



From Coins to Codes The Path to Blockchain and CBDCs

On Money

A modernized and stable financial system is a main driver for any economy.

It is a simple statement that holds true since the beginning of the first communities formed in human history. A journey back to Mesopotamian times supports the initial statement. The rise of Mesopotamian civilization is largely credited to its strong agricultural foundations, along the banks of the Euphrates and Tigris rivers, the Mesopotamians engaged in trade by exporting their surplus of grain, clay, and reeds, while importing commodities such as copper, ivory (Indus Valley Civilization), gold, silver (Egypt and Asia Minor), and wood (Persia). The demand for goods within communities, coupled with the imperative to optimize trade, facilitated the emergence of a medium of exchange, a unit of account, and a store of value that garnered acceptance from both parties — indeed, **a currency!** Each region had their local monopolies on the accepted medium of exchange. Agricultural societies such as Mesopotamia relied on barley or livestock, while the Zhou Dynasty in ancient China utilized salt. Meanwhile, cowry shells were favored as currency in North Africa and Rome on thaler (large silver coins). The concept of money has constantly evolved, what we recognize today as paper currency and digital transfer represents a relatively recent development in the history of monetary transactions and settlements.

The transition of assets into financial products facilitated the emergence of banks, institutions designed to bridge capital providers with seekers. Banking enabled the development of broader credit systems by facilitating a third party (such as a money changer or bank) to act as a reliable intermediary between two entities lacking mutual trust (such as purchasers and vendors, or lenders and borrowers).

In 1661, Swedish banker Johan Palmstruch established Stockholms Banco, pioneering the complex management of deposits and loans within the bank. He led the way in introducing paper banknotes, known as *Kreditivsedlar*. These banknotes were backed by a decree guaranteeing their exchangeability for gold and silver coins, swiftly gaining circulation. Once limited by the physical burden of storing and transporting physical assets, the introduction of paper currency allowed for commerce and money to settle at faster rates.

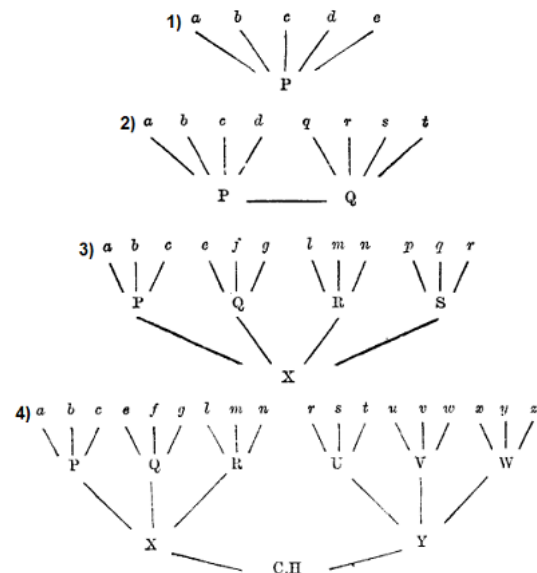
Paper currency sparked enthusiasm but quickly followed its decline. The King **granted one person** the power to create unlimited currency. The bank began issuing banknotes extensively, making loans without needing deposits. By 1663, loans had increased so much that the banknotes' value fell. Customers trying to redeem their notes faced a bank run due to lack of liquidity, leading to the bank's closure in 1664.

Since then, the introduction of payment technologies without adequate oversight has led to cycles of rapid growth and sudden declines, much like other significant technological advancements. Paper currency in Mesopotamia would have been impractical - how to trust one's trade counterpart without a double-entry bookkeeper and legal arbitrageurs. PayPal's innovative online payment platform relies on the existence of electronic funds transfer (EFT) systems. SWIFT messaging's effectiveness relies on sophisticated telecommunications, while the advent of Real-Time Payment Systems (RTPS) reflects technological progress and the demand for immediate transactions.

The often-used examples mentioned reach a conclusion that boasts of a modern financial system but fails to highlight how stability within these systems is reached. A critical, intangible asset essential for the stability of novel financial infrastructure: trust. Jonathan Palmstruch was imprisoned, and his irresponsible innovation led to the creation of Sveriges Riksbank, the first Central Bank in history. The Swedish Central Bank only introduced paper currency a century later.

Inevitability of Centralization

In his 1875 work, "Money and the Mechanism of Exchange," Stanley Jevons presented four distinct diagrams. These were compiled to guide the reader through the evolving landscape of hypothetical banks, illustrating the inevitable process of centralization over time.



1. Account holders within a single bank transfer money using the bank as a settlement layer.

2. Banks connect to allow their account holders to transfer funds across different banks using accepted paper payment instruments.

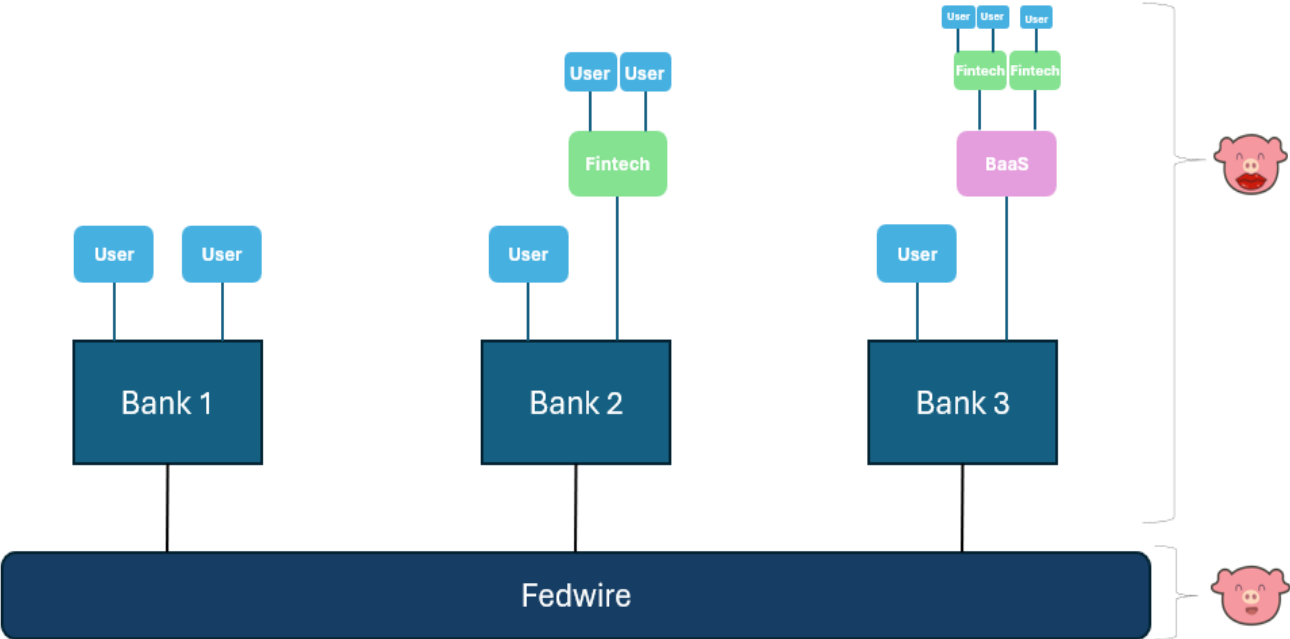
3. The introduction of a central bank enhances the efficiency of settlements among multiple banks.

4. A base layer clearing house, operating nationally or globally, connects all banks for even broader financial transactions.

Jevons highlights the evolution and efficiency of global trade and the advent of a centralized layer among the several financial institutions. Step 4 is what he later claims as "The Worlds Clearing House" and exemplifies the importance of this abstracted layer for an increasingly

interconnected global financial system. This imaginary clearinghouse is a missing puzzle for today's closed monetary networks.¹

Attaining a World Clearing House is a dream for payments and settlements. But such clearinghouses have yet to adapt to present demands. 2-3% transaction fees and sluggish T+2 transaction settlement times have been treated as the inevitable reality. Retail users (small/medium transactions) have a false sense of atomic settlement. PayPal and Venmo make transactions seem instantly finalized when the back end has outdated infrastructure and an infinite labyrinthine network of intermediaries required for processing a single transaction. Foundational payment and settlement systems, like Fedwire, are exclusively available to banking institutions. No matter how innovative a new fintech solution is, its limitation is a vertical bureaucratic layer of API connections to incumbents. Individuals looking to utilize these networks can only do so through indirect means, such as by being clients of a bank or a financial technology company that has established connections with a bank. **A pig on a lipstick** - current fintech's and other user-facing applications disguise the true nature of our outdated infrastructure. Luckily, there is a solution.



¹ Speed of Transactions v. Speed of Settlement – Lyn Alden

An Open Monetary Network

For the past 7 years there has been an innovation wonderland. Just as Jonathan Palmstruch's introduction of paper money revolutionized commodity-based currency systems, the advent of Bitcoin, particularly its Proof of Work (PoW) consensus mechanism, and Ethereum's propagation of smart contracts are set to continuously reshape the “inevitable reality”.

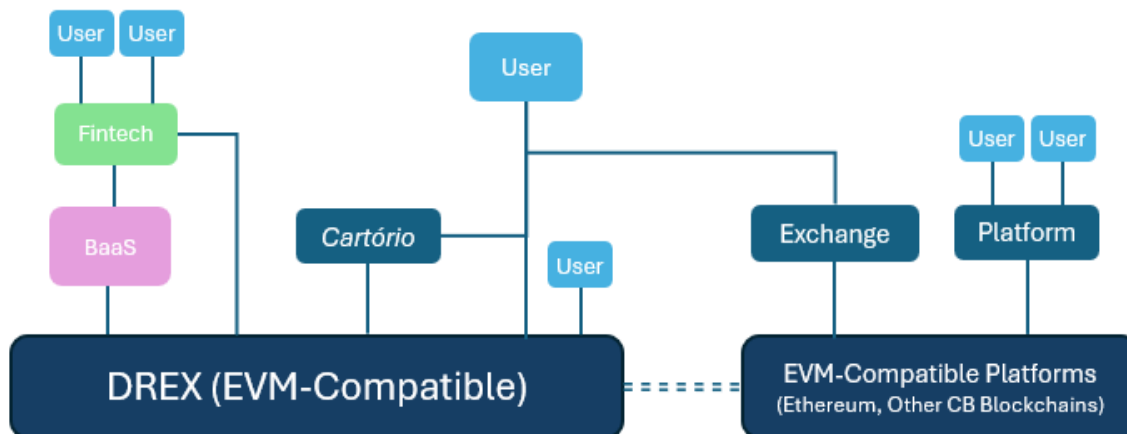
Let us revisit the definition of blockchain, a digital ledger for asset ownership, a fundamental yet sometimes overlooked aspect of two economic activities: **trading and payments**. Trading facilitates efficient resource allocation, while payments encompass the broader spectrum of financial transactions and money transfers. A decentralized ledger-based system became an initial point of attention for enthusiasts in the industry, providing a Delivery versus Payment (DvP) mechanism with no intermediaries, rather a decentralized set of nodes to coordinate. Time shows the added layer of abstraction, via smart contracts and interoperable protocols, is where blockchain can reach mass adoption.

Challenges related to trust persist, as demonstrated by events like the Terra/Luna collapse. This incident highlighted that decentralization and transparency do not inherently ensure stability. Conversely, the situation with Sam Bankman-Fried and FTX showcased the risks of excessive centralization in one person, much like Johan Palmstruch's unsupervised paper-back printing. It may be the case that the most trusted financial autarchy can leverage what has been done for the past decades in crypto - Central Banks.

The Brazilian Central Bank (BCB) stands out in this context. Announced in 2020, the Brazilian Central Bank's DREX platform incorporates an EVM-compatible blockchain and a Central Bank Digital Currency (CBDC), also named Drex. This initiative mirrors instant payments infrastructure PIX, which is settled in Brazil's *Sistema de Pagamentos Brasileiros* (SPB).

Drex settlements are validated by a sole node (the Central Bank) and unlike other stablecoins with unreliable pegs, the Drex maintains a 1:1 parity with the Brazilian real, ensuring reliability and trust in digital transactions.

Forget payments! At first-sight, readers may believe the initiative is aimed for P2P/B2B payments, but Drex is not being rolled out to solve payments. Brazil figured this out with PIX. Drex plans to harness real-world-asset (RWA) tokenization, programmable money, and the interoperability with other open monetary systems. Fintech's, users, and other open monetary systems can enjoy the possibility of directly connecting with Drex platform, while settling with the digital Real (or other CBDCs, soon).



Using home equity tokenization as an example we can reach many of the possible advantages of the Drex platform.

Home equity in Brazil is a major issue. A R\$100k loan requires a R\$4.000 payment to Cartórios. Cartórios are industry offices that hold the authority to execute public deeds, authenticate documents, and perform registration services to validate the existence of one's home and the possibility of a loan. A 4% cost on an already-high interest-rate environment is ludicrous. What if this claim of ownership of assets is tokenized and re-issued as needed? Issuance costs are near zero, together with transaction costs and settlement time.

Fraud prevention. Validating the existence of one's home will be validated by a government-mandated wallet. Digital legal frameworks will verify proof of home ownership using oracles. Oracles are services that provide real-world data to blockchain networks, enabling smart contracts to make decisions based on information from outside their network, like stock prices, weather conditions, or in this case home prices. Automatized Delivery versus Payment and fraud prevention digitized contracts can connect to the Drex platform.

Speed. When a buyer proposes a specific price for a home and the homeowner agrees, network validators swiftly verify both parties' wallet balances and check their details through smart contracts, including KYC, fraud checks, and risk assessments. The transaction is completed instantly, with the buyer's funds moving to the seller's wallet and the seller's tokenized property being transferred to the buyer's account. Providing central bank money in the same venue as

other claims is necessary for settlement and only possible with blockchain. This speed can be provided by the Drex platform.

Interoperability. The examples mentioned above could work for other assets, stablecoins, jurisdictions. The Drex platform is EVM-compatible, meaning it can run the Ethereum Virtual Machine (EVM) and execute Ethereum smart contracts. This means developers can write and deploy the same smart contracts across various EVM-compatible blockchains without significant changes to their code, facilitating interoperability. If other Central Banks and financial institutions build EVM-compatible blockchains, cross-border asset transfers have 24/7, secure, immediate settlement. No complex labyrinth networks and T+forever to receive transfers.

Liquidity. Having a tokenized asset that trades in a composable environment will tap into global liquidity pockets who also operate in Drex-like regulated platforms. Interoperability and liquidity, connecting with other open-network platforms and capital markets, can be provided by Drex.

Programmability/ Composability. Using one's tokenized home equity for a loan and accessing a broader capital market, after engaging in a loan contract, collateral can be executed immediately, and balances transferred instantly. Payments are settled using central bank money, ensuring they all go through at par and preserving the singleness of money. Assets can be structured similarly to building with Lego blocks, reminiscent of how mortgage-backed securities, ETFs, and other securitized assets operate currently, but with the added benefit of programmability. This allows for the fractionalization of tokenized assets and the creation of unique financial products with conditional formats. This programmability can be provided by Drex.

Central bank money resides in the same venue as other tokenized claims, giving firm foundation to the functionalities flowing from tokenization. ²

Siloed Closed Monetary Network



Blockchain Open Monetary Network



² Tokenization for the Real World – BIS Report

What has been done up to now? Financial institutions participating in the BCB’s Drex Pilot test are now required to hold a nominal amount of tokenized treasury notes, signaling a significant shift from traditional practices. Unlike the conventional approach of creating SPV-like structures around traditional assets and then “tokenizing” them, the new treasury notes are designed to be tokenized from the outset, while always maintaining a legal framework in the background. All, if not most incumbent Brazilian banks are participating - Itaú, Bradesco, BTG, Nubank, Santander, Caixa, XP, and others. Payment companies, cooperatives, infrastructure and service providers, and exchanges are all participating.



Looking Ahead

It is often easy to get excited about a new technology and its implications. The Drex platform introduced by the Brazilian Central Bank is a small step into a globally trusted and disintermediated financial system. A system enabling local asset registers to serve as collateral for international loans, offering a variety of funding sources, and allowing for quick collateral exchanges between banks certainly presents an appealing proposition. Hooray-ing for innovation alone would not be effective, and the crypto-enthusiasts must understand that to leverage the technologies being developed, one must harness real-world demand. To put it simply, the path towards a utopic crypto-only infrastructure will only be possible by adapting this technology for real-world problems, as the BCB has done.

Onboarding financial institutions is challenging, like the initial difficulties faced when moving legacy businesses to the cloud. A software layer will be necessary for financial institutions to set up nodes and will create an efficient environment for managing collateral and reconciling accounting standards between tokenized and traditional balance sheets. This setup aims to facilitate the integration of new financial technologies with established systems. Doubts brought on by Roberto Campos Neto and the industry include - how to bring DeFi closer to our banks? How can we intertwine blockchain-enabled and legacy capital markets?

The introduction of the Drex platform by the Brazilian Central Bank marks a significant milestone in the evolution of financial technology and legacy systems can harness blockchain to become the truly first interoperable and disintermediated clearinghouse, and DREX stands as a testament to the potential of integrating blockchain technology and Central Bank Digital Currencies (CBDCs) into mainstream financial systems. Drex promises to streamline the way we handle assets, offering a seamless, secure, and efficient mechanism for transactions. By enabling digital contracts and tokenization, it opens new possibilities for investment and liquidity, making financial markets more accessible to a wider audience. As we move forward, the success of Drex will hinge on its ability to blend with existing financial structures, encourage broad adoption, and navigate the intricate balance between innovation, regulation, and market needs. The journey is complex, yet the prospect of revolutionizing financial transactions makes it a compelling path to explore for policymakers, financial institutions, and consumers alike.

Fuse Capital is cautiously excited, but overly confident with Brazil's role in the future of finance.



fuse
capital

Rio de Janeiro
February 20, 2024
jg@fuse.capital