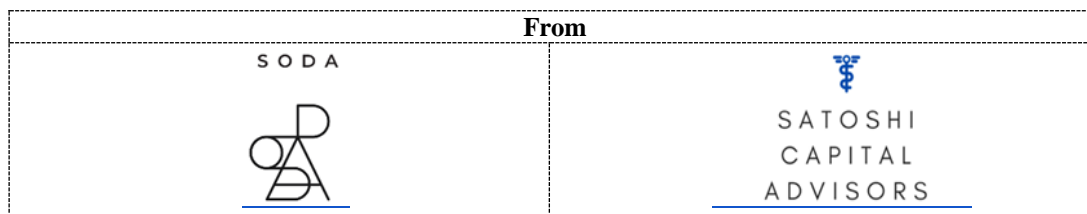


Kiffmeister's Central Bank Digital Currency Monthly Monitor (February 2024)



Retail central bank digital currency (CBDC) is being explored, or has recently been explored, in 100 jurisdictions (unchanged). Wholesale CBDC is being explored, or has been explored, by 20 central banks (unchanged). Newswise it was a very quiet month, but there was a slew of new research papers including an IMF paper that introduces, and illustrates the use of, the ASAP (access, service, asset, platform) digital asset platforms (DAP) conceptual model that is quite applicable to CBDCs. There are a number of papers that analyze potential impacts of retail CBDC on financial stability and the macroeconomy.

Retail CBDC Developments (see also Annex 1)¹

The European Parliament's Committee on Civil Liberties and Justice voted to endorse the [latest draft digital euro legislation](#). It was [passed by 48 in favor of, with six against, and seven abstentions](#). A full parliamentary vote will not likely happen until after European Union elections in June 2024. The draft includes support for permissionless blockchains ("with the approval and under conditions set by the European Central Bank (ECB)"). The ECB and European Council had said they don't want programmable money at the base layer, so the legislation specifies conditional payments will take place in the "layer above". [\[European Parliament\]](#)

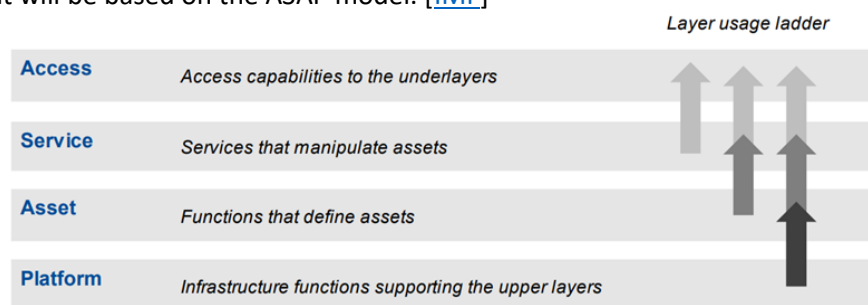
[CURRENCY RESEARCH](#) is hosting its Payments Week in Kuala Lumpur from June 10 to 14, and its Payments, Innovation & Technology Week in London from September 23 to 26. Whether you're interested in payment infrastructure and policy, digital currency, or AI, these events will have the best topics, speakers, and networking opportunities. For more information:

- [Central Bank Payments Conference \(Kuala Lumpur, June 10 to 12\)](#)
- [Global Payments Summit \(Kuala Lumpur, June 12 to 14\)](#)
- [Digital Currency Conference \(London, September 23 and 24\)](#)
- [Central Bank AI Conference \(London, September 24 and 25\)](#)

The IMF published a paper that introduces, and illustrates the use of, the ASAP (access, service, asset, platform) digital asset platforms (DAP) conceptual model. Just as the utilization of a seven-layer TCP/IP model has been fundamental to the interoperability of the internet, it is anticipated that the four-layer ASAP DAP model will similarly promote cross-platform and cross-border interoperability. The model is illustrated through examples and use cases, like asset tokenization and purpose bound money. I am

¹ [Retail CBDC](#) is a broadly available general purpose digital payment instrument, denominated in the jurisdiction's unit of account, that is a direct liability of the jurisdiction's monetary authority. [Wholesale CBDC](#) is limited to a set of predefined user groups, typically financial institutions, and based on distributed ledger technology (retail CBDC is platform agnostic – it can run on a centralized or decentralized ledger, or no ledger at all).

currently working on a CBDC reference architecture paper for the International Telecommunications Union (ITU) that will be based on the ASAP model. [\[IMF\]](#)



Other retail CBDC Developments:

- 17 banks are joining the Bank of Russia’s digital ruble pilot program. They have already signed an agreement with the central bank and are now implementing the necessary systems to participate in the upcoming expanded pilot. Currently, 13 banks are already participating in the pilot, along with around 600 citizens and 30 trading and service companies. [\[Bank of Russia\]](#)
- 13 U.S. states have now passed, or may soon pass, anti-retail CBDC legislation. Some are aimed at preventing the state from accepting CBDC as payment, and many additionally block participation in CBDC trials. Others are excluding CBDC from the definition of money in the Uniform Commercial Code (UCC) so businesses can’t use CBDC to discharge liabilities. [\[Ledger Insights\]](#)
- The Reserve Bank of India (RBI) plans to add programmability and offline payments to its CBDC pilot. The former will likely take the form of [purpose-bound money](#), that embeds programming logic bounding its use based on conditions, that becomes “unbounded” once conditions are met. [\[RBI\]](#)
- The Bank of England (BOE) and HM Treasury published a digital pound [request for information](#) on privacy, meaning the protection of users’ personal and transaction data, and ensuring they have control and visibility over who can process their data and for what purposes. [\[BOE\]](#)
- The Türkiye Cumhuriyet Merkez Bankası (CBRT) published an English version of the report on the first phase of its digital Turkish lira testing (originally published in Turkish in December 2023). It reports on pilot tests but is unclear on whether they’re really “pilots”. [\[CBRT\]](#)

Wholesale CBDC Developments (see also Annex 2)

[Nothing new to report this month]

Recent CBDC-Related Publications of Interest

Rise of digital money: Implications for Pacific Island countries

The IMF published a paper on the development of digital money and payment systems in twelve Pacific Island countries (PICs), assessing potential benefits and risks. It also examines the prerequisites for successfully implementing various forms of digital money and proposes a strategic framework for policy decisions. It advocates a gradual approach tailored to PICs’ unique monetary and financial circumstances. Moreover, the paper suggests that a regional approach could help address capacity and scalability challenges in introducing new digital money forms and payment methods in PICs. [\[IMF\]](#)

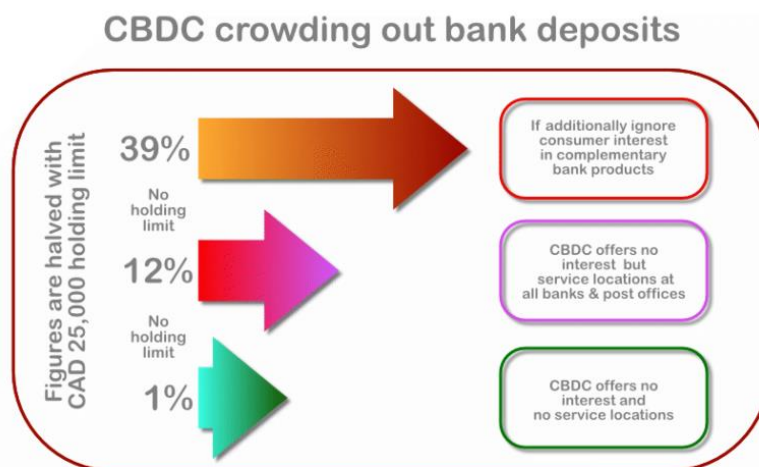
CBDC and monetary sovereignty

A chapter in a recently published ECB legal conference volume investigated the potential rationale for the introduction of a CBDC to preserve monetary sovereignty. It concluded that the introduction of a CBDC as a protective measure when the currency substitution is caused by unfavorable economic conditions is neither effective nor appropriate for such purposes. It identified a very limited set of

circumstances when the issuance of a CBDC might be appropriate to push back on the use of technologically superior foreign money. More bluntly, it concluded that “a digital euro might help defend the monetary sovereignty of the euro area Member States by facilitating cross-border payments as a conduit, mitigating dependence on foreign infrastructure for pan-European payments, serving as a catalyst for the promotion of technologically new payment functionalities, and offering a digital complement to cash. In its planned form, however, the digital euro is not (yet) fit for purpose. Its statutory privilege compared to cash and its holding limits will prevent it from fulfilling its anchoring function. Its issuance would thus weaken rather than strengthen the euro area’s monetary sovereignty in the long run.” [[ECB starting on page 165](#)]

Central bank digital currency and banking choices

The Bank of Canada (BOC) published a paper that uses a structural model where households decide which financial institution to deposit their digital money with to estimate the extent to which a retail CBDC competes with bank deposits. It uses a dataset of information on Canadian households’ bank selections for a rich set of financial products. The paper finds that non-interest-bearing CBDC that does not provide complementary financial products can substantially crowd out bank deposits only if it provides an extensive service network. Also, a Canadian CBDC that uses post offices as service locations would benefit rural households more than a CBDC that uses bank branches as service locations. [[BOC](#)]



CBDC and the banking system

Banca D’Italia published a paper on the channels through which a CBDC may affect the banking system and the economy at large. The paper also provides a set of illustrative exercises about the potential impact of a CBDC on the funding structure and profitability of banks using data on the Italian banking system between June 2021 and March 2023. It finds that the impact depends on how credit institutions re-optimize their balance sheets in response to an outflow of deposits induced by the CBDC. It finds that the potential impact could be manageable if there were individual holding limits and the CBDC were introduced in an environment of ample liquidity and stable funding for banks. [[Banca D’Italia](#)]

CBDC and bank lending: The role of financial frictions

[Fernando Cirelli](#) and [Remo Nyffenegger](#) posted a paper that examines the impact of CBDC on bank lending, emphasizing the role of different financial frictions. Within a stylized general equilibrium model, it integrates a banking sector characterized by market power on deposits and leverage constraints, together with liquidity in households’ utility. Calibrating the model to US data and simulating a CBDC

introduction as a shift in households' preferences for public money, the results indicate that a CBDC increases bank lending when market power is the primary operating friction in the banking sector. However, the result reverses when leverage constraints are binding for banks. [[SSRN](#)]

Demystifying fears about bank disintermediation

The Centre for Economic Policy Research's VoxEU published an article by Ulrich Bindseil and two other senior ECB staff, arguing that commercial bank deposits are unlikely to be impacted much by the launch of a digital euro due to its design. This combines a holding limit with the reverse waterfall, which allows instant top-up of a CBDC wallet from the users' bank accounts. Also, merchants and other businesses cannot hold digital euro balances. According to the article, stablecoins and other innovative private sector financial products are bigger threats to bank business models. [[VoxEU](#)]

Issuing a wholesale central bank digital currency: Why and how

Intereconomics published a paper by [Christian Pfister](#) on the whys and hows of issuing distributed ledger technology (DLT) based wholesale CBDC. The whys focus on the provision of a safe and liquid settlement instrument that would be directly available in a DLT environment, thus preserving the anchoring role of central bank money in this environment. The hows focus on the potential perimeter of the use of wholesale CBDC (e.g., whether to integrate with a [regulated liabilities network](#)), along with the consequences for monetary policy and precautions that central banks should take. [[Intereconomics](#)]

Digital euro: The case against it being legal tender

SUERF published an article by Christian Pfister that the notion of legal tender is a "barbarous relic" that is unfit in a digital environment where there is a wide optionality of payment instruments. Furthermore, making the digital euro legal tender could even undo some of the expected benefits of its launch and entail risks. That is not to say that making a retail CBDC legal tender may be more justified in a context where the wide majority of payments are made in cash and the public authorities wish to encourage the modernization of payments, i.e. in some developing and emerging economies. [[SUERF](#)]

Offline payments for smartphones

Crunchfish published a paper by Lipis Advisors on the challenges of implementing offline payments on smartphones and how to mitigate the risks. Offline payments require a much higher security than what is offered by the smartphone rich execution environment (REE). This higher level of security may be achieved by implementing offline payments as a trusted application (TA) protected by a tamper-resistant element (TRE) that provides a secure runtime and storage for both cryptographic keys and other offline assets, such as the offline balance and risk rules. The TRE can be provided either as a hardware-based standalone TRE or a software-based app-integrated TRE, the trade-off being the higher security of the former versus the greater scalability of the latter. [[Crunchfish](#)]

Notes:

Kiffmeister is Research Director at [SODA](#), Head of CBDC/Digital Capital Markets Advisory at [Satoshi Capital Advisers](#), and Advisor to [Whisper Cash](#). He was a Senior Financial Sector Expert at the IMF from 2005 to 2021. Prior to that, he was at the Bank of Canada for 25 years, where he spent most of his time managing the funding and investment of the government's foreign exchange reserves, including running its interest rate and currency swap book. At the IMF he was part of the team that produces the semi-annual Global Financial Stability Report covering innovative financial products. [Kiffmeister](#) offers CBDC-related advisory services through several channels, and blogs on fintech at [Kiffmeister Chronicles](#).

The [Sovereign Official Digital Association \(SODA\)](#) is a technology-agnostic firm offering advisory services at the intersection of central banking, digital finance and the web3 industry, aiming to make public digital money a reality. SODA believes institutions in the existing financial ecosystem should have access to the tools and resources they need to move from discussion to action. SODA offers 'real life' use cases to help test digital money and drive adoption as central banks and other public institutions explore the future of a more financially inclusive world powered by interoperable networks. **SODA would love you to join us on this journey - please get in touch (chris@sodapublicmoney.org).**

[Satoshi Capital Advisors](#) is a New York-based, global advisory firm that works with central banks, governments, and the private sector to architect, implement, and operate varying initiatives. Satoshi Capital Advisors' central bank work revolves around CBDC architecture and implementation, providing advisory services from research phase through to growth phase. Utilizing a product-market fit and technology agnostic approach to CBDC architecture and implementation enables Satoshi Capital Advisors to build tailored solutions, bespoke to local financial system nuances. **Satoshi Capital Advisors welcomes requests from central bank officials for virtual and in-person CBDC workshops.**

[WhisperCash](#) offers the first fully offline digital currency platform that has the same properties as physical cash. It can perform secure consecutive offline payments without compromising on security, privacy, or accessibility. WhisperCash allows direct person to person offline payments without any server infrastructure or internet connectivity. It comes in various form factors including the self-contained credit card-sized "Pro" that sports an eInk screen and capacitive keyboard and lasts for two weeks between recharges assuming a few transactions per day.

Annex 1: Jurisdictions Where Retail CBDC Is Being Explored (changes from end-January highlighted)	
Where central banks (CBs) have launched or piloted (or soon will)(14)	
Australia (2023)(update; 2023)	Jamaica (launched in 2022)
Bahamas (launched in 2020)	Kazakhstan (2023)
China (pilot launched)(update; 2022)	Korea (2023)(update; 2023)
Eastern Caribbean (pilot since 2021)	Nigeria (launched in 2021)
Ghana (2023) (pilot completed in 2023)	Russia (2023)(update; 2023)
Hungary (2023)(update; 2023)	Uruguay (pilot completed in 2018)
India (pilot since 2022)(update; 2024)	Zimbabwe (2023)
Where CBs have done proofs of concepts or prototypes (or soon will)(19)	
Bahrain (completed 2022)	New Zealand (2022)
Bhutan (2023)(completed 2022)	Norway (update; 2023)
Brazil (2023)(update; 2023)	Solomon Islands (2023)
Euro Area (2023)(update; 2024)	Sweden (2023)(update; 2023)
Georgia (2023)	Taiwan (2023)(completed 2022)
Hong Kong (2023)	Thailand (2022)(update; 2023)
Iran (2023)	Turkey (2023)
Israel (2023)(update; 2023)	Ukraine (completed 2019)(update; 2022)(update; 2023)
Japan (2023)(update; 2023)	United States (update; 2022)
Laos (2023)	
Where CBs are in advanced stages of research and development (5)	
Canada (2023)	Mauritius (2023)
Indonesia (2022)	United Kingdom (2024)
Singapore (2023)	
Where CBs have explored or are exploring (with year of last update)(62)	
Argentina (2022)(update; 2023)	Mauritania (2023)(private)
Algeria (2023)	Mexico (2022)(update; 2023)
Armenia (2023)	Mongolia (2022)(update; 2022)
Azerbaijan (2022)	Montenegro (2023)
Bangladesh (2022)	Morocco (2019)(update; 2022)
Belarus (2023)(update; 2024)	Namibia (2023)
Botswana (2022)	Nepal (2022)
Central Africa States (2022)	Oman (2022)
Chile (2022)(update; 2022)	Pakistan (2022)(update; 2023)
Colombia (2023)	Palestine (2021)(update; 2022)
Costa Rica (2021)	Paraguay (2021)
Curaçao en Sint-Maarten (2023)	Peru (2023)
Czech Republic (2021)	Philippines (2023)(update; 2023)
Dominican Republic (2022)	Poland (2021)
Denmark (2023)	Qatar (2022)(update)
Egypt (2022)	Rwanda (2023)
Eswatini (2023)	Saudi Arabia (2023)
Fiji (2022) (IMF confirmed; 2022)	South Africa (2021)
Guatemala (2021)	Sri Lanka (2022)(update; 2024)
Haiti (Bitkòb)(2021)(update; 2022)	Sudan (2022)
Honduras (2023)	Switzerland (2019)
Iceland (2018)	Tanzania (2023)
Iraq (2022)	Tonga (2022) (IMF confirmed; 2022)
Jordan (2023)	Trinidad & Tobago (2021)(update; 2022)
Kenya (2023)	Tunisia (2019)(update; 2022)
Kuwait (2022)(update; 2023)	Uganda (2022)(update; 2022)
Lebanon (2020)(update; 2022)	United Arab Emirates (2023)
Macau (2021) (IMF confirmed; 2022)	Vanuatu (2022) (IMF confirmed; 2022)
Madagascar (2021)	Viet Nam (2021)
Malaysia (2022)	Yemen (2022)
Maldives (2023)	Zambia (2022)
Where CBs have launched and discontinued (2)	
Ecuador (2014-2018)(CBDC?)	Finland (1993-2006)
Sources: Central banks or <i>various news sources</i> per hyperlinks above, the Bank for International Settlements CBDC database and CBDCTracker.org .	

Annex 2: Domestic Payments System Focused Wholesale CBDC Experiments (no changes since end-December)

Central Bank	Project	Platform/Vendor Partner(s)
Reserve Bank of Australia (RBA)(2020)	Interbank payments	Ethereum
Bank of Canada	Project Jasper Phase 1 (2017) Project Jasper Phase 2 (2017)	Ethereum R3 Corda
Colombia (2023)	N/A	Ripple
New York Fed	Regulated Liability Network U.S. Pilot	DAML/Canton
Republic of the Philippines	Project Agila	Hyperledger Fabric
Monetary Authority of Singapore (MAS)	Project Ubin Phase 1 (2017) Project Ubin Phase 2 (2021) Project Orchid	R3 Corda Hyperledger Fabric & Quorum N/A
South Africa Reserve Bank (SARB)(2018)	Project Khokha	Quorum
Bank of Thailand (BOT)(2019)	Project Inthanon Phase 1	R3 Corda

Cross-Border Payments Focused Wholesale CBDC Experiments

Central Bank	Project	Platform/Vendor Partner(s)
Bank of Canada & Monetary Authority of Singapore (2019)	Project Jasper-Ubin	R3 Corda & Quorum
Banque de France (BdF)(2022)	Cross-Border Payments	Multiple Platforms
Hong Kong Monetary Authority (HKMA) & Bank of Thailand (BOT)	Project Inthanon-LionRock 1 Project Inthanon LionRock 2	R3 Corda Consensys
Monetary Authority of Singapore (MAS)	Project Ubin+	N/A
New York Fed and MAS	Project Cedar Phase II x Ubin+	N/A
Saudi Arabian Monetary Authority (SAMA) and the CBUAE	Project Aber	Hyperledger Fabric
Bank for International Settlements Innovation Hub (BISIH) and: Swiss National Bank and Banque de France RBA, Bank Negara Malaysia (BNM), MAS, and SARB HKMA, BOT; the People's Bank of China (PBOC), and CBUAE Banque de France, MAS, and Swiss National Bank (SNB)	Project Jura Project Dunbar Multiple CBDC (mCBDC) Bridge Project Mariana	R3 Corda R3 Corda and Quorum HotStuff+ and Dashing Hyperledger Besu and Ethereum

Securities Settlement System Focused Wholesale CBDC Experiments

Central Bank	Project	Platform/Vendor Partner(s)
Reserve Bank of Australia (RBA)(2021)	Syndicated loan settlement	Ethereum
Bank of Canada (2018)	Project Jasper Phase 3	R3 Corda
Banque de France (BdF)(2021)	Securities settlement	Multiple platforms
BdF and Banque Centrale du Luxembourg	Project Venus	N/A
BdF, HSBC and IBM	Cross-border securities settlement	Hyperledger Fabric and R3 Corda
European Central Bank (ECB)	Securities Settlement	N/A
Reserve Bank of India	Securities Settlement	N/A
Bank of Korea	Tokenized Deposit Settlement Carbon credit settlement	N/A N/A
Oesterreichische Nationalbank (2021)	Project Delphi	N/A
South Africa Reserve Bank (SARB)(2022)	Project Khokha 2	R3 Corda
Bank of Thailand (BOT)(2019)	Project Inthanon Phase 2	R3 Corda
Swiss National Bank (SNB)	Project Helvetia	R3 Corda
BISIH, SNB and BdF (2021)	Project Jura	R3 Corda

Other Wholesale CBDC Experiments

Central Bank	Focus	Platform/Vendor Partner(s)
Banco de España	All three use cases	Adhara
Bank Indonesia	Use cases not specified	N/A