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Central Bank Digital Currency: The Series, Vol. 4

Central Bank Digital Currency (CBDC): Wholesale CBDC Global Developments

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Abstract

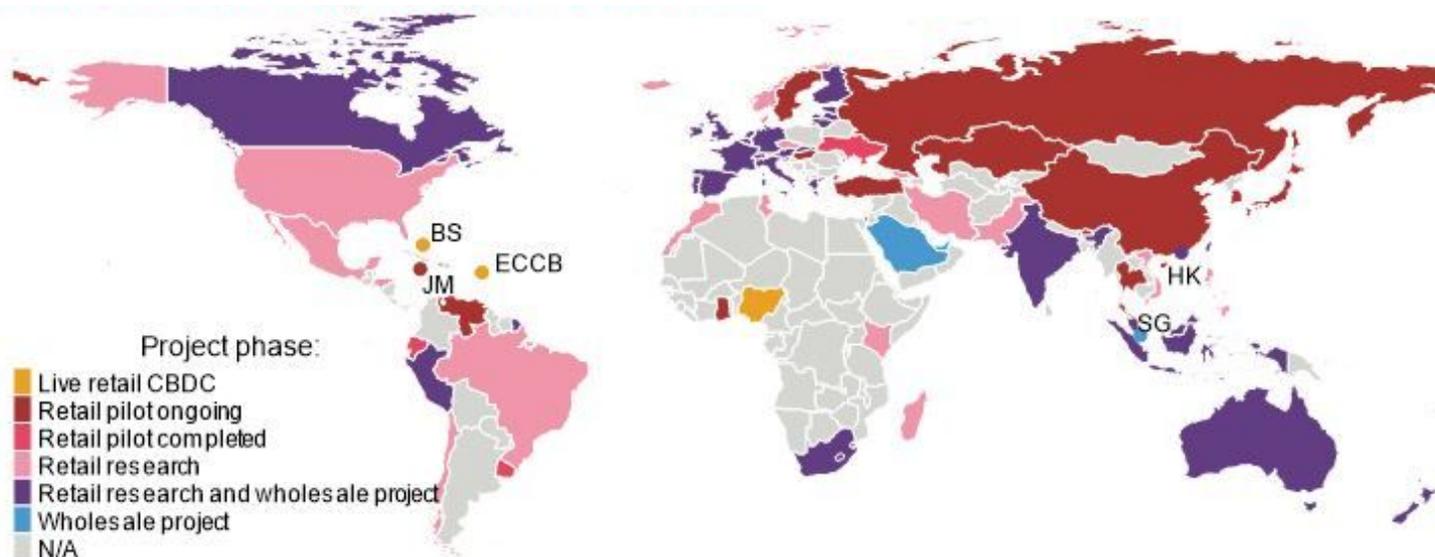
This paper is the fourth in [Payments Canada's series](#) exploring the implications of a central bank digital currency (CBDC). This paper explores key global developments of wholesale CBDC as an accompaniment to the [Retail CBDC Global Developments paper](#). While more central banks are looking at the issuance of a retail CBDC versus a wholesale CBDC, motivations for wholesale CBDC issuance range from increased circulation and access to central bank money to enhancing traditional methods for cross-border payments. This paper looks at three developing wholesale CBDC approaches in different jurisdictions: Australia, Switzerland, and a co-issued CBDC in the United Arab Emirates and Saudi Arabia.¹

¹ Note: This paper takes into consideration developments up until January 15th 2022. This paper is non-exhaustive.

Wholesale CBDC Developments

CBDC continues to be a priority for central banks worldwide. The Bank for International Settlements (BIS) has cited CBDC exploration as a way for central banks to maintain their mandates and foster innovation in a rapidly evolving payments ecosystem with uptake of innovations like mobile payments and digital currencies like Stablecoins.² In this environment, more central banks are looking to the implementation of a wholesale CBDC that could be used for payment and/or collateral for settlement obligations or an asset that could be purchased and exchanged bilaterally between banks - it would only be accessible to banks and other payment service providers rather than end-users like consumers and merchants.

Central Bank Digital Currencies Across the World



BS = The Bahamas; ECCB = Eastern Caribbean Central Bank; HK = Hong Kong SAR; JM = Jamaica; SG = Singapore. The use of this map does not constitute, and should not be construed as constituting, an expression of a position by the BIS regarding the legal status of, or sovereignty of any territory or its authorities, to the delimitation of international frontiers and boundaries and/or to the name and designation of any territory, city or area.

Source: R. Auer, G. Cornelli and J. Frost (2020). "Rise of the central bank digital currencies: drivers, approaches and technologies", *BIS working papers*, No 880, August.

² See: [Central Bank Digital Currency: The Future Starts Today. Bank for International Settlements. September 2021.](#)

Key Motivations for Wholesale CBDC Issuance

The case studies in this paper were selected based on commonalities in key motivations and use cases for issuance of a wholesale CBDC. These motivations vary by jurisdiction and by the scope of the CBDC project in question (*outlined below*).

Operational efficiency and driving innovation

Since there is no need for the traditional interbank clearing and settlement process with a wholesale CBDC, this can shorten transaction chains relative to existing wholesale payments systems and make wholesale payments faster, cheaper, and lower risk overall. Lower transaction costs and efficiency can be driven through the use of decentralized ledger technology typically associated with digital currencies.³ Wholesale CBDCs could also be used to minimize the collateral held in wholesale payments systems as there is less liquidity required to control counterparty risk. Risk can also be mitigated as central bank money is the lowest risk form of money.⁴ In particular, securities and derivatives settlement is a use case that can be greatly improved with wholesale CBDC.⁵ This is also a developing space, and implementing a wholesale CBDC could drive the potential for innovation in the future, particularly in the case of tokenizing digital assets.

A wholesale CBDC would enhance access to central bank reserves for players such as financial institutions or payment service providers (depending on the jurisdiction). This can also particularly help alternative payment service providers like fintechs by easing barriers to access central bank reserves directly and potentially contributing to a more innovative and competitive payments ecosystem.

Enhancement of cross-border payments

A key use case and long-term objective for wholesale CBDCs is the possibility of “interlinking” high-value payment systems or having interoperable CBDCs with parity in different jurisdictions to speed up the clearing and settlement of cross-border payments. This can work to address frictions present in cross-border payments such as the slow

³ This will be dependent upon the design of the CBDC and whether it is centralized or decentralized. For more on CBDC design attributes, please see the [CBDC: Fundamentals paper](#) in the CBDC education series.

⁴ See: [Central Bank Digital Currencies. Bank for International Settlements, March 2018.](#)

⁵ Ibid.

settlement of transactions, low visibility and high costs.

The Financial Stability Board (FSB) and Committee on Payment Market Infrastructures (CPMI) are currently working towards the global enhancement of cross-border payments through a roadmap endorsed by the G20.⁶ A key focus area of that roadmap includes the exploration of how new payment infrastructures can drive a higher standard for cross-border payments. This includes cross-border capabilities of CBDCs and multilateral platforms.

A prime example is the Bank for International Settlements' (BIS's) Project Dunbar.⁷ This pilot brings together the central banks and financial institutions of Australia, Malaysia, Singapore and South Africa and offers a shared platform for CBDC exchange. Financial institutions across all jurisdictions involved are able to pay each other directly out of the "pool" of CBDCs available and this removes the need for currency conversion and eliminates key frictions of wholesale cross-border payments.

Enhancement of monetary policy transmission and central bank control

Similar to retail CBDCs, the implementation of a wholesale CBDC offers the issuing central bank the potential for enhanced monetary policy transmission. Dependent on the design and the privacy parameters of the CBDC, the central bank could have full visibility of user transactions. This can provide a new tool for monitoring and implementation of monetary policy, including measures like quantitative easing.⁸ However, policymakers believe that large-value payments that would be facilitated via a wholesale CBDC should not be anonymous relative to a retail CBDC that could be to protect end-user data and privacy of transactions.⁹

For both retail and wholesale CBDCs, one of the key drivers is maintaining the central bank's control in their respective jurisdictions and ultimately having control over the resiliency of domestic payments. This includes being able to offer competitive payment methods that can hold up against current or incoming market offerings, particularly

⁶ See: [FSB delivers a roadmap to enhance cross-border payments.](#)

⁷ See: [Project Dunbar: international settlements using multi-CBDCs.](#)

⁸ See: [Central Bank Digital Currency: Motivations and Implications. Bank of Canada, November 2017.](#)

For more on quantitative easing, see: [Understanding Quantitative Easing.](#)

⁹ See: [Central Bank Digital Currencies: Financial Stability Implications. Bank for International Settlements, September 2021.](#)

Blockchain-based/ digital currency payment alternatives that are out of the central bank's scope and control.

Case One: Australia/Reserve Bank of Australia (RBA)

Motivations

Australia's (RBA) motivations for CBDC issuance:

- *Central bank control and monetary policy transmission* - Part of RBA's mandate includes promoting competition and efficiency in the market for payment services and maintaining relevance internationally in terms of innovation. The RBA stated that they wanted their CBDC efforts to be paced similarly relative to other international CBDC efforts.¹⁰ RBA also is looking at CBDC as a response to the rise of digital currencies and the subsequent threat to the central bank's sovereignty on monetary policy transmission.
- *Driving Financial Innovation* - RBA has indicated that a wholesale CBDC would be used to enhance wholesale financial use cases such as issuing loans or tokenizing securities (*see below for more*).
- *Expansion of central bank duties* - In addition to exploring a CBDC to maintain central bank control, RBA has also indicated that issuance of a CBDC could play a role in expanding its current roles and duties to other sectors such as directly providing banking services for the Australian government services.¹¹
- *Cross-border payments enhancement* - RBA is a participant in [Project Dunbar](#) and is working with several other central banks to allow for interoperability of CBDCs. This work is separate to their wholesale CBDC pilot (Project Atom) outlined below.

Project Atom Pilot

The Project Atom pilot (in collaboration with the National Australia Bank and the Commonwealth Bank) is a proof-of-concept (PoC) for a wholesale tokenized CBDC settling

¹⁰See: [Reserve Bank partners with Commonwealth Bank, National Australia Bank, Perpetual and ConsenSys Software on Wholesale Central Bank Digital Currency Research Project](#).

¹¹ Ibid.

on a private, permissioned Ethereum-based network leveraging Consensus technology.¹² The addition of “permissioned” to this PoC means that RBA can take advantage of all of the benefits of using Blockchain technology but with an extra layer of control for the issuer of the chain (RBA) as they can control and view the actions of participants on the network, allowing them to maintain the level of security needed for high-value transactions.

A key feature of Project Atom is the use of “atomic” delivery vs. payment settlement mechanisms for wholesale CBDC transactions, allowing for payments or transference of digital asset ownership to be made to the recipient in real time once the payment has been made. The use of atomic delivery and settlement for wholesale transactions can significantly decrease the cost and risks of transactions as all CBDCs are backed by fiat currency reserves, widely perceived to be the lowest risk form of money.¹³

The PoC began with the use of the CBDC to facilitate wholesale loans (including funding, clearing and settling and repayment of these loans) domestically.¹⁴ RBA is expected to look at a wider range of use cases such as tokenization of short term securities like bonds or allowing for “programmability” of the CBDC, allowing for smart contracts to be built into the CBDC or the tokenized asset and automate transaction flows. RBA found that the combination of wholesale CBDC and atomic settlement significantly increased operational efficiency, particularly for back office operations.¹⁵ However, they also found these efficiency gains could also be accomplished without the use of distributed-ledger technology (DLT). The next steps in this project will be determining the pros and cons of using a DLT platform for CBDC, determining technological issues like requirements for operators, and understanding next steps in terms of governance and legal implications of wholesale CBDC.¹⁶

Note: While RBA is investigating CBDCs, they have stated that “the case for issuing a CBDC for use by households (retail CBDCs) has not been established” - there would need to be a

¹² See: [RBA partners with Commonwealth Bank, National Australia Bank, Perpetual and ConsenSys Software on Wholesale CBDC Research Project](#)

¹³ See: [Reserve Bank of Australia considers wholesale digital dollar.](#)

¹⁴ See: [Exploring a Wholesale CBDC for Syndicated Lending. Reserve Bank of Australia. December 2021.](#)

¹⁵ Ibid.

¹⁶ Ibid.

better understanding of the implications of retail CBDC issuance on overall financial stability for them to consider issuance.¹⁷

Case Two: Switzerland/ Swiss National Bank (SNB)

Motivations

- *Driving financial innovation* - Similar to RBA's Project Atom, SNB's wholesale CBDC pilot is being used to drive innovation and increase the operational efficiency of wholesale transactions. Similar to Project Atom, SNB's wholesale CBDC approach is based on identifying the benefits of settling digital assets like securities via CBDCs.
- *Cross-border payments enhancement* - One aspect of SNB's PoC ([Project Jura](#)) looks specifically at being able to link a decentralized ledger to domestic payments systems which can significantly increase efficiency in cross-border payments.
- *Understanding macro implications of CBDC issuance* - One of the key drivers behind SNB's CBDC pilot was to understand the legal, policy and technological implications of wholesale CBDC issuance and its impact on financial stability and safety (*detailed below*).

Project Helvetia

Working with the [BIS Innovation Hub](#) and [SIX](#), Switzerland's primary securities and stock exchange, this project consists of two separate PoCs. The first PoC is reliant on the use of wholesale CBDC for settlement of digital assets on a DLT platform while the other works to connect RTGS systems to the DLT platform from the first PoC. A natural evolution for this project would be the use of wholesale CBDCs across connected RTGS systems for cross-border payments.

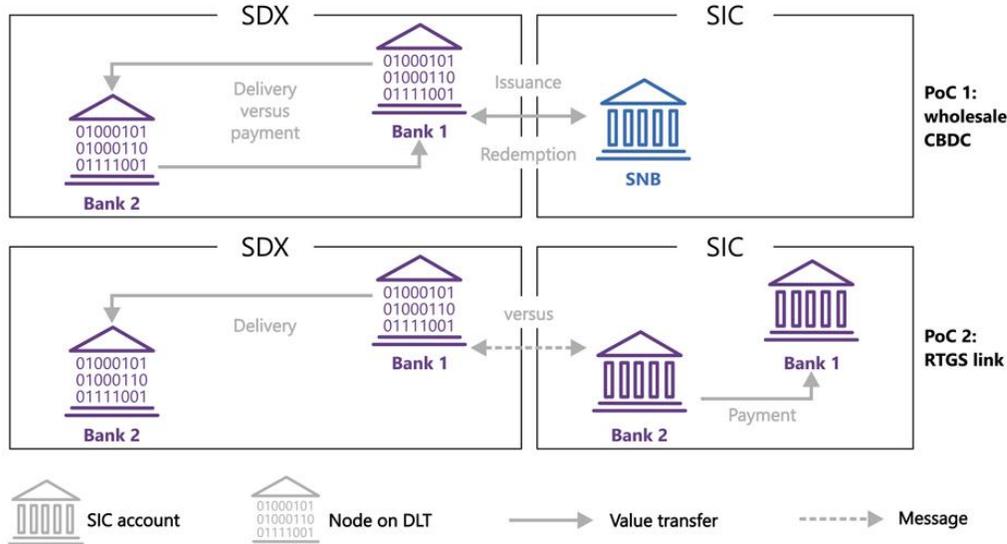
Results from Phase 1 of Project Helvetia were released in December 2020 and found that the use of wholesale CBDCs for digital asset settlement showed significant benefits such as speedier and cheaper transfer and settlement of digital assets as well as a significant

¹⁷ See: [Reserve Bank of Australia considers wholesale digital dollar](#).

reduction in counterparty risk.¹⁸ However, all exchanges and settlements were simulated. Phase 1 also found that while wholesale CBDC settlement was technically feasible, it brought up significant challenges in terms of governance of transactions.

Two PoCs for settling digital assets in central bank money

Graph III.A



Source: BIS, SIX Group AG and Swiss National Bank, *Project Helvetia – Settling tokenised assets in central bank money*, December 2020.

Phase Two of Project Helvetia looked specifically at using the DLT platform established in the first PoC for the purpose of wholesale cross-border exchanges working with the Swiss RTGS (SIC) and the SIX Digital Exchange (SDX).¹⁹ The findings showed that wholesale CBDCs can successfully be integrated into existing financial structures by testing transactions with commercial banks. Phase Two also dove deeper into the risk and governance requirements for market participants (i.e., commercial banks) and found policy solutions for monetary policy and cross-border transaction settlement.

¹⁸See: [Project Helvetia Phase 1: Settling tokenised assets in central bank money. Bank for International Settlements. December 2020.](#)

¹⁹See: [Project Helvetia Phase 2: Settling tokenised assets in wholesale CBDC. Bank for International Settlements. January 2022.](#)

Recent statements from SIX, the exchange working with SNB on Project Helvetia, showed optimism for the future shift of digital assets to wholesale CBDCs on DLT platforms and that corporate bond issuance would be the next use case explored in this project.²⁰ However, they do not indicate that wholesale CBDC would be an absolute requirement for the shift of digital assets to DLT but that it would greatly improve the safety and robustness of this shift.²¹

Note: While SNB is part of the [BIS Working Group on retail CBDCs](#) and has piloted their wholesale CBDC, they have not indicated with certainty that they would issue either.²²

Case Three: Saudi Arabia and United Arab Emirates (UAE)/ Saudi Central Bank (SAMA) and Central Bank of the U.A.E

Motivations:

Saudi Arabia and UAE's motivations for CBDC issuance:

- *Enhancing cross-border payments* - This co-issued wholesale CBDC is the first of its kind and will work to shorten wholesale cross-border transaction chains by having parity in both Saudi Arabia and the UAE. UAE and Saudi Arabia cross-border corridors are heavily used and the use of a CBDC accepted in both countries can enhance speed of settlement, transparency of payments and reduce cost and risk overall.²³
- *Driving financial innovation* - Through the use of DLT technology like [IBM's Hyperledger fabric](#), both central banks are working to understand how to leverage emerging technologies to drive innovation for wholesale transactions, particularly for the use of tokenization and settlement of digital assets. Alternative payment service providers such as fintechs also benefit from Project Aber (discussed below)

²⁰ See: [Swiss expect digital corporate bonds before year's end](#)

²¹ Ibid.

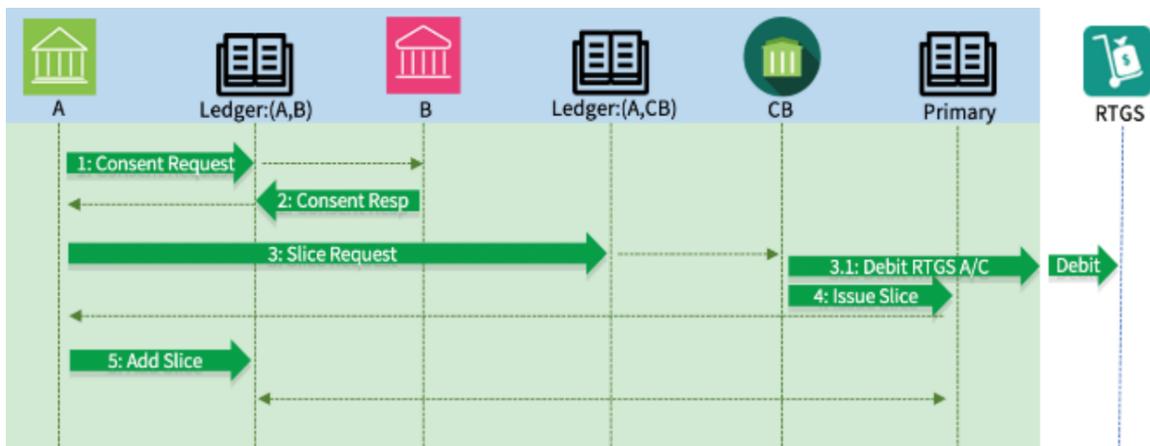
²² See: [Project Helvetia Phase 1: Settling tokenized assets in central bank money. Bank for International Settlements. December 2020.](#)

²³ See: [Digitizing Financial Markets: Project Aber From Saudi Arabia And The UAE Addresses Cross Border Payments With Digital Currencies](#)

as barriers to access central bank money (i.e., cost) are reduced through CBDC issuance.

- *Maintain central bank control and resilience of domestic payments systems* - The co-issued CBDC is a response from both central banks to alternative cross-border payment methods emerging, particularly digital currency-based alternatives with limited regulatory and transaction visibility. Additionally, Project Aber explored the improved safety and resilience of payment systems by eliminating the single point of failure issue through decentralization.

Project Aber



Aber Protocol: Issue Workflow

Project Aber consisted of three phases that included six commercial financial institutions (three from Saudi Arabia and three from UAE) and both central banks with IBM's Hyperledger fabric being used as the core DLT.²⁴ This project was not only the first co-issued CBDC but also one of the first CBDC trials that used real funds for exchange and settlement rather than simulated funds. The use of real funds was meant to place a greater emphasis on the safety aspects of co-issued CBDCs. The key objectives of Project Aber were focused on cross-border payments and determining whether this approach

²⁴See: [Saudi Central Bank and Central Bank of the U.A.E Joint Digital Currency and Distributed Ledger Project. Saudi Central Bank. 2020.](#)

would be able to address key pain points traditionally associated with wholesale cross-border transactions.

The three phases of Project Aber looked at several use cases, increasing in complexity:

- Cross border settlement between the central banks of Saudi Arabia and UAE.
- Domestic settlement of transactions between commercial financial institutions via CBDC.
- Cross-border settlement of transactions between commercial financial institutions via CBDC across both jurisdictions.

Overall, the project and all use cases were deemed a success by both central banks.²⁵ They found that co-issued CBDCs worked to address cross-border pain points and also contributed to the resiliency of domestic payment systems.

As traditional payment infrastructures are centralized, there is always a single point of failure risk, meaning that if there are technical/ organizational issues with payment system operators, the entire economy could be adversely impacted. However, with a wholesale CBDC based on DLT platforms implemented, the single point of failure is addressed and risk is “spread” through decentralization of operations. Project Aber’s findings report indicated that security would be improved overall by using CBDCs as a “backup” to existing payments infrastructure.²⁶

Another key finding (similar to Project Atom) was the use of atomic delivery versus payment settlement to mitigate settlement risk for the exchange of digital assets and cross-border transactions alike. This will become more pertinent as the adoption of blockchain-based payment methods (i.e., digital currencies) increases in popularity.

²⁵See: [Saudi Central Bank and Central Bank of the U.A.E Joint Digital Currency and Distributed Ledger Project. Saudi Central Bank. 2020.](#)

²⁶Ibid.

Concluding Thoughts

Overall, the wholesale CBDC pilots covered in this paper set out with the intention to foster innovation as well as cement the central bank's control over monetary policy with rapid adoption of alternative currencies (i.e., Stablecoins) and other payment innovations. While CBDCs can offer central banks a way to uphold their mandates and ensure financial stability, they also have the potential to change the way that we look at entire segments of payments such as cross-border. All three case studies above showed that technically, wholesale CBDCs are feasible and could enhance operational efficiency - however, determining policy and governance, particularly for large-value wholesale transactions, will be vital before considering CBDC issuance.

Appendix²⁷

Region	Project (s)	Stage
Australia, Reserve Bank of Australia	Project Atom - use of wholesale CBDC for settlement of short term securities	Pilot
Austria, Oesterreichische Nationalbank	Project Delphi - short term securities settlement, pegged to Euro	Assessment
Bhutan, Royal Monetary Authority	Digital Ngultrum - wholesale and retail CBDC using Ripple technology	Assessment
Canada, Bank of Canada	Contingency planning for a wholesale/retail CBDC	Assessment
France, Banque de France	Project Jura - Settlement of short term securities and cross-border CBDC settlement. France is also working with Eurozone, Singapore and Tunisia	Proof-of-Concept
Hong Kong, Hong Kong Monetary Authority	Project LionRock - focus on wholesale CBDC use for cross-border	Pilot
Singapore, Monetary Authority of Singapore	Project Ubin - blockchain-based wholesale CBDC payments	Pilot
South Africa, South African Reserve Bank	Project Khokha - DLT-based wholesale payments platform	Pilot
Switzerland, Swiss National Bank	Project Helvetia - wholesale CBDC for settlement of digital assets. Project Jura - use of wholesale CBDC for cross-border transactions between Switzerland and France	Proof-of-Concept
Thailand, Bank of Thailand	Project LionRock - focus on wholesale CBDC use for cross-border	Pilot
United Arab Emirates, Central Bank of the U.A.E	Project Aber - co-issued wholesale CBDC with Saudi Arabia for cross-border	Launched
United Kingdom, Bank of England	Platform model for wholesale CBDC	Assessment

²⁷ The appendix takes into consideration “in-progress” wholesale CBDC projects up until the date of January 15, 2022 sourced from the [BIS](#). List is non-exhaustive - retail, certain cross-currency/interbank CBDCs and inactive projects are not accounted for.