



Central Bank Digital Currencies

Challenges and Opportunities for Central
Banks in the Middle East

January 2024

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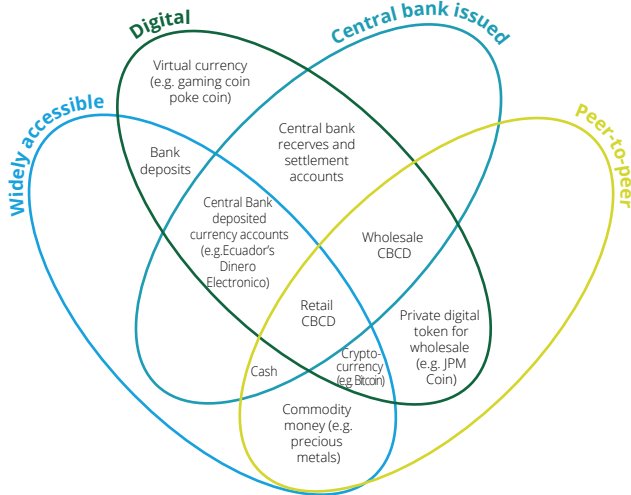
Introduction

Central Banks worldwide have significant interest in studying Central Bank Digital Currency as a potential solution to the challenges monetary systems faced historically. Almost 100 Central Banks are exploring CBDC feasibility and assessing its potential risks and benefits.

Definition and background of CBDCs

Central Bank Digital Currency (CBDC) is an electronic form of Central Bank money with the potential for wide use by businesses and individuals. CBDC is a digital representation of the country's fiat currency backed by the Central Bank and it can be used as legal tender with the same value as physical currency in circulation.

Money taxonomy

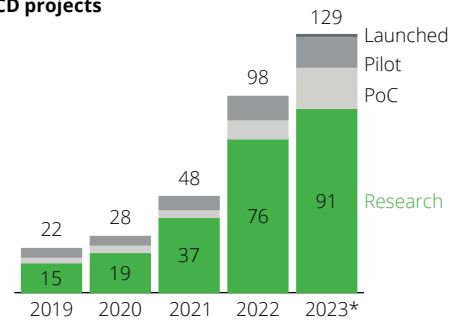


Source: BIS Central Bank Digital Currencies

The current monetary system, based on physical and electronic currency, accomplishes basic money functions as it is relatively safe and stable. Further, checks and balances allow for some degree of regulatory surveillance and consumer protection. In addition, most domestic payments have sufficient infrastructure for some degree of effectiveness in local transactions with a fairly acceptable user experience. Nonetheless, the current monetary system may be able to move forward to a better state. The current system faces significant challenges in international cross-currency arrangements, user accessibility, cost efficiency, financial inclusion, data privacy and prevention of illicit activities, among others. CBDCs use cases attempt to modernize the system by easing interactions between Central Banks, financial institutions, merchants and individuals.

Over the past years, CBDC gained traction among Central Banks. However, 70.5% of these active projects are still in the early research stages

Active CBDC projects



Source: BIS Trackers and Deloitte analysis
 (*) 2023: Year to Date as at April 2023

Distributed Ledger Technology (DLT) and Blockchain have made cryptocurrencies such as Bitcoin possible. The private sector is also developing virtual currencies based on the same technology aspiring to be the payment of choice for merchants and individuals. However, we must draw a clear distinction between CBDC, cryptocurrency and other Virtual Currencies. CBDC is a type of digital currency issued and backed by a Central Bank in a centralized network regulated by the governmental institution. The Central Bank is the only authorized entity to issue and remove CBDC in circulation, whereas a cryptocurrency (e.g. Bitcoin) relies on a decentralized network, so it is not issued by any Central Bank. Their value is determined by the supply and demand in the market. Finally, Virtual Currency (e.g. Meta's Diem currency formerly known as Libra) refers to a broader category of digital assets that can be a means of exchange.

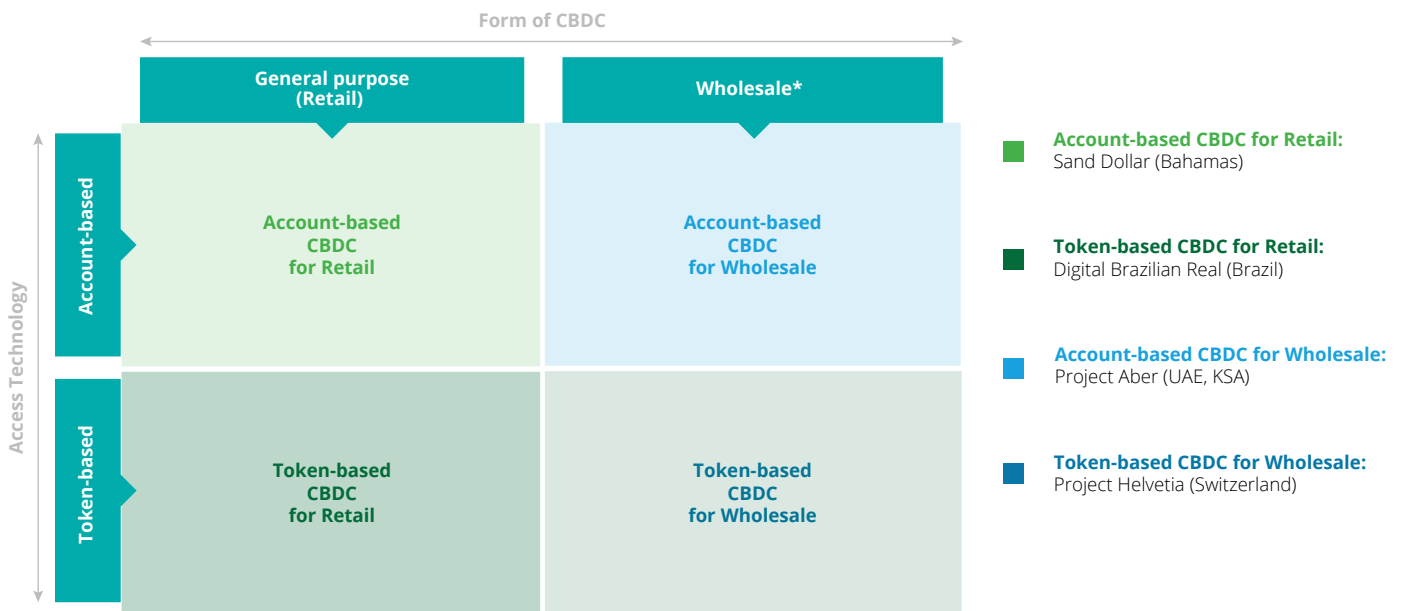
Although they are not issued by any Central Bank, they do not represent legal tender and they may, adopt a centralized ledger from the private sector.

Types of CBDCs

Overview of the different models and designs of CBDCs

Central banks have the flexibility to tailor the design of Central Bank Digital Currency (CBDC) according to their policies and economic strategies. They can adjust key features to align with their desired settings. However, it is important to note that certain critical features of CBDCs are difficult to reverse once implemented. To classify their taxonomy, consider two structural dimensions shaping the CBDC architecture: the form of CBDC (retail/wholesale) and the access technology (account-based/token-based).

Taxonomy matrix for CBDC models:

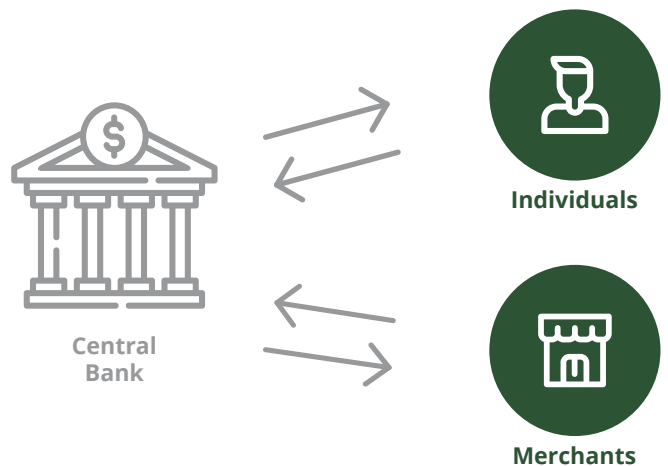


(*) Wholesale refers to interactions only between the Central Bank and commercial banks

Form of CBDC: Central Banks have the choice to interact and maintain a direct relationship with the general public (Retail CBDC) or with commercial banks (Wholesale) where final users will obtain the CBDC indirectly.

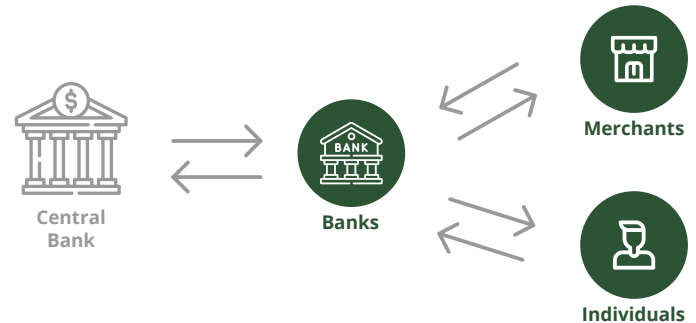
Retail CBDC (Direct Approach):

The purpose of Retail CBDC is to be universally accessible to the general public (individuals and merchants). The CBDC currency represents a direct claim on Central Bank reserves. While this approach may foster inclusivity of certain vulnerable population segments with limited access to financial services, on the downside, it may also cannibalize the commercial banks. Banks may become redundant if the public decides to disintermediate banking activities to operate directly with the Central Banks. The illustration to the right depicts the Retail CBDC (direct approach) and how the Central Bank interacts directly with the users, independent of commercial banks.



Wholesale CBDC (Indirect Approach):

Commercial banks act as a middleman between Central Banks and their customers. Under this approach, the commercial banks have a claim on the Central Bank reserves, acting as intermediaries on behalf of their clients. Commercial banks will have a relevant role in client identification (KYC) and servicing the payments in the system.



The illustration to the right depicts the Wholesale CBDC (indirect approach) and how commercial banks interact with the Central Bank on behalf of end users.

Access Technology consists of the degree of anonymity users will be granted under a CBDC. Two models (Token-based and Account-based) have arisen as alternatives to the data privacy issues that CBDCs face:

- 1. Token-based model:** Token-based CBDCs allow access to users through pre-requisite knowledge in the form of digital tokens. This model could grant a high level of anonymity thanks to blockchain technology (access with public or private keys e.g. passwords). So far, this model is the one most chosen by Central Banks. For example, the e-CNY (China), the Sand Dollar (Bahamas), Khokha (South Africa), DXCD (Eastern Caribbean) and Ubin (Singapore) base their storage on it.
- 2. Account-based model:** Central Banks may require users to identify themselves (prime ID) in order to execute any operation related to the CBDC. Data stored will be linked to a bank account which is tied to the identity of the account holder. This model allows better tracking of monetary flows by the Central Bank in the detriment of certain degree of users' privacy. In the Middle East, the Aber project collaboration between the UAE and Saudi Arabia to launch a common CBDC chose the account-based model.

Central Banks have the choice to interact and maintain a direct relationship with the general public or with commercial banks, where final users will obtain the CBDC indirectly.

Comparison of the structural characteristics and features

As opposed to traditional bank reserves and physical money, CBDCs digital format are highly programable with features and functions. Central Banks must be aware of the implications derived from the design set-ups.

Comparison of approaches and models related to the CBDC design

| Approach | Benefits | Challenges |
|---|--|---|
| Retail CBDCs (Direct Approach) | <ul style="list-style-type: none"> • Financial inclusion: Retail CBDCs can potentially increase financial inclusion by providing access to digital payments and financial services to individuals who are currently underserved or excluded from traditional financial systems. • Lower transaction costs: The direct approach provides a mode of cheaper and faster payments, particularly to cross-border operatives. • Reduction of settlement days: CBDCs may have the potential to generalize real-time payments that are barely present in cross-border transactions and are more costly for local transactions. The processing time could be almost immediate. • Enhanced security: Digital Ledger technologies and blockchain's use of advanced encryption and security protocols make cybercrime more difficult as compared to traditional payment methods. | <ul style="list-style-type: none"> • Privacy concerns on control over the use of data: In certain architectures, governments may be able to track all transactions controlling all aspects of their citizens' lives. • Incentivizing disintermediation of banks: individuals may prefer to operate directly with their Central Bank making runs on banks more likely, specially in distressed times. • Operational risks: Retail CBDCs could potentially face operational risks such as cyberattacks, system failures, and fraud. Sensitive financial information about users would create a valuable honeypot for cybercriminals. • Implementation challenges: The large volume of transactions with different user archetypes ranging in financial and technological sophistication creates significant investment requirements. • Cultural and religious considerations: CBDC should adapt to religious precepts and norms that may influence wide acceptance. |
| Wholesale CBDC (Indirect Approach) | <ul style="list-style-type: none"> • Increased operational efficiency: Wholesale CBDCs encourage quick wins in providing faster and more efficient settlements of high-value transactions between financial institutions. • Reduction of market risk: Real-time settlements result in decreased credit risk and increased liquidity. • Transparency: real-time visibility into the flow of funds between financial institutions promotes transactional clarity. | <ul style="list-style-type: none"> • Limited room for financial inclusion: A CBDC designed for use by financial institutions may limit productivity gains from financial inclusion. • AML and KYC processes: Commercial banks require a strong approach as the first line of defense against illicit activities to onboard and monitor an increasing number of transactions, which would require significant investments to cope with the user scale. |
| Token-Based Model | <ul style="list-style-type: none"> • High degree of anonymity: Despite Central Banks implementing minimum identification requirements, the token-based model allows for reinforced anonymity. • "Universal Accessibility: The model supports the facilitation of financial services to vulnerable collectives and under extreme circumstances. • High programable adaptability: Token-based CBDCs are capable to customize Central Banks' demands to provide innovative solutions. | <ul style="list-style-type: none"> • Privacy concerns: Token-based CBDC transactions are recorded in a Centralized Ledger potentially exposing sensitive information from end users. • Pervasive use: Governments may take advantage of CBDC customization forcing the population against their freedom such as CBDC with expiration dates, restricting payments of dissidents and negative bearing interest acting as taxes). |
| Account-Based Model | <ul style="list-style-type: none"> • Robust user identification: Transactions need to be verified based on user identities and systems are required to maintain a prime identifier per individual across payment systems. • AML and KYC: Central Bank maintains direct controls of AML and KYC processes. | <ul style="list-style-type: none"> • Universal financial inclusion: as end-users require a banking relationship, this model challenges the possibility of universal financial inclusion. |

Overview of the CBDC Landscape in the Middle East

The Central Banks in the Middle East have engaged in ambitious projects with the objective of issuing CBDCs. Particular focus has been given to cross-border settlement and data security. Below are some of the most notorious projects seen in recent years:

Saudi Arabia:

SAMA and CBUAE collaborated with six commercial banks in Project Aber to launch a wholesale CBDC common to both countries. The project pilot has been tested and it gave important insights on how to reduce the inefficiencies among cross-border settlements.

UAE:

CBUAE joined forces with the Central Banks of Hong Kong, China, and Thailand, in collaboration with 20 commercial banks, to create a new native blockchain, the mBridge ledger. This pioneer multi-CBDC was characterized by a modular functionality that allows compliance with jurisdiction-specific policies and legal requirements. The project demonstrated the potential of CBDC in fostering international trade by improving speed, cost, and security of international settlements through multiple CBDCs supported by DLT.

Advanced CBDC Country Developments

| Country | Status | Use case | Technology | Crossborder projects |
|--------------|-------------|-----------|------------|------------------------|
| Saudi Arabia | Pilot | Wholesale | DLT | Aber |
| UAE | Pilot | Wholesale | DLT | Aber, mCBDC Bridge |
| Iran | Pilot | Retail | Undecided | N/A |
| Bahrain | Development | Wholesale | Undecided | Collaboration with JPM |

Source: Central Bank Releases, BIS, Atlantic Council and Deloitte analysis

Iran:

A pilot has been launched in collaboration with two local banks. The CBDC is to be used with a retail public intended to foster financial inclusion in a country with a significant unbanked population.

Bahrain:

The Central Bank of Bahrain, in collaboration with JP Morgan and the local Bank ABC, aims to enable instantaneous settlements in US dollars. The CBB has successfully completed a digital currency settlement test using JP Morgan's JPM Coin system. It was facilitated by JP Morgan's new blockchain-focused business unit Onyx.

Other Central Banks:

Kuwait, Qatar, Oman, Jordan, Lebanon, Iraq, Yemen and Palestine are currently researching CBDC feasibility and are yet to define their particular cases.

Case studies

Analysis of real-world examples of CBDC initiatives

This section examines CBDC case studies to show how the theory comes to life. Central Banks often cooperate in cross-border projects to smooth their payments and provide an integrated solution.

Case Study 1:

Project Aber cross-border CBDC settlement network between KSA and UAE

In the Middle East, Project Aber is a reference initiative by the Saudi Central Bank (SAMA) and the Central Bank of the United Arab Emirates (CBUAE) to explore the feasibility of a dual-issued digital currency for domestic and cross-border settlements. The project pilot was launched and completed in 2019. Six commercial banks (three from each jurisdiction) participated in the project.

The project successfully demonstrated the technical viability of a distributed payment system using DLT and identified areas for future expansion. It also highlighted the benefits of DLT in terms of architectural resilience, performance, and privacy.

Main Design Features:

| CBDC or Project | Use case | Model | Carry interest | Liquidity saving mechanism | Cross-border payments |
|-----------------|-----------|---------------|----------------|----------------------------|-----------------------|
| Project Aber | Wholesale | Account-based | No | No | Yes |

Source: SAMA, CBUAE Aber Report

Problem Statement:

The Aber project aims to make more efficient cross-border payments between the Kingdom of Saudi Arabia and the United Arab Emirates. The existing correspondent banking-based payment systems in the GCC states have shown certain delays in transactions restraining certain liquidity among commercial banks.

Implementation:

To address these issues, Project Aber developed three use cases for a Wholesale CBDC specifically designed for settlement between the central banks and the commercial banks participating in the testing:

- 1. Payments between Central Banks** (creating a ledger infrastructure to support CBDC transactions)
- 2. Domestic payments between commercial banks**
- 3. Cross-border payments between commercial banks**

Main requirements applicable to the use cases

- **Decentralization:** Commercial banks were able to settle payments, regardless of Central Banks' connectivity. This feature provides stronger system resilience as compared to traditional centralized systems.
- **Currency peg:** The CBDC will act as a medium of exchange between AED and SAR, which are both pegged currencies. Therefore, project Aber CBDC was also proposed as pegged digital currency.
- **Exchange Rate:** A fixed rate was assumed over the cases, which may be a reasonable assumption given AED and SAR are pegged currencies.
- **Currency acceptance for domestic and cross-border usage:** The CBDC was designed to be transferable and redeemable between UAE and KSA.
- **Full visibility of the money supply:** Each Central Bank is able to quantify the total amount generated and issue. In addition only Central Banks are allowed to issue new CBDC under the system.

Outcome:

The Aber project provided a protocol capable to orchestrate end-to-end currency lifecycle operations through workflows for issuance, transfer, and redemption.

- 1. Issuance workflow:** A commercial bank initiates a request to the Central Bank for a specific amount of the CBDC. The currency is issued in slices, and the bank needs to decide on a bilateral channel for the issuance unless automated fund management is enabled. For example, if Bank A wants to issue a slice in its bilateral channel with Bank B, the process involves generating pseudonyms (one-time addresses) by both banks and Bank B providing consent for full ownership by Bank A's address.
- 2. Transfer workflow:** This involves the process of a commercial bank initiating a payment to a counterparty. The workflow focuses on payments between banks in a bilateral channel rather than movements across channels. At initial steps a series of checks and balances are conducted to verify sufficient balance and netting opportunities. Then, the settlement cycle gets triggered and exchange consents reflected in the digital ledger.
- 3. Redemption workflow:** A commercial bank requests the destruction of digital currency and its return to the core banking account outside the DLT system. The redemption workflow was challenging in instances where the core banking and the DLT network were not directly integrated and standardized manual processes were established.

Overall project Aber showcased a pilot experimentation demonstrating technical and functional feasibility for CBDC applied cross-border settlements in the Middle East. A comprehensive protocol presented detailed workflows over the CBDC lifecycle. However, some challenges still exist to navigate through strategic decisions impacting the banking system.

Furthermore, CBUAE along with International Central Banks have continued the research with the **Project mBridge** consisting of facilitating cross-border payments in multiple

CBDCs. The mBridge project involved the collaboration of the **UAE, Hong Kong, China, and Thailand** to co-create a **native blockchain, the m-bridge ledger. 20 participating commercial banks** conducted experimentation on three types of transactions consisting of:

1. Domestic issuance and redemption
2. Cross-border payments using domestic CBDC
3. Cross-border FX payment versus payment (PvP) transactions.

Over USD 12 million was issued on the platform, facilitating over 160 payments and foreign exchange payment versus payment transactions totaling more than USD 22 million.

Early results demonstrate a significant increase in transfer speeds, and high degree of interoperability between participating banks.

Case Study 2: The Sand Dollar Retail: First mover to foster financial inclusion in remote areas

In October 2020, the Central Bank of the Bahamas launched the Sand Dollar after an intense process of research initiated in 2019.

Problem statement:

Initial research seemed to suggest financial exclusion was not excessively problematic. The pilot research done over the Exuma (group of family islands) showed that 93% of the population had some form of deposit account and 90% had a debit card. However, some remote areas of the archipelago were excluded from financial services due to the high cost related to the transport of physical currency. The Sand Dollar was introduced with the clear objective of fostering financial inclusion and improving payment efficiency.



The Sand Dollar is named after the marine creature common in Bahamian coast

Main design features:

| CBDC or Project | Use case | Model | Carry interest | Quantitative restrictions | Offline functionality | Cross-border payments |
|-----------------|----------|---------------|----------------|---------------------------|-----------------------|-----------------------|
| Sand Dollar | Retail | Account-based | No | Yes | Yes/exploring | Future projects |

Source: Central Bank of Bahamas, IMF and Deloitte analysis

The Sand Dollar implementation was structured through an e-wallet system targeting individuals and merchants. Authorized Financial Institutions (AFIs) were selected to assist the management of the solutions.

| Implementation | Individuals Retail-level Peers | Merchants Private Commercial Entities |
|----------------------------------|--|---|
| Limits | <p>Tier I</p> <ul style="list-style-type: none"> • BSD 500 eWallet holding limit, with a BSD 1,500 monthly transaction limit. <p>Tier II</p> <ul style="list-style-type: none"> • BSD 8,000 eWallet holding limit, with a BSD 10,000 monthly transaction limit | <ul style="list-style-type: none"> • Merchant wallets have a holding limit of \$8,000 to \$1,000,000 with unlimited annual transactions. |
| Requirements | <p>Tier I</p> <ul style="list-style-type: none"> • Government-issued identification is not required • Cannot link to a bank account <p>Tier II</p> <ul style="list-style-type: none"> • Government-issued identification is required • Can be linked to a bank account | <ul style="list-style-type: none"> • Merchant wallets must be tied to a bank account • Valid business license • VAT Certificate |
| Value-add functionalities | <ul style="list-style-type: none"> • Safety is offered as the Sand Dollar is not stored in a device or physically • Income and spending records help support loan applications • Zero transaction cost for individuals • Flexible access from mobile phone (iOS or Android) or by physical payment card | <ul style="list-style-type: none"> • Safety is ensured through reduced exposure to cash and possible robberies • Audit trails increase transactional transparency • Seamless access through a mobile phone, tablet or integrated smart point of sale (POS) terminals • Local payments are faster and cheaper, as compared to debit or credit cards. Further, transfers to local suppliers are instantaneous |

Outcome:

After a 2 year launch, the adoption of the Sand Dollar CBDC is still modest. According to the Central Bank Statements as of February 2023, the **Sand Dollar adoption rate was 0.19%** of Bahamian Dollars in circulation while Notes and Coins made up 94.04% and 5.75% respectively.

The Bahamian Sand Dollar aimed to address the problem of

financial exclusion in remote parts of the Bahamas, but data gathered before and after the pilot did not strongly support financial inclusion as a reason for introducing a CBDC. Despite the low rate of adoption, there is still potential for the Sand Dollar to help foster financial inclusion and payment system resilience, but the Central Bank of the Bahamas needs to accelerate its education campaigns and continue strengthening internal capacity and oversight of the CBDC project to safeguard financial integrity.

Case Study 3: The Helvetia Project Wholesale Token-based CBDC

The Swiss National Bank, The Bank for International Settlements (BIS), SIX Group AG (SIX), and some commercial banks joined forces in a multi-phase project called Project Helvetia. The project consisted of Phase I, which aimed at investigating the feasibility of Wholesale CBDC in SIX's DLT infrastructure Real-Time Gross Settlement (RTGS), and Phase II, which added end-to-end interoperability experimentation between the Central Bank, Exchange platform and commercial banks.

Main design features:

| CBDC or Project | Use case | Model | Technology |
|------------------|-----------|-------------|------------|
| Project Helvetia | Wholesale | Token-based | DLT |

Helvetia phase I:

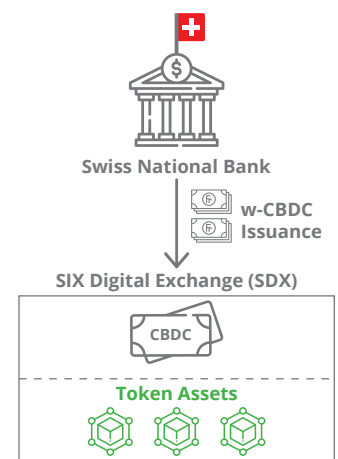
The Swiss National Bank and SIX Group AG engaged in two Proof of Concepts to test the technological environment and the tokenized asset operational flow through through SIX Digital Infrastructure (SDX).

Proof of Concept 1: Issuing a novel wholesale Central Bank digital currency Wholesale CBDC (w-CBDC)

In this Proof of Concept, the cash leg of the transaction flows through SDX through a wholesale tokenized asset. The next steps are as follows:

- 1. Tokenization or Issuance of w-CBDC:** One-to-one conversion of RTGS balances into w-CBDC.
- 2. De-tokenization or redemption of w-CBDC:** One-to-one conversion of w-CBDC into RTGS balances.
- 3. Delivery versus Payment settlement in w-CBDC:** Delivery of tokenized assets against w-CBDC (both on DLT platform).
- 4. W-CBDC payment:** A transfer of w-CBDC on DLT platform (free of delivery).

Illustration: Helvetia phase I - Proof of concept 1



Proof of Concept 2: Building a link between the new securities settlement platform of SDX and the Central Bank's existing payment system

Proof of Concept 2 aimed at the interoperability between SDX and the Central Bank's systems. The use case consists of delivery versus payment settlement of tokenized assets against SIC Balances.

The Phase I experiments showed successful token issuance, redemptions, settlements and DLT connections between the Swiss National Bank and the platform. Both PoCs used the testing environments of live or near-live systems, and transfers were shown to be legally robust.

Helvetia Phase II:

Helvetia Phase II aimed to further explore the **settlement of tokenized assets using wholesale Central Bank Digital Currency (w-CBDC)**. The experiment expanded on Phase I by involving five commercial banks, the SDX platform, and the Swiss RTGS.

The objectives of Phase II demonstrated the **end-to-end settlement of tokenized transactions in w-CBDC**, identifying controls and monitoring functions for operational and regulatory requirements for future potential policy considerations.

The experiment successfully showcased the **integration of w-CBDC into the core banking systems of the Central bank and commercial banks**. It demonstrated the seamless settlement process from entering **settlement instructions on the SDX** platform to booking and reconciliation in the respective core banking systems. The focus was on ensuring the effectiveness of control and monitoring mechanisms for w-CBDC transactions conducted on a third-party operated platform.

Phase II highlighted the **potential of w-CBDC in settling tokenized financial transactions** with insights on operational, legal, and policy aspects related to its implementation. The experiment emphasized the importance of **interoperability between distributed ledger technology (DLT)-based systems and traditional financial systems**. While the experiment **did not indicate any intention from the Swiss Central Bank to issue w-CBDC**, it has contributed valuable knowledge for further exploration and discussion in the realm of CBDCs.

Conclusion

Recent CBDC projects show potential to improve the current banking system by promoting the inclusion of vulnerable collectives, increasing payment speed, reducing cost, standardization and providing transparency to the banking services.

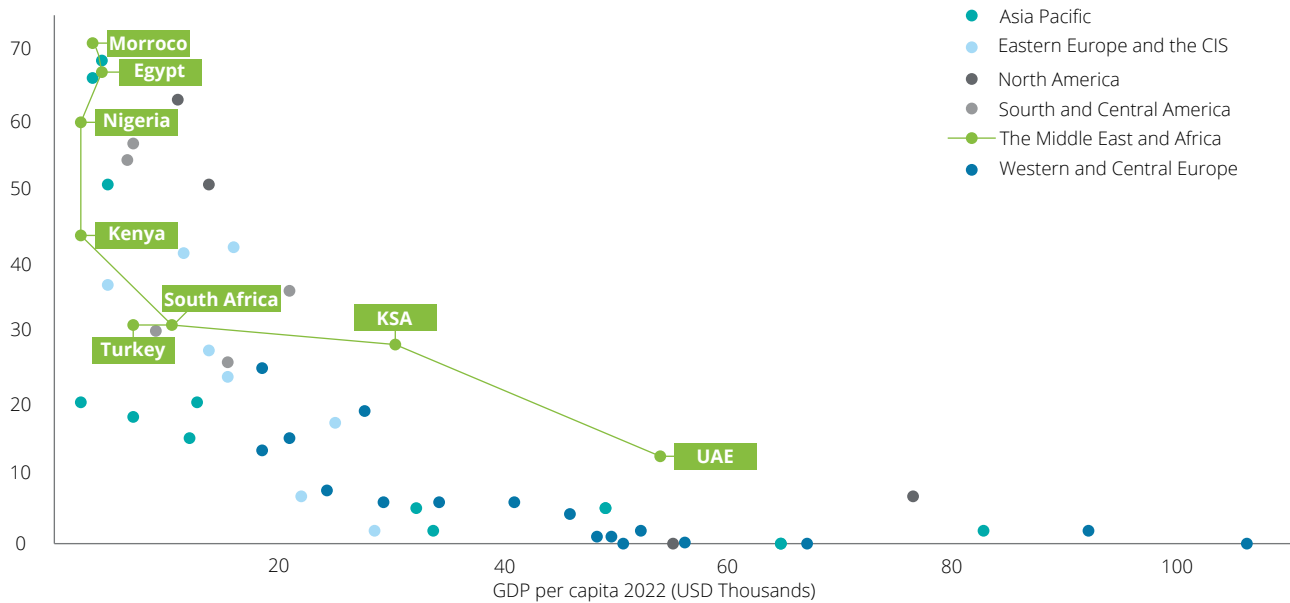
Banking the unbankables and leveling the playing field

Access to banking services is taken for granted in most developed countries. Having a current account, making seamless cross-border transactions through credit or debit cards, and accumulating excess cash in savings for a rainy day are common financial activities for higher and middle-income households.

However, vulnerable collectives struggle to open bank accounts due to several reasons such as geographical barriers, lack of documentation, and personal financial instability, among others. The Middle East and Africa may have the potential for exponential CBDC adoption, driven by significant unbanked populations gaining rapid access to new CBDC in the region and paving the way for worldwide adoption. The most developed countries would enable technological capabilities by investing in cross-border CBDCs while providing opportunities to bridge the gaps of financial inclusion. The availability of modern banking systems through CBDCs may allow unbanked populations to leapfrog traditional banking infrastructure and directly access advanced financial services.

The untapped potential for financial inclusivity is especially large in the Middle East North Africa

% Unbanks over total population



Source: World Bank and Merchant Machine (2021)

Accelerated adoption propelled by underserved communities would not only foster inclusivity but also allow Middle East CBDCs to have a competitive advantage by reaching critical mass earlier than possible alternatives. After all, CBDCs have network effect dynamics, making a CBDC more attractive when they have a larger user base.

Nonetheless, Central Banks have to make several critical decisions among a wide range of models. The sound development of CBDCs requires a methodology that is capable of aligning each building block with policy objectives to ultimately safeguard the network security and preserve financial market stability.

How can we help?

In the Middle East, Deloitte has become a trusted advisor for regulators due to its multidisciplinary capabilities in regulatory strategy, technological expertise, local regional knowledge and global expert network in Digital Assets. We are prepared to support Central Banks and regulators in their CBDC journey:

- 1. Define CBDC policy objectives:** Identify the specific policy objectives that the CBDC aims to achieve, such as enhancing financial inclusion, improving payment efficiency, combating illicit activities, or promoting monetary sovereignty.
- 2. Assessing the current state and expected end game:** Taking into account the regional context, adoption potential and cost-benefit analysis between the different trade-offs.
- 3. Technological infrastructure:** Evaluate the technological infrastructure required to support a CBDC, including the choice of underlying technology (e.g., blockchain or centralized database), scalability, security, privacy, and interoperability with existing payment systems.
- 4. Legal and regulatory framework:** Assess the legal and regulatory implications of introducing a CBDC, including issues related to monetary policy, financial stability, consumer protection, data privacy, and compliance with existing laws and regulations.
- 5. Economic and financial impact:** Analyze the potential economic and financial consequences of implementing a CBDC, such as changes in monetary policy transmission, financial intermediation, payment system efficiency, cross-border transactions, and the impact on commercial banks and other financial institutions.
- 6. CBDC Target Operating Model:** Evaluate the operational aspects of a CBDC, including issuance, distribution, redemption, identity verification, transaction monitoring, customer support, and the overall infrastructure required to support day-to-day operations.
- 7. Operationalization:** Governance, design and implementation of functional and technical capabilities including business requirements, necessary system enhancements, and UAT testing to help financial institutions with the CBDC transformation.
- 8. Public acceptance and adoption:** Assess the potential acceptance and adoption of a CBDC by the general public, businesses, and other stakeholders, considering factors such as user experience, convenience, trust, and education and awareness campaigns.
- 9. Tokenization:** Helping to simplify the entire digital asset cycle, reinforcing price discovery and liquidity among market participants.

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