org.in/product/upi/product-statistics>.

¹³ The two largest stablecoin issuers, Circle and Tether, collectively rank as the 17th largest holder of US Treasuries globally (IMF, 2025).

between the two sectors: BlackRock manages the reserves backing USDC, while Circle's USDC provides the on-chain redemption infrastructure of BUIDL, so that stress at either firm could propagate to the other.

By keeping tokenised finance anchored in central bank money and within the supervised perimeter, the unified ledger should arguably improve financial stability relative to a system dominated by stablecoins on public blockchains. It could also offer the technical capability to act faster in a crisis. But if both financial systems coexist, stress propagation channels could amplify through banks' activities in both systems. The role of the central bank in stress events will thus become increasingly complex, and Project Hangang, by moving from concept to practice, makes these questions more concrete.

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