

How Central Banks Can Win the Digital Currency Race

By Philip Luck, Richard Gray, and Justin Hu

Executive Summary

Central banks design retail digital currencies as though adoption, sovereignty, and security are independent variables. But the record on existing instruments shows that central bank payment initiatives require each component to be part of a holistic strategy, with greater adoption allowing payment systems to have greater longevity. Optimizing the architecture for one sole vertex sacrifices at least one of the other two. An instrument that does not anticipate this trade-off at the design stage, therefore, will encounter the setback at the operating stage.

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The Center for Strategic and International Studies surveyed five central bank digital currency (CBDC) programs. While each cleared the security and sovereignty vertices, none of them attained wide user adoption.

These programs responded to their underutilization in four distinct ways.

1. **Two gained minimal market share:** The Bahamas' Sand Dollar **plateaued** at 0.4 percent of physical currency, while 98.5 percent of downloaded eNaira wallets in Nigeria went **unused**.
2. **One was substituted out:** The Eastern Caribbean Central Bank **suspended** DCash 2.0 in February 2026 in favor of a regional fast-payment system.

3. **One operates primarily for the disbursement of welfare payments:** India's e-Rupee **accounted** for 0.006 percent of banknotes, its daily volume having **fallen** from 1 million transactions to about 100,000 the moment banks stopped routing salary payments through the rail.
4. **The last was restructured:** In January 2026, China's eCNY 2.0 **rerouted** retail balances onto commercial bank balance sheets in light of Alipay and WeChat Pay—the currency never dented the 94 percent share of mobile payments held by Alipay and WeChat Pay controlled **over** 90 percent of mobile payments. The future of this architectural redesign—whether it converges toward the regulated stablecoin model—is uncertain.

CSIS also surveyed two private rails and found a stark contrast in adoption. Brazil's Pix processed about 63 billion transactions worth \$4.6 trillion in 2024, and India's Unified Payments Interface (UPI) processed about 241.6 billion **transactions** in 2025 with more than 550 million users. These digital currencies did not achieve this success through central bank branding or national appeal, but through two deliberate design choices:

1. **Pricing set below the incumbent as policy:** Pix was made free to individuals and **applied** rates of 0.33 percent to merchants, compared to card rates of 2 to 5 percent. UPI similarly **depended** on a state subsidy to eliminate merchant discount rates.
2. **Permissive nonbank market access:** The National Payments Corporation of India (NPCI) **invited** private firms such as PhonePe and Google Pay to build consumer interfaces around a state-managed settlement rail. In doing so, the system produced a division of labor that reduced adoption friction, all while increasing competitive innovation.

Enhancing CBDC utility is vital. When sovereign options underdeliver on utility, shadow infrastructure will form. Ruble-pegged rails such as A7A5 and stablecoin remittance corridors in sub-Saharan Africa clear enormous volumes precisely because they solve user-side cost and speed, largely through bypassing Western anti-money laundering (AML) and sanctions screening.

To balance these objectives, this report recommends the following:

1. **Prove the utility before authorizing the rail.** No sovereign retail instrument should be authorized until its issuer publishes a quantified cost-and-speed advantage over the dominant domestic incumbent, benchmarked regularly against the Financial Stability Board's 2027 G20 targets.
2. **Reorient development strategy from permissioned CBDC pilots toward open fast-payment rails on the UPI and Pix model.** Under this model, sovereignty over data and settlement coexists with low costs because the architecture was designed for nonbank entry. As a condition of financial integration within the G7 financial architecture, CBDCs should be programmable to align with existing compliance regimes.

The Stakes and the Vertices

Retail digital money is a **contest** for network effect across millions of users, and with their existing strategy, central banks are losing this competition.

Architects have treated adoption, sovereignty, and security as independent choices:

- **Adoption:** Whether mass users will transact on the instrument in volumes large enough to displace incumbent rails.
 - **Sovereignty:** Whether the state keeps control over its unit of account, over who may issue claims on it, and over the rails on which domestic payments settle.
 - **Security:** Whether the instrument complies with AML and counterterrorist financing standards, responds to sanctions, and protects consumers against run risk and operational failure.
- Because these variables have been approached independently, central banks have consequently produced instruments that are secure and sovereign, but often not used to their potential.

Early adoption is the linchpin for the success of the digital currency. Retail payment platforms are **two-sided** markets: A consumer adopts because merchants accept, and merchants accept because consumers hold. An instrument will stall if it cannot clear an entry-level threshold in both markets, and no amount of compliance investment or sovereign branding can compensate for underutilization.

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Wholesale projects do not face the same trilemma. Wholesale CBDC projects operate to digitize transactions between banks and financial institutions. mBridge, for instance, is a wholesale platform developed by China, Hong Kong, Thailand, the United Arab Emirates, and Saudi Arabia. Adoption for such an initiative **runs** through a few institutional counterparties whose participation a supervisor can coordinate by mandate. Retail, on the other hand, must be won across millions of users who use what is cheaper and faster.

Four Forms of Muted Adoption

Among the first-generation retail CBDCs surveyed by CSIS, their specific architectures did not achieve widespread adoption. Their failure assumed four distinct forms:

1. **Two gained minimal market share:** In the Bahamas, the Sand Dollar **plateaued** at 0.4 percent of physical currency in circulation through late 2024, while physical cash itself **grew** about 20 percent over the same year. In Nigeria, three years after launch, 98.5 percent of downloaded eNaira wallets **sat** unused and only about 1.5 percent were active every week, even with the country's central bank **releasing** a Vision 2028 strategy to **strengthen** confidence and adoption.
2. **One was substituted out:** In the Eastern Caribbean Currency Union, the central bank **suspended** DCash 2.0 at its 112th Monetary Council meeting on February 13, 2026, in favor of a regional fast-payment system—the second wind-down of the DCash line, after the original pilot was **terminated** in January 2024 following a two-month outage. The replacement is a state-coordinated fast-payment rail, not another permissioned CBDC.
3. **One continues as a rail for welfare and public provisions:** In 2024, India's e-Rupee **accounted** for 0.006 percent of banknotes. Its daily volume **reached** roughly 1 million transactions in December 2023 while participating banks routed salary payments through it, then fell to about 100,000 by mid-2024 once those incentives lapsed. The instrument still runs,

but its operational role has **shifted** from a mass-retail payment instrument to a channel for government and employer programmable disbursements.

4. **One was restructured:** The People's Bank of China's (PBOC) pilot digital cash, the eCNY, **reached** 260 million wallets but failed to displace private incumbents, with Alipay and WeChat Pay controlling **over** 90 percent of mobile payment volume in late 2025. PBOC **overhauled** this infrastructure in 2026, with commercial banks managing accounts and the central bank operating the underlying payment system. The future of the world's largest retail CBDC pilot—whether it converges toward the regulated stablecoin model or diverges into a unique Chinese architecture—remains uncertain.

Two cases from developed economies replicate the pattern:

1. **The U.S. Federal Reserve's FedNow:** A state-coordinated fast-payment rail rather than a CBDC, FedNow was launched in 2023 with adequate compliance and broad participation among banks. It **processed** about \$853 billion in 2025, up from \$38.2 billion in 2024, yet still trailed the private Clearing House real time payments (RTP) network's \$1.3 trillion in 2025. A state rail with no clear user-side edge will grow sluggishly even in a deep banking, high-smartphone market.
2. **The Bank of Korea's Project Han River:** This retail pilot paused in 2025, not by sovereign reclassification, but because the participating commercial banks could not see how their investments in infrastructure, integration, and merchant recruitment (which **totaled** 30-35 billion won) could generate revenue or strategic value through user adoption. Following this retail-utility analysis, banks shifted to developing regulated stablecoins over tokenized deposits.

The challenge of lukewarm user adoption is not limited to sovereign instruments. The European Union's Markets in Crypto-Assets Regulation (MiCA) established a regulatory architecture that was **calibrated** for sovereignty and security but not market entry: a 2 percent reserve requirement, €350,000 minimum capital, and a prohibition on interest remuneration. As the European Commission conceded in its 2026 MiCA review consultation, no asset-referenced token has been **licensed** after nearly two years of operation.

Across all five CBDCs, the income range runs from low (Nigeria) to upper-middle (China), and all cleared sovereignty and security by design. The pattern is a foreclosure of an architectural family—the permissioned, holding-limited, bank-only family—due to its missing user-utility edge.

Capturing Demand in Emerging Markets: How Pix and UPI Cleared the Frontier

When setting the platforms beside the rails that captured mass adoption, the design difference is sizable.

Pix, launched by the Banco Central do Brasil in November 2020, **processed** about 63 billion transactions (totaling \$4.6 trillion) in 2024, **covering** 87 percent of Brazil's adult population. The central bank owns and operates the rail, settlement is in central bank reserves, the unit of account is the Brazilian real, and identity is mandatory at the recipient side—sovereignty and security are both intact. UPI, run by the NPCI under Reserve Bank oversight, processed about 241.6 billion **transactions** in 2025 with more than 550 million users.

Two structural factors explain the adoption of these payment systems:

1. **Setting a policy requirement to fix prices below incumbents:** Pix is free to individuals and **charges** about 0.33 percent to merchants, compared to card-network fees that ran 2 to 5 percent in Brazil before launch. UPI runs at a zero-merchant discount rate, the costs of operation **covered** by a Cabinet-approved subsidy of about INR 1,500 crore from 2024 to 2025. By making Pix free and by subsidizing merchant rates for UPI, Brazil and India respectively ensured that the cost advantage would arrive at the user.
2. **Permissive nonbank market access on a state-coordinated rail:** India **maintains** the settlement layer and Reserve Bank oversight while allowing third-party providers, such as PhonePe, Google Pay, and Paytm, to build the consumer interface directly on the UPI rail. Such an ecosystem produced enhanced capabilities for the digital currency: interoperable multi-app flows, recurring mandates, and in-app purchasing features. Sovereignty over data and settlement turns out to be compatible with a thick, competitive market, because the regulatory framework was designed for entry rather than against it.

The Advanced-Economy Constraint: Leveraging Sovereignty Across the Monetary Network

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The European Central Bank (ECB), the Federal Reserve, the Bank of England, and the Bank of Japan are not positioned to undercut their commercial banking systems on retail pricing or to disintermediate them at scale. Central banks depend on commercial banks to effect monetary policy, and the political cost of a central bank competing with regulated banks on retail price outweighs the consumer benefits that a competitive CBDC could deliver. It is for this reason that both the United States and European Union have **restricted** yield-bearing stablecoins, for **fear** of diverting deposits from traditional banking institutions.

Central banks should leverage their institutional power and resources to create an integrated environment across banking networks. Such an approach would operationalize the principle of how integrated monetary infrastructure can transmit and multiply network effects. It is a widely held theory that in monetary networks, greater acceptance **engenders** greater adoption; this adoption feedback loop is broken, however, if the monetary landscape is fragmented. In the digital realm, this

fragmentation is occurring through the growth of decentralized public permissionless blockchains, as well as through enduring differences across national legal systems and regulatory frameworks.

By planning a unified monetary and technological ecosystem, the European Union's push for sovereignty might present solutions to this fragmentation. ECB President Christine Lagarde has **observed** that the ECB's pilot for a single, interoperable distributed ledger technology regime succeeded in leveraging central bank money not only as an anchor for settlements but as a reliable instrument for transferring assets across different networks. If a central bank authority can operate an underlying architecture with compatible data formats, software, and smart contract standards, it would be able to ensure cohesion and communicability across the network. Such an integrated network would act as scaffolding to prevent its user base from splintering and to consequently amplify user adoption.

The corollary is a build-or-don't-build threshold. If a Western retail instrument cannot beat commercial cards on convenience or commercial fast-payment rails on merchant cost, then the effort behind a sovereignty-framed launch is better spent improving the rails with which it would have competed.

Recommendations

Require the utility before authorizing the rail. Digital currencies must demonstrate advantages in cost and speed compared to incumbents. Specifically, these metrics should be benchmarked at the design stage against two criteria:

1. The Financial Stability Board's 2027 G20 **target**: average retail cross-border costs at or below 1 percent, no corridor above 3 percent, and 75 percent of payments settling within an hour.
2. A state-coordinated rail based on sub-incumbent pricing, nonbank market access, and instant settlement. The authorizing legislation should require the issuer to name the dominant domestic incumbent it will be measured against, such as the digital euro against Girocard or FedNow against Clearing House RTP; specify the cost-and-speed edge in quantitative terms; and commit to a proceed, pause, or redesign protocol when a gap manifests.

Reorient development strategy toward open fast-payment rails. India's UPI is the proof that data localization and low cross-border cost are compatible when nonbank entry is preserved at home. Developers and policymakers should model their architecture after UPI and Pix: state-owned settlement, permissive nonbank access, and sub-incumbent pricing. To prevent and repair fragmentation across the network, central banks should establish the standards and requirements that commercial parties should follow—the prerequisite for adoption. On security, the enforcement gap exists when assets are transferred on the secondary market, which is where most illicit transactions actually occur. Closing the gap on the rails requires a competitive and sovereign instrument.

Conclusion

The trilemma is the central design challenge in retail digital payment systems. For digital payment systems that attained adoption alongside security and sovereignty, they did so by (1) pricing below the incumbent and (2) opening the rail to nonbank competition while the state operates the settlement layer.

Where sovereigns decline to make these choices, private and adversarial rails make them instead, on their own terms, beyond the reach of compliance regimes. The ability of CBDC regimes of past and present to win the digital currency race depends on being advantageous—through more seamless and cost-efficient transactions—to incumbent instruments. ■

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