The state of CBDCs and their implications for the global payments industry

By Payments and Commerce Market Intelligence

October 2023

PCMI Payments & Commerce Market Intelligence

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PCMI Payments & Commerce Market Intelligence

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PCMI is a market intelligence consultancy focused on the global payments industry. PCMI's founders have over four decades of market intelligence experience and have produced over 400 engagements in the payments industry. PCMI performs custom market intelligence studies adapted to our clients' strategy needs, including market sizing, opportunity benchmarking, market entry, customer insights, and more.

PCMI was born in 2022 out of AMI, the leading market intelligence firm for Latin America, with over 30 years' experience providing market intelligence to leading corporations in the region. With payments and commerce transcending borders, AMI launched PCMI to support its clients worldwide and now covers over 50 global markets. In Latin America and beyond, our mission remains the same: to be more committed to our clients' success than any consultancy on earth.

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Objectives and methodology

This report delves into the current landscape of central bank digital currencies (CBDCs) and their implications for the global payments industry. It builds upon existing literature on CBDCs and surfaces concepts essential for anticipating future CBDC consequences.

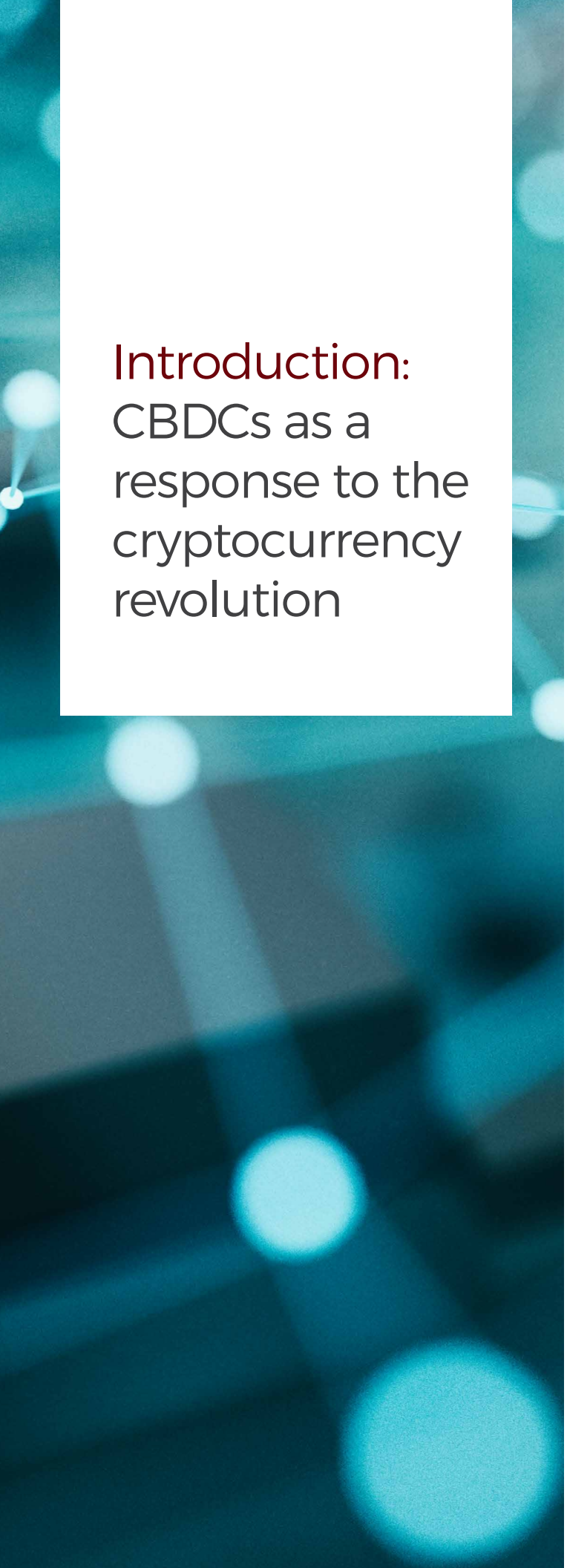
The implementations of these currencies are poised to have direct repercussions on various payments ecosystem members — including commercial banks, payment networks, and other non-bank payment providers — as they navigate the development, operation, and governance of CBDC networks.

This paper aims to accomplish three objectives:

- To showcase the fundamental components of CBDCs
- To offer an up-to-date overview of the global status of CBDC initiatives across different regions
- To anticipate possible CBDC effects and outcomes, as well as provide recommendations and guidance

Our recommendations are designed to assist payment industry participants in navigating the forthcoming CBDC landscape with greater success.

To develop these insights, PCMI conducted comprehensive desk research on the global CBDC landscape, drawing from publicly available sources such as the Bank for International Settlements and World Bank; academic literature from universities and academic journals; industry reports; and general media coverage. PCMI also drew upon its extensive internal knowledge of global payment systems, blockchain, and digital currencies, combining this with intelligence from in-depth interviews conducted with global payments industry practitioners.



Introduction: CBDCs as a response to the cryptocurrency revolution

In the past decade, the financial services industry has witnessed significant technological advancements which have been instrumental in accelerating the widespread adoption of mobile services among consumers. The prominence of this phenomenon increased during the COVID-19 pandemic, particularly with regard to mobile payment systems.[1]

Several financial trends emerged because of this phenomenon. As the demand for digital forms of payment for retail purposes increased and the use of cash decreased, central banks worldwide have begun to investigate the creation of central bank digital currencies (CBDCs). We also see the rise of CBDCs due to a broader phenomenon: the cryptocurrency revolution. Today, with these two factors combined, more than 90% of global central banks are investigating the issuance of CBDCs, with 6 out of 10 conducting tests or proofs of concept.

Undoubtedly, the crypto revolution was one of several profound consequences of the digital financial revolution. Among the crypto-related repercussions was the general population's increased awareness of different types of cryptocurrencies, digital tokens, and blockchains. During Bitcoin's limited 14-year existence, both the private and public sectors were disrupted, with the financial and technological sector implementing numerous crypto-related innovations. We have witnessed banks, tech companies and fintechs experimenting with blockchain and multiple fintechs around the world — as well as card networks — developing concrete partnerships with crypto players.

One of the most iconic and ambitious cases occurred in 2018 when Meta (formerly known as Facebook) announced its intent to create its own

1 See "COVID-19 Drives Global Surge in use of Digital Payments." World Bank, 2022. **Access here.**

digital currency initiative centered on blockchain technology. The Diem (formerly known as Libra) project was a permissioned blockchain-based stablecoin payment system proposed by Meta Platforms, whose plan also included a private currency implemented as a cryptocurrency.[2]

After this announcement — and the concrete threat to the monopoly that central banks have over the issuance of currency to the general public — the world witnessed the first reaction of governments as they spoke about Bitcoin and took divergent stances. The United States and various countries of the European Union, as well as big-tech CEOs such as Apple's Tim Cook, all initially rejected Facebook's controversial blockchain initiative, Libra.[3]

But in other regions, the response was different. The People's Bank of China (PBoC) began researching digital currencies as early as 2014, but it wasn't until 2020 that pilot programs began in key Chinese cities. Many analysts agree that the Digital Yuan was in fact born as China's answer to Facebook's Libra.[4]

In contrast, other governments decided to implement decentralized cryptocurrencies, as opposed to pursuing the creation of their own digital assets. For instance, in June 2021, El Salvador's president surprised the world with the announcement that the country would adopt Bitcoin as legal tender, becoming the first nation to do so.[5]

Other trends have also spurred central banks' interest in CBDCs, such as the global plummeting of cash usage, the growing interest in privately issued digital assets, and the growth of cross-border payments. For the first time in history, we can see how fiat currency as we know it is being challenged by an alternative financial and payment system.

In this report we'll study the role of CBDCs and their implications for the global payments ecosystem. CBDCs emerge as a key opportunity for governance and the public sector to position themselves as leaders in the new "money-movement" era.

In this scenario, the questions that remain are what role the private sector and payment industry players will play...and what opportunities and obstacles traditional payment actors (e.g., networks, payment processors, digital wallets, crypto players, etc.) will face when conducting business in a CBDC context.

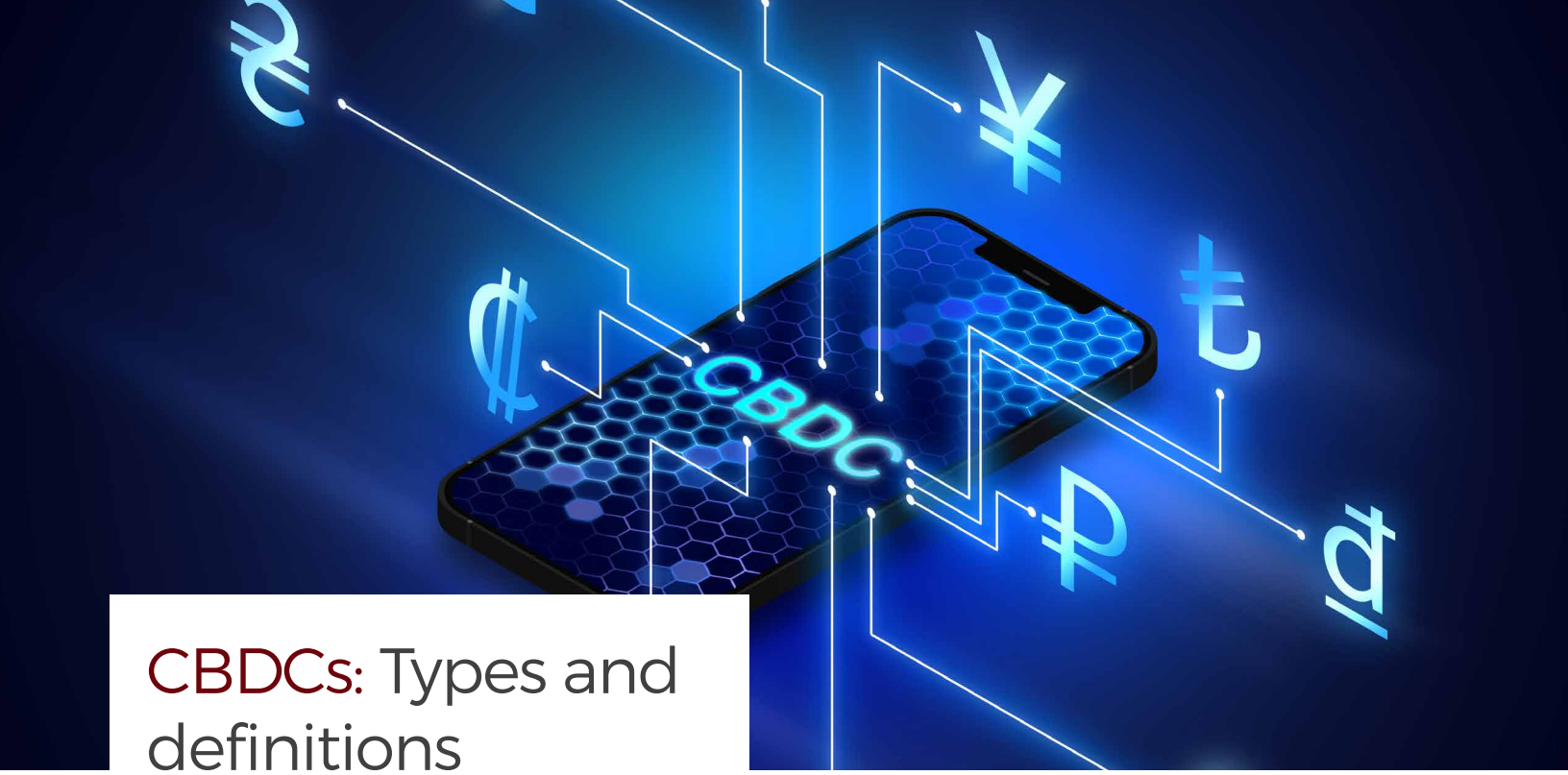
In the following pages, we will attempt to answer these questions while also providing an analysis of the implications and opportunities that the implementation of CBDCs may present to traditional players in the financial sector.

2 See "Facebook launched a new cryptocurrency called Libra." CNBC, June 2018. **Access here.**

3 See "Why governments around the world are afraid of Libra, Facebook's cryptocurrency." *Washington Post*, July 2019. **Access here.**

4 See "China's Digital Yuan is a warning to the world." *WiredUK*, Aug 2021. **Access here.**

5 See "El Salvador: Launching Bitcoin as legal tender." HBS, March 2022. **Access here.**



CBDCs: Types and definitions

What is a central bank digital currency?

As previously stated, several recent digital disruptions, such as the emergence of cryptocurrencies and blockchain technology, have caused ripples in the financial services industry. Digital currencies are a part of this narrative, and central banks are beginning to take notice.

In a broader sense, central bank digital currencies (CBDCs) are digital currencies issued by central banks. Their value is tied to the official currency of the issuing country and legally backed by its regulators. This distinguishes them from other types of cryptocurrencies, such as floating cryptocurrencies or stablecoins (see Figure 1 on p. 9), which are decentralized or maintained by the private sector.

CBDCs, unlike traditional fiat-backed stablecoins, are the digital representation of a government-issued currency that is not tied to a physical commodity. They are issued by central banks, whose function is to support financial services for a nation's government and commercial banking system, to establish monetary policy, and to issue currency.

Back in 2020, the Bank for International Settlements (BIS) published a joint report with the Bank of Canada, the European Central Bank, the Bank of Japan, the Sveriges Riksbank, the Swiss National Bank, the Bank of England, and the Board of Governors of the US Federal Reserve. This report set out the common foundational principles and core features of a CBDC.[6]

A key distinction appears in how regulators are evaluating the role of the CBDCs. Specifically, central banks are researching the pros and cons of offering a digital currency to the public (a "general purpose" CBDC) or a CBDC for wholesale money movements or transactions.

CBDC issuance and design are sovereign decisions that each jurisdiction must make independently. The arguments for and against issuing a CBDC — as well as the design options under consideration — are influenced by domestic conditions. There will be no "one size fits all" type of CBDC. Nevertheless, domestic CBDCs will have international consequences. Cooperation and coordination are crucial for preventing negative international consequences and ensuring that impacts on cross-border payments do not go unnoticed.

6 Refer to BIS, 2020. **Access here.**

Figure 1: The three types of digital currencies

FLOATING CRYPTOCURRENCY

It is typically issued and maintained by a decentralized system. Its value is often volatile and subject to uncertain regulations.

Examples:
Bitcoin, Ethereum, Litecoin, etc.

STABLECOINS

Any cryptocurrency designed to have a relatively stable price. Stablecoins are typically backed by cash or another approved financial instrument.

Examples:
USD Coin, Tether (USDT), DAI, etc.

CBDCs

A digital currency issued and overseen by a country's central bank.

Examples:
Chinese Digital Yuan, The Bahamas Sand Dollar, etc.

Central banks primarily have a mandate for monetary and financial stability in their respective jurisdictions and, explicitly or implicitly, to promote widespread access to secure and efficient payment systems. The provision of the safest form of money to banks, businesses, and the general public — central bank money — is a key means by which central banks achieve their public policy goals. This money acts as a means of payment, as a unit of account, and as a store of value for a jurisdiction. Today, central banks provide money to the public through cash and to banks and other financial companies through reserve and settlement accounts.

So, in the words of the BIS and as it is understood by central banks: "A CBDC is a digital form of central bank money that is different from balances in traditional reserve or settlement accounts." This new form of money is gaining popularity, and central banks are experimenting with the underlying technology. Concurrently, private experiments with new forms of digital currency continue, and the conceptual diversity afforded by new technologies has resulted in CBDCs being well-defined but not always comprehended.

Main characteristics and types of CBDCs

As previously stated, with the rapid rise in circulation of cryptocurrencies and stablecoins over the past several years, central banks have stepped up efforts to explore their own stable digital currencies. Beyond addressing the challenge of greater financial inclusion, some governments view CBDCs as programmable money — vehicles for monetary and social policies whose use could be restricted to basic necessities, for use at specific locations, or for defined periods of time.

The first essential learning is that there is no single form of CBDC; instead, a diverse range of approaches are being researched, implemented, or experimented with in various markets. Below are the main characteristics that define the different types of CBDCs.

1 Who connects/has access to the CBDC

This is the first and probably the most relevant characteristic of CBDCs. Who will connect and have access to them? The figure below breaks down the two options.

Figure 2: Retail vs. wholesale CBDCs

RETAIL

These are government-backed digital currencies used by consumers and businesses. Retail CBDCs eliminate intermediary risk — the risk that private digital currency issuers might become bankrupt and lose customers' assets. There are two types of retail CBDCs. They differ in how individual users access and use their currency (see footnote 7 on p. 11).

Simply put:
Can be viewed as a digital form of physical cash, like digital and programmable banknotes that a central bank can control.

WHOLESALE

These are similar to holding reserves in a central bank. The central bank grants an institution an account to deposit funds or use to settle interbank transfers. Central banks can then use monetary policy tools, such as reserve requirements or interest on reserve balances, to influence lending and set interest rates.

Simply put:
Can be viewed as electronic bank reserves held at the central bank, used to settle interbank payments and transactions.

A retail CBDC allows access for all citizens and businesses to a universally accepted means of payment, whereas a wholesale CBDC would be restricted to interbank payments and financial settlement processes. If the CBDC is intended for use by households and firms for everyday transactions, it is referred to as a "general purpose" or "retail" CBDC.[7]

A retail CBDC differs from existing forms of cashless payment instruments (i.e., credit transfers, direct debits, card payments and e-money), as it represents a direct claim on a central bank rather than the liability of a private financial institution.

A wholesale CBDC targets a different group of end users. Wholesale CBDCs are meant for use between banks, central banks, and other financial institutions. Wholesale CBDCs would serve a role similar to that of today's reserves or settlement balances held at central banks. However, wholesale CBDCs could allow financial institutions to access new functionalities enabled by tokenization, such as composability and programmability.

According to the results of the 2022 BIS survey on CBDCs,[8] central banks' implementation of wholesale CBDCs would mainly be driven by the desire to enhance cross-border payments. One example of a cross-border wholesale CBDC project is Project Dunbar, the results of which were published in 2022. This joint project — which involved the Reserve Bank of Australia, the Central Bank of Malaysia, the Monetary Authority of Singapore, the South African Reserve Bank and the BIS Innovation Hub — explored how a common platform for multi-CBDCs could enable cheaper, faster, and safer cross-border payments.

Below, Figure 3 summarizes the main differences between retail and wholesale CBDCs.

7 Individuals can access their accounts in two ways: i) Token-based retail CBDCs are accessible with private keys or public keys or both. This method of validation allows users to execute transactions anonymously. ii) Account-based retail CBDCs require digital identification to access an account.

8 See BIS, 2023. **Access here.**

Figure 3: Retail vs. wholesale CBDCs: Main characteristics

	Retail CBDCs	Wholesale CBDCs
Target audience	Individuals and businesses	Financial institutions and banks
Transaction scale	Many small-value transactions	Fewer high-value transactions
Accessibility	Broad accessibility for almost all individuals	Usually limited to authorized institutions
Privacy & anonymity	Balances user privacy and transaction transparency	Prioritizes regulatory oversight
Technology infrastructure	User-friendly interfaces that are accessible	Robust infrastructure and connectivity

2 Who the user connects to — and how they connect

If a central bank decides to issue a retail CBDC, it can propose a direct connection with businesses or individuals. By doing this, the central bank will be creating a new paradigm which may cause fundamental shifts within the country's financial system — and in the system's players.

This model (see Figure 4 below) is based on whether or not the retail user has direct or intermediated access to CBDC.

Figure 4: Direct vs. indirect CBDCs

DIRECT

The users have a direct connection with the central authority.

Example:
DCash, which is being implemented in the Eastern Caribbean. With DCash, consumers hold deposit accounts directly with the central bank.

INDIRECT

The CBDC relies on private sector banks to distribute and maintain digital currency accounts for their customers.

Example:
China showcased e-CNY during the 2022 Olympic Games in Beijing. User access is through Chinese financial institutions.

As we indicate in Figure 4, CBDCs can either be "direct" or "indirect." The indirect CBDC model is also considered the "two-tier CBDC" due to its similarities with the existing two-tier financial system. From the perspective of consumers, the indirect CBDC does not offer a direct claim on the central bank. Instead, it involves an intermediary, which takes on the responsibility of backing the indirect CBDCs. Intermediaries can provide cash-like liability to retail consumers through their existing pool of CBDCs in a central bank. The indirect CBDC architecture imposes many crucial responsibilities on the intermediaries.

Direct CBDC implementation would involve the central bank taking care of account management. The direct CBDC model empowers players — be they in the private sector, central banks or in other private institutions — to handle "know your customer" (KYC) processes and customer due diligence. However, only the central bank would have authority over the management of the payment services.

The direct CBDC model eliminates the need for depending on intermediaries. However, the exclusion of intermediaries subsequently leads to discrepancies in the reliability, efficiency, and speed of payment systems. The exclusion of intermediaries also increases the burden of risks that the central bank will take on. If central banks must take over process such as KYC, then they would need to undergo a massive operational makeover.

Hybrid CBDCs blend the elements of direct and indirect CBDCs. They involve a combination of direct claims on the central bank and a private-sector messaging layer. Hybrid CBDC architecture offers both pros and cons when compared to indirect and direct CBDC architectures. For example, hybrid CBDCs can achieve improved resilience in comparison to indirect CBDCs and better ease of operation in comparison to direct CBDCs.

Figure 5 summarizes the main differences between direct and indirect CBDCs.

Figure 5: Main characteristics of indirect, direct, and hybrid CBDCs

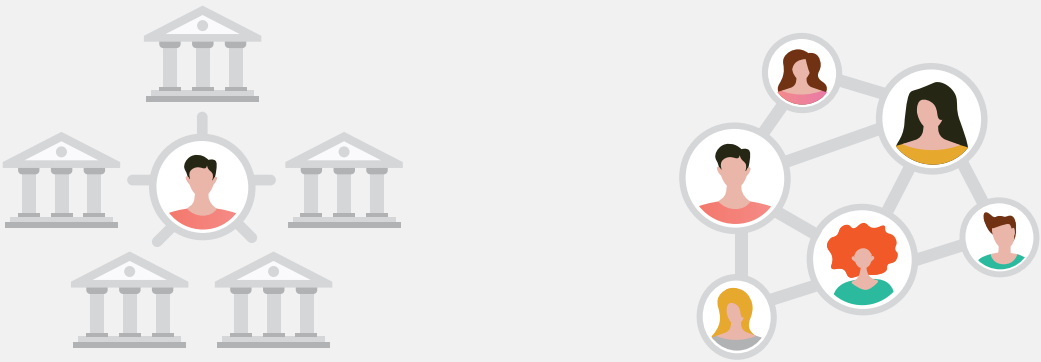
	Indirect	Direct	Hybrid
Liability	CBDC issuers or intermediaries take on the liability	Central bank takes on liability	Central bank takes on liability
Issuing the CBDC	Intermediaries issue the CBDC to the public	Central bank is responsible for issuing the CBDC	Central bank issues the CBDC while intermediaries take care of CBDC distribution to the public
Operational roles	CBDC issuers take care of KYC procedures and management of retail payments	Central bank is responsible for the onboarding and management of retail payments	Intermediaries take care of KYC and retail payments
Recordkeeping	CBDC issuers maintain records of retail balance	Central bank maintains records of retail balance	Central bank and intermediaries maintain records of retail balance

3 The characteristics of blockchain technology

Of course, another important factor to contemplate when considering whether to issue a CBDC is technology. As previously said, the decentralization of digital assets has been a fundamental component of the crypto and blockchain revolution. In this sense, central banks can choose the type of technology that will power their CBDC.

The options are a fully distributed ledger or centralized ledger; each option has advantages and disadvantages, with neither model (in its current incarnation) dominating the other. However, this approach is determined by whether the CBDC will be issued in a permissioned blockchain model or an anonymous and fully decentralized blockchain model (see Figure 6 below).

Figure 6: Permissioned vs. decentralized CBDCs



PERMISSIONED

Financial institutions each operate a permissioned node of a blockchain network as a conduit for the distribution of the CBDC.

Example:
This model is the one under consideration by the European Central Bank, where licensed financial institutions collaborate on the Digital Euro.

DECENTRALIZED

In this model, fiat currency (currency that is government-issued but not backed by a commodity) would be issued as anonymous fungible tokens to protect users' privacy.

Example:
This is a proposed model — but it has not yet been fully trialed by central banks.

Bitcoin is the most successful cryptocurrency and is considered as such by central banks in early blockchain-based CBDC research, such as the Dutch DNBcoin/Dukaton and RSCoin.[9] However, with the maturity of permissioned consortium blockchains, central banks have been attempting the application of consortium blockchain in CBDCs.

Permissioned projects are essentially used in wholesale cross-border CBDCs. A number of recent projects include the following: Project Jasper/CAD-coin (2015), by the Bank of Canada; Project Ubin (2016), in which the Monetary Authority of Singapore launched a blockchain-based CBDC; Project Stella (2017), by the European Central Bank (ECB) and Bank of Japan; Project LionRock (2017), by the Hong Kong Monetary Authority; Project Khokha (2018), by the South African Reserve Bank; the E-Krona (2018), by the Swedish central bank; Project Inthanon (2018), by the Bank of Thailand; and in 2021-22, the Reserve Bank of Australia also participated in Project Dunbar.

The most widely used consortium blockchain in CBDCs are Ethereum, Corda, Hyperledger Fabric and Quorum. The main application scenarios of these projects include intra-bank payments, inter-bank payments, cross-border payments, and settlements.

As mentioned, the fully anonymous and decentralized model has not yet been fully trialed by central banks.

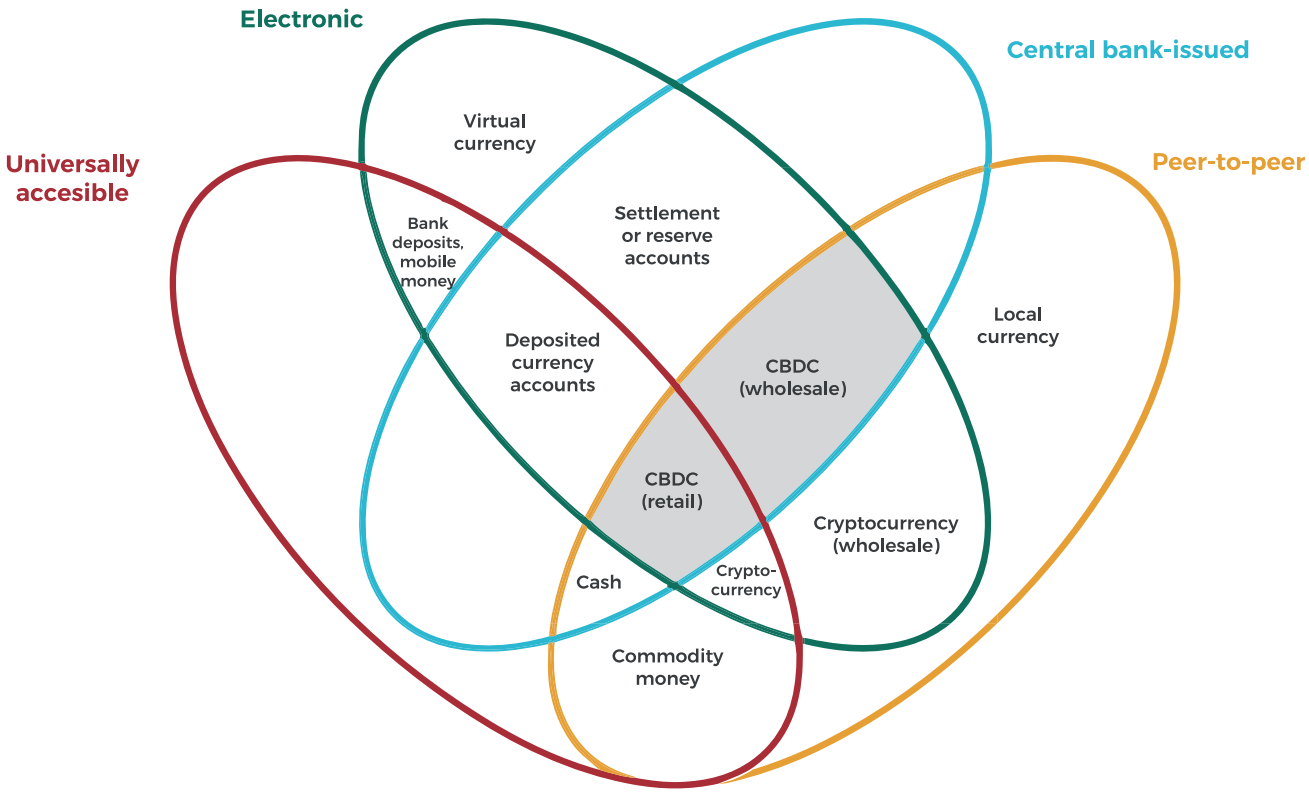
9 In 2015, the Dutch central bank introduced DNBcoin/Dukaton, a Bitcoin blockchain-based CBDC prototype, but found limitations in blockchain technology's capacity and efficiency. Unfortunately, detailed technology information on Dukaton remains unavailable. In 2016, the Bank of England and University College London proposed RSCoin, a blockchain-based CBDC prototype, featuring a dual ledger system managed by the central bank and payment interface providers to enhance transaction efficiency and dispute resolution (see Zhang & Huang, 2022. **Access here**).

4 Other combinations: CBDCs as programmable money

While we have outlined three distinct categories of CBDCs, the technology and potential combinations extend beyond these classifications. As the Bank of International Settlements pointed out in 2017, the emergence of various currency taxonomies is a result of continuous innovation and evolving technology.

CBDCs can be understood as programmable currency, representing a new iteration of central bank money that differs from physical cash or central bank reserve/settlement accounts. The interrelationships among these different forms of money are highlighted by the "money flower" taxonomy, which is founded on four fundamental attributes: issuer (central bank or otherwise); form (digital or physical); accessibility (broad or restricted); and technology (token/value-based or account-based).

Figure 7: The money flower: a taxonomy of money



Source: Bank of International Settlement

Currently, cash is the only way for the public to possess central bank currency. To digitize this holding, the holder must convert the central bank liability into a commercial bank liability by depositing the currency into a bank. A CBDC would enable individuals to possess central bank liabilities in digital form. However, this would also be conceivable if the public were permitted to have central bank accounts, a long-standing idea.

As previously stated, each country preserves its sovereignty when it comes to the issuance and configuration of CBDCs. These judgments are heavily influenced by the specific domestic or local variables that form the arguments for and against CBDC adoption, as well as the range of design possibilities under consideration. It is critical to recognize that a CBDC that is universally applicable is an impossible goal due to the inherent diversity of situations across different jurisdictions.

For that reason, before analyzing the potential consequences and impacts of CBDCs on the global payments industry, we will examine the current state of CBDCs around the world in order to extract conclusions and learnings from empirical study.

Current status and empirical approaches to CBDCs worldwide

Current state of CBDCs: A global analysis

Numerous central banks around the globe are investigating the viability of central bank digital currencies (CBDCs) as a means of enhancing and expanding access to payment systems. Even though the majority of CBDC projects are still in the experimental phase, some have speculated that a currency that combines the convenience of crypto with the complete faith and backing of a central bank would render crypto obsolete.

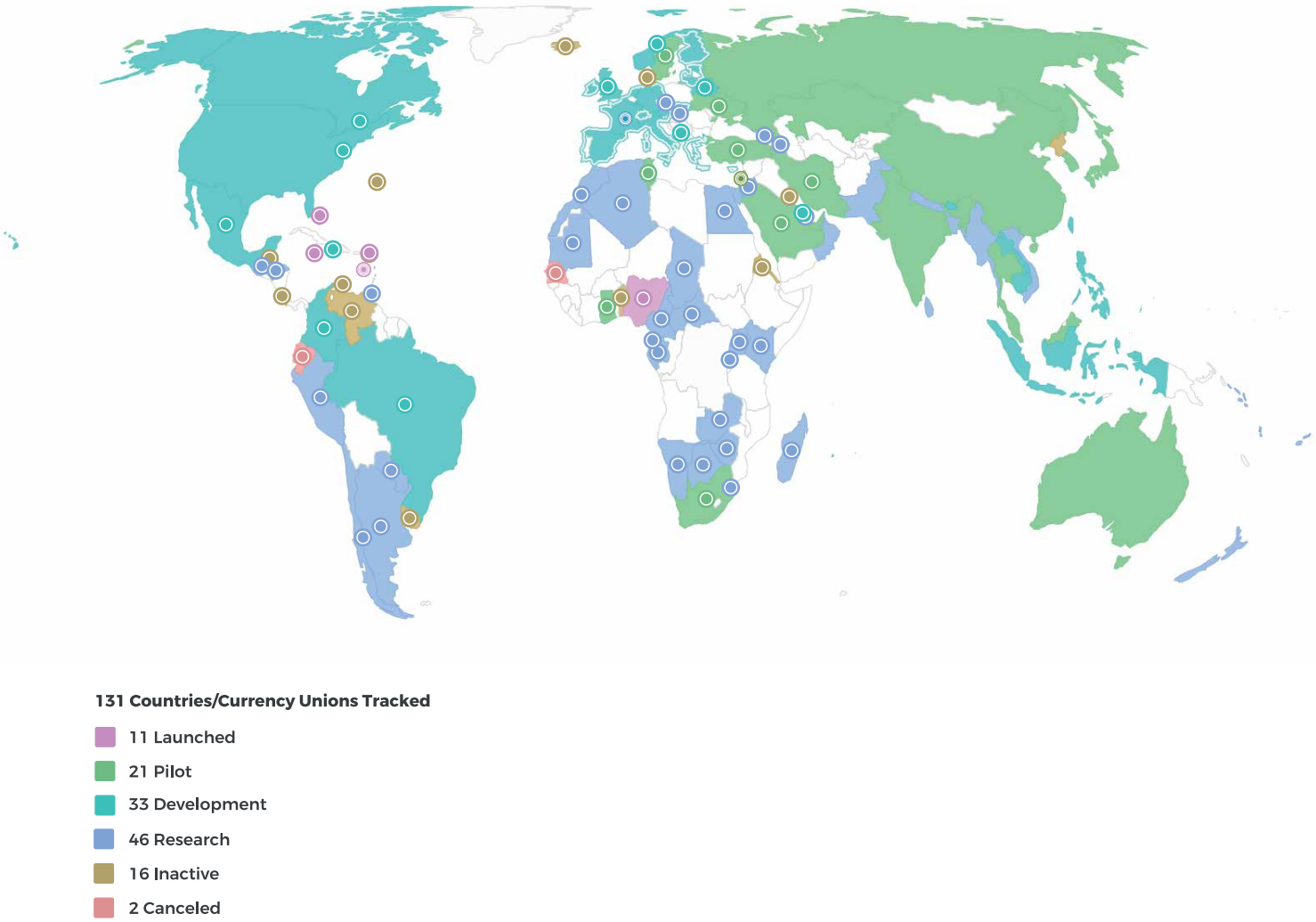
The current state of CBDCs in the world is extraordinary. According to the Atlantic Council's Central Bank Digital Currency Tracker,[10] based on data updated in October 2023:

- **131 countries, representing 98% of global GDP, are exploring a CBDC.** In May 2020, only 35 countries were considering a CBDC. A new high of 64 countries are in an advanced phase of exploration (development, pilot, or launch).
- **19 of the G20 countries are now in an advanced stage of CBDC development.** Of those, 9 countries are already in pilot. Nearly every G20 country has made significant progress and has invested new resources in these projects over the past six months.
- **11 countries have fully launched a digital currency.** China's pilot, which currently reaches 260 million people, is being tested in over 200 scenarios, some of which include public transit, stimulus payments and e-commerce.
- **The European Central Bank is on track to begin its pilot for the Digital Euro.** Over 20 other countries will take steps toward piloting their CBDCs in 2023. Australia, Thailand, and Russia intend to continue pilot testing. India and Brazil plan to launch their respective CBDCs in 2024.
- **In the US, progress on retail CBDC has stalled.** However, other G7 banks, including the Bank of England and the Bank of Japan, are developing CBDC prototypes and consulting the public and private sectors on privacy and financial stability issues.
- **Since Russia's invasion of Ukraine and the G7 sanctions response, wholesale CBDC developments have doubled.** There are currently 12 cross-border wholesale CBDC projects. In fact, the US is moving forward on a wholesale (bank-to-bank) CBDC.

See Figure 8 on the next page for a map view of CBDC projects around the world, provided by the Atlantic Council.

10 For the latest status of CBDC projects, see the CBDC Tracker. **Access here.**

Figure 8: Central Bank Digital Currency Tracker



Source: Atlantic Council Central Bank Digital Currency Tracker, last accessed October 11, 2023

As we can see, more than 10 countries have already launched some form of CBDC. This list includes the Bahamas, which introduced its Sand Dollar in October 2020, as well as nine other Caribbean nations; Cambodia, which unveiled a cross-border, remittance-focused CBDC; and Nigeria, which launched its e-Naira in October 2021. The Cambodian and most of the Caribbean central banks used blockchain technology for their CBDCs, while Nigeria and Jamaica opted for more conventional database architectures.

The majority of CBDCs that have been launched thus far have been developed for retail purposes. However, other Caribbean countries have chosen a hybrid retail and wholesale strategy. Other wholesale CBDCs are emerging quickly in the pilot stage and are currently being tested in several other nations. The most prevalent are collaborations between central banks, commercial banks, and IT consultancies, and the most advanced are wholesale, cross-border CBDCs. Finally, several central banks are currently assessing the costs, advantages, and dangers of establishing CBDCs because they are unsure of how to proceed.

In practice, CBDCs are tailored to each country's priorities, such as encouraging financial inclusion, enabling competition in payment systems, or facilitating financial tokenization. CBDCs, like cryptocurrencies, seek to make finance more accessible and affordable.

But this is not to say that CBDCs and cryptocurrencies are interchangeable. Just as different currencies, payment methods, and rail systems all operate together today, cryptocurrencies and CBDCs may coexist in the future. Indeed, Singapore and Australia, two countries with significant CBDC programs, have highlighted the potential significance of stablecoins in improving the efficiency of traditional finance.

Importantly, even though cryptocurrencies like Bitcoin were founded in part to address issues with fiat currencies like inflation, their purpose and potential now transcend the realm of banking. Crypto and blockchain use-cases continue to emerge, notably in the new (but quickly growing) Web3 iteration. In other words, CBDCs and cryptocurrencies are likely to coexist — and the structure of each CBDC will bring unique opportunities and difficulties to the payments industry.

To comprehend these implications, it is necessary to examine empirical cases of CBDCs. We will now map the most notable CBDC initiatives (launched, piloted, and researched) in the major regions. Then we'll dig deep into the most well-known CBDCs initiatives to see how the payments industry might respond to them.

North America (US and Canada only)

North America is a vibrant region with a fundamentally different function in global finance than that of Latin America. The significance and importance of the United States in the global economy in particular serves as a benchmark for the rest of the world.

Although this region does not have an active CBDC, the economies of both the US and Canada have made substantial contributions to the global debate about them. In fact, this region is developing and researching CBDC initiatives at many different levels.

Even while the US Federal Reserve is still assessing the possible implications of a Digital Dollar, federal efforts such as Project Hamilton (Boston) and Project Cedar (New York) are well underway. Project Cedar is a wholesale cross-border CBDC effort involving the Federal Reserve Bank of New York and the Singapore Monetary Authority. On the other hand, in December 2022, the Federal Reserve Bank

(Fed) of Boston and the Massachusetts Institute of Technology (MIT) announced that Project Hamilton, a two-year project that created a platform for a hypothetical digital currency issued by the US central bank, was over.

In Canada, the Bank of Canada (BoC) does not have immediate plans to launch a CBDC, but it is working on several projects. In 2017, it launched Project Jasper, which concluded after four phases and included cross-border testing with the Bank of England and the Monetary Authority of Singapore. The BoC is also a part of the Bank for International Settlements's Group of 7, which includes the Bank of England, the Bank of Japan, the European Central Bank, the Sveriges Riksbank, and the Swiss National Bank, which are all collaborating on their work on retail CBDCs. Its efforts imply retail and wholesale levels through an intermediated architecture and both blockchain and non-blockchain infrastructure. In 2023, BoC will experiment with offline CBDC payments, with a focus on financial inclusion.

Figure 9: Selected CBDC initiatives in North America (US and Canada only)

CANADA

The Bank of Canada (BoC) is working on several technical projects designed to help it prepare for the future of money and payments. On one hand, it is exploring the possibility of issuing a digital form of the Canadian dollar. On the other hand, through Project Jasper, the BoC has a significant footprint in the cross-border testing of wholesale CBDCs.

General Status: Development or research
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Both

Relevant Projects:
a) Canadian Digital Dollar
b) Project Jasper

UNITED STATES OF AMERICA

The United States is actively working on development of a CBDC, both at the federal and state levels (New York and Boston). Its efforts imply retail and wholesale levels through an intermediated architecture.

General Status: Development or research
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Both

Relevant Projects:
a) US Digital Dollar
b) Project Cedar (New York)
c) Project Hamilton (Boston, concluded)

Source: PCMI, based on the Atlantic Council.

Latin America and the Caribbean

Latin America and the Caribbean (LAC) are home to cutting-edge financial technology and digital services. In recent years, it has demonstrated to the world that its markets can produce world-class corporations and innovative regulations.

Additionally, 10 of the 11 launched CBDC initiatives are in LAC. All of the Central American nations, as well as the Bahamas, Jamaica, and the eight nations of the Eastern Caribbean, have officially implemented a CBDC. Other significant LAC economies, such as Colombia, Mexico, and Brazil, are constructing their own CBDCs. In all cases, they are retailed and intermediated. However, the Eastern Caribbean Central Bank's DCash may help improve remittances between the members.

One of the leading LAC countries exploring CBDCs is Brazil, which successfully implemented a massive real-time payments infrastructure (Pix) that garnered global attention. The Brazilian Central Bank has been developing the Digital Real since 2017 and launched its first public pilot program in 2023 with an eye toward producing a CBDC in 2024. This project is the next step of a comprehensive set of reforms that included Pix and the Open Finance roadmap that was launched in 2021. The Brazilian central bank expects to conclude its pilot of its CBDC in December 2023 ahead of the 2024 launch; this Digital Real will be called "Drex."

In Mexico, the central bank of Mexico (Banxico) announced in April 2022 its revised plans to complete development of its CBDC, the Digital Peso, in 2025. However, no further details were given. In Colombia, in June 2023 the Banco de la República announced a partnership with Ripple and the Ministry of Information and Communications Technologies to run use-case pilots.[11] In Chile, after the country's central bank (BCCh) called for a survey of citizens and corporations about the risks and benefits of a retail CBDC in July 2022, it began working on a second stage of digital currency exploration. It held seminars, talks, and roundtables to collect feedback from the private sector, especially on financial stability issues. Other countries — such as Argentina, Paraguay, Peru, and Uruguay — at different points have declared that they are researching CBDCs, but thus far, there is no concrete evidence for this.

11 "Central Bank of Colombia to Pilot CBDC Project on Ripple's XRP Ledger." *The Fintech Times*, June 18, 2023. **Access here.**

Figure 10: Selected CBDC initiatives in Latin America and the Caribbean

MEXICO

In April 2022, the central bank of Mexico (Banxico) announced revised plans to complete development of its CBDC, the Digital Peso, in 2025. This will be a retail CBDC, but no further features are known.

General Status: Development or research
Architecture: Unknown
Use-Case: Unknown
Infrastructure: Unknown

Relevant Projects:
a) Mexican Digital Peso

COLOMBIA

In June 2023, the Banco de la República announced a partnership with Ripple and the Ministry of Information and Communications Technologies to run use-case pilots.

General Status: Development or research
Architecture: Indirect
Use-Case: Unknown
Infrastructure: Ripple

Relevant Projects:
a) Colombian Digital Peso

Source: PCMI, based on Atlantic Council.

CENTRAL AMERICA & CARIBBEAN

As mentioned, Central America is home of the longest ongoing CBDC project. In October 2020, the Bahamas' Sand Dollar became the first CBDC in the world to go beyond the pilot stage and achieve an official launch. In May 2022, Jamaica announced a phased launch of JAM-DEX. The Eastern Caribbean Central Bank (ECCB) launched DCash to members on March 31, 2021.

General Status: Launched
Architecture: Indirect
Use-Case: Retail
Infrastructure: DLT

Relevant Projects:
a) The Bahamas' Sand Dollar
b) Jamaica's JAM-DEX
c) Eastern Caribbean Central Bank's DCash

BRAZIL

The Brazilian central bank has been developing the Digital Real since 2017 and intends to start its first public pilot program in 2023 before launching a CBDC in 2024. In August 2023 Brazil's CBDC was officially renamed "Drex."

General Status: Development or research
Architecture: Indirect
Use-Case: Retail
Infrastructure: DLT

Relevant Projects:
a) Brazilian Drex

CHILE

The Chilean central bank concluded that, although a retail CBDC could address several of the challenges presented by the rapidly changing payments ecosystem, the decision to issue a CBDC should be based on a thorough cost-benefit analysis. It is currently working on a second stage of digital currency exploration.

General Status: Development or research
Architecture: Indirect
Use-Case: Retail
Infrastructure: DLT

Relevant Projects:
a) Chilean Digital Peso

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Europe, Middle East, and Africa

The EMEA is a wide and complex region full of countries with widely different conditions in terms of economic and social characteristics. Inside each of the three geopolitical subregions, we may find several approaches with regard to CBDCs.

The European countries have all been researching, developing or piloting a proof-of-concept CBDC. Sweden has been at the forefront of CBDC development since 2017.

The Swedish central bank, the Riksbank, finished the third phase of its pilot in April 2023. In 2016, Norway started publishing reports, and in April 2021, it was announced that the central bank would test various technical solutions for a central bank digital currency (CBDC) over the next two years. Finland, Netherlands, Switzerland, Italy, France, Spain, and the rest of the markets' central banks are all developing or researching CBDCs. However, the three most relevant CBDC projects in terms of global impact are the Digital Euro, the UK Digital Pound, and the Russian Digital Ruble.

Figure 11: Selected CBDCs initiatives in Europe, Middle East, and Africa

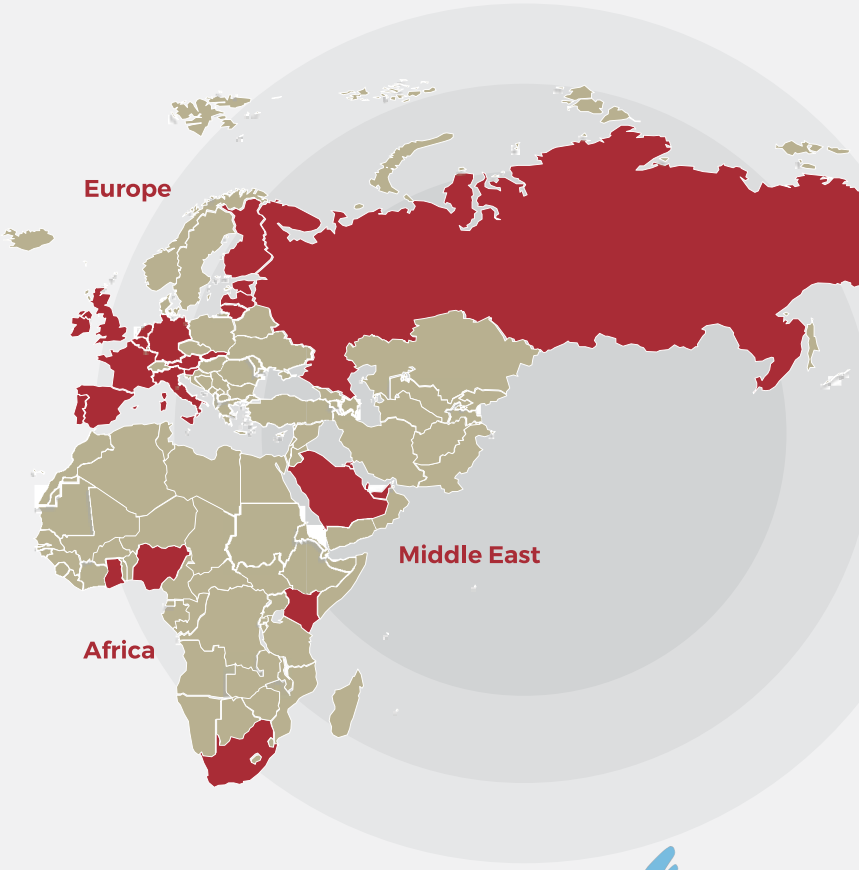
EUROPE

The European Central Bank (EBC) is working with the national central banks of countries that use the euro to investigate the feasibility of introducing a Digital Euro. The Digital Euro project focuses on a retail CBDC, as opposed to, for example, Project Jasper or Project Jura. In February 2023, the Bank of England and HM Treasury released a consultation paper outlining the case for a Digital Pound: it concluded that it was too early to decide but that preparation toward that decision would be ongoing. In 2023, the Bank of Russia performed a beta-test of a Digital Ruble with a set group of participants, but widespread use of this CBDC is not expected until 2025 or 2027.

General Status: Development, research or pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Unknown

Relevant Projects:

a) The Digital Euro
b) The United Kingdom Digital Pound
c) The Russian Digital Ruble



PCMI Payments & Commerce Market Intelligence

The Middle East is a strategic region that spans parts of Western Asia and North Africa. While the United Arab Emirates (UAE) and Saudi Arabia are at the forefront of CBDC discussions in the Middle East, other countries in the region are also exploring the possibilities of digital currencies. Central banks in countries like Bahrain, Kuwait, and Qatar are reportedly researching the potential benefits and challenges of CBDCs for their respective economies.

Finally, the interest of African central banks in CBDCs has shot up in recent times. While most of them are analyzing CBDCs, only few have projects at advanced stages (pilot or live). Some countries, in particular those in East and West Africa, stand out as promoting fast payment systems through mobile money, but several central banks think that CBDCs can provide a superior solution.

MIDDLE EAST

UAE and Saudi Arabia are the most relevant cases. In March 2023, UAE's central bank confirmed that for the next 12 to 15 months they will be focused on: 1) testing a domestic retail Digital Dirham and a wholesale CBDC, 2) producing a joint proof-of-concept on CBDC interoperability with India, and 3) the intended soft launch of mBridge. In January 2023, the Saudi central bank announced that it is increasing research into CBDCs, with a focus on domestic wholesale CBDC use-cases with local commercial banks and fintech partners.

General Status: Development, research or pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Both

Relevant Projects:

a) UAE Digital Dirham
b) Project Amber
c) Project mBridge
d) Digital Dinar

AFRICA

The Nigerian eNaira was the world's second CBDC, launched on October 25, 2021. South Africa is currently in the pilot stage of its wholesale CBDC after launching Project Khokha 1 and 2, through Project Dunbar. The South African Reserve Bank has not yet decided to issue a retail CBDC. Ghana has been working on a pilot CBDC project called the e-Cedi since 2020. It was supposed to be launched in 2022 but is still delayed. Kenya began exploring the possibility of introducing a CBDC in October 2020. In June 2023, the Central Bank of Kenya released a statement noting that designing a CBDC is not a priority in the short to medium term.

General Status: Development, research or pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Both

Relevant Projects:

a) South African Digital Rand
b) Project Khohka 1 & 2
c) Project Dumbar
d) Ghana e-Cedi
e) Kenya e-Cedi

Source: PCMI, based on Atlantic Council.

Asia and the Pacific (APAC)

Given that it is home to 60% of the world's population[12] (4.3 billion people) and has the world's most populous countries (China and India), one of APAC's comparative advantages is that it has one of the largest fintech user bases in the world, with rapidly expanding adoption. But it can be a challenge to analyze APAC as one regional block. The 10 countries that make up the Association of Southeast Nations (ASEAN) cannot be treated as a sole entity. They also can't be compared directly to India and China (two giants that hog the spotlight) or be grouped together with the high-income economies of Australia and New Zealand.

However, APAC is at the forefront of CBDC exploration and interest in CBDC development has clearly been on the rise in this region. Central banks in APAC are interested both in wholesale and retail CBDCs, but only a few countries currently have the legal authority to issue a CBDC, while others are contemplating legal reforms. In fact, APAC is the region with the most active pilots of CBDCs worldwide.

As previously stated, China's e-CNY CBDC — which dates back to 2014 and whose pilots started in 2019 — has shaken the worldwide state of CBDCs. Reports from early 2022 indicated that more than 260 million wallets have been opened. China is also working on better integrating its existing payments channels with the e-CNY, and in 2023, AliPay began offering e-CNY in its express payment category. In January 2023, China included e-CNY in their currency circulation calculations, and the Digital Yuan represented 0.13% of cash and reserves held by the central bank.

India has taken a different approach: in 2019, an Indian government panel recommended banning all private cryptocurrencies and asked the government to consider the launch of an official CBDC. In February 2021, the Reserve Bank of India (RBI) released a report describing the pros and cons of a CBDC. In July 2021, the RBI announced that it was considering a series of pilot studies for an eventual phased rollout of a CBDC. In 2023, India's retail CBDC architects sought to scale the user base of the Digital Rupee to one million users and have prioritized offline capabilities. In July 2023, the RBI called on a wider set of lenders to take part in pilot programs that use the CBDC as it tries to increase transactions. In September 2023, the RBI confirmed that it is planning to introduce its CBDC in the call money market. India's CBDC is currently in a pilot phase across the retail and wholesale segments. The central bank has set a target of one million transactions a day by the end of 2023.[13]

12 UNFPA – Asia and the Pacific. **Access here.**

13 "India's central bank plans to widen use of digital currency," Reuters, September 5, 2023. **Access here.**

Hong Kong's e-HKD launched pilot testing for its retail CBDC in partnership with 16 banks and payment companies. In June 2023, Thailand launched an additional retail CBDC pilot program which will include two banks and a Singaporean payment service. The project involved up to 10,000 users.

Other members of ASEAN, particularly Indonesia, the Philippines, and Vietnam, already had a strong usage of mobile money. Recently, however, crypto assets have been widely used for remittance payments and investment purposes. All three countries have started research and development into CBDCs because they deem them as necessary to keep up with private crypto assets.

The advanced economies in the Asia-Pacific region have all undertaken strong research and development efforts to be technically ready for the issuance of CBDCs. These countries view CBDCs as an opportunity to reduce inefficiencies in the current payments system and to provide the central bank counterpart of digital money. However, they do not foresee any immediate need to issue CBDCs. Research and development in Australia and Japan have covered both wholesale and retail CBDCs. Singapore has focused on a wholesale CBDC with Project Ubin, and Korea is considering a retail CBDC.

Figure 12: Selected CBDC initiatives in Asia and the Pacific

CHINA

The People's Bank of China has been leading the development of domestic and cross-border payment networks via digital currencies. China began the pilot of its e-CNY program in 2019. The pilot has about 260 million wallet users. Additionally, it's part of the wholesale mCBDC Bridge project with UAE, Thailand, and Hong Kong.

General Status: Pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Unknown

Relevant Projects:
a) China e-CNY
b) mCBDC bridge

INDIA

Consistent with the phased rollout outlined in 2021, the Reserve Bank of India has released a concept note outlining the features and objectives of the Digital Rupee and launched a wholesale CBDC pilot program in partnership with nine national banks.

General Status: Pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Unknown

Relevant Projects:
a) The Digital Rupee
b) UAE interoperability project

SINGAPORE

The Monetary Authority of Singapore (MAS) has been a leader in cross-border testing of CBDCs through projects Ubin, Jasper, and Dunbar. With respect to retail CBDCs, MAS is keeping an open mind and researching user-driven applications.

General Status: Pilot
Architecture: Indirect
Use-Case: Wholesale
Infrastructure: Both

Relevant Projects:
a) Project Ubin, Project Dunbar, Project Jasper, Onyx/Multiple wCBDC, Project Mariana

THAILAND & HONG KONG

The Bank of Thailand has been a leading developer of both retail and wholesale CBDCs. It is in the pilot phase with a retail CBDC, which is expected to be completed in 2023. Thailand has also been an early leader in wholesale CBDC development, as one of the participants in Project mBridge. Thailand launched an additional retail CBDC pilot project in a regulatory sandbox in June 2023. Hong Kong has been involved in both retail and wholesale use-cases for CBDC through its e-HKD and mBridge projects. In March 2023, the HKMA launched pilot testing for its retail CBDC in partnership with 16 banks and payment companies.

General Status: Pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Both

Relevant Projects:
a) The Digital Bat
b) The e-HKD
c) Project mCBDC Bridge

SOUTH KOREA

The Bank of Korea (BoK) launched a pilot program for a retail CBDC in April 2020. BoK successfully finished the first phase of the pilot in December 2021 and the second phase in June 2022. On May 15, 2023, BoK announced a partnership with Samsung to enhance collaboration on offline CBDC technology.

General Status: Pilot
Architecture: Indirect
Use-Case: Retail
Infrastructure: Ethereum

Relevant Projects:
a) The Digital Won

JAPAN

The Bank of Japan (BoJ) is working on a proof of concept for a retail CBDC that is currently in its second phase and will undergo additional functionality testing in 2023. The Bank of Japan is also involved in cross-border research through its work with the European central bank on Project Stella.

General Status: Pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Unknown

Relevant Projects:
a) The Digital Yen
b) Project Stella

AUSTRALIA

The Reserve Bank of Australia (RBA), in collaboration with the Digital Finance Cooperative Research Centre, has outlined technical and policy requirements, invited public comment, and launched a pilot program to test CBDC use-cases and explore potential economic impacts. In August 2023, the RBA trial declared that the eAUD launch is still "some years away." In 2021 and 2022, Australia also participated in Project Dunbar.

General Status: Pilot
Architecture: Indirect
Use-Case: Retail - Wholesale
Infrastructure: Ethereum

Relevant Projects:
a) The eAUD
b) Project Dunbar

Source: PCMI, based on Atlantic Council.

Possible impacts on the global payments industry

After conducting this comprehensive research on the global landscape of CBDCs, both theoretically and empirically, we can contemplate several factors that offer valuable insights for understanding the potential consequences of CBDCs on the payments sector and its various participants.

There are still general challenges and considerations. For instance, a strong digital infrastructure, including internet connectivity and access to digital devices, is necessary for CBDC success. Many nations still lag in this regard, so this may restrict the spread of CBDCs. The use of CBDCs also brings up security issues because digital currencies are vulnerable to fraud and hacking. To reduce these dangers, most developing countries will need to invest in robust cybersecurity measures. Finally, creating a thorough legal and regulatory framework is crucial to ensuring the effective implementation and adoption of CBDCs. As we've shown, most nations lack formal rules and regulations governing the use and administration of CBDCs.

The specific impacts will hinge on several factors, including the type and configuration of the CBDC under consideration, the actors within the payments industry being examined, the geographic region or economy in which it is slated for implementation, and the underlying urgencies or incentives driving its adoption.

The primary factors that would delineate any scenario are summarized here.

- **Cross-border vs. local payments:** Beyond the numerous theoretical designs and undergoing discussions, research, development, testing, or even launches of CBDCs, empirical research highlights two distinct focal points within the payments industry: local and cross-border. Local initiatives primarily revolve around retail and domestic CBDCs, while cross-border efforts are aimed at implementing wholesale cross-border CBDCs.

  The latter often entail bilateral or multilateral cooperation, requiring a higher degree of coordination among central banks and governments. However, except for a few nations where retail and domestic CBDC initiatives are advanced (India, China, some Caribbean nations, etc.), wholesale and cross-border initiatives appear to be more developed than retail ones on a global scale.

- **Long-term (and unpredictability) vs. short-term:** The research and development around CBDCs are advancing rapidly. However, upon reviewing several empirical cases, it becomes apparent that only a handful of banks have announced tentative deployment dates (with "tentative" being the operative word, since these are far from confirmed).

  When it comes to retail domestic CBDCs, countries like Brazil, the United Arab Emirates, Russia, and a select few others have voiced their intentions to introduce initiatives, accompanied by a well-defined roadmap (typically targeting 2025-2026); they have emphasized that this introduction will depend on several factors. In most cases, the remaining nations are, at best, still in the pilot phases with no official confirmation of full implementation.

  Currently, there is a similar ambiguity with regard to wholesale cross-border CBDC initiatives. Even when the pilot phase is well underway in a given country, concrete information regarding full deployment is lacking. Furthermore, there is uncertainty about how these initiatives will coexist with the current correspondent infrastructure setup and how they will address the challenges related to the lack of legal, regulatory, and operational consistency across multiple jurisdictions.

- **Developing vs. advanced countries Incentives:** Incentives for the development of retail and domestic CBDCs differ between developing and advanced nations. In developing countries, unlike their advanced counterparts, CBDCs hold the potential to bring large unbanked populations into the banking system, fostering financial inclusion. This, in turn, can lead to increased overall lending and a reduction in the risks associated with bank disintermediation. In advanced economies, the consequences of CBDC adoption may be more medium- to long-term in nature, improving innovation and efficiency — but the incentives are less immediate and not as directly tied to central bank agendas aimed at reducing cash usage and financial exclusion.

  On the other hand, advanced economies with significant global and international trade interests are more inclined to address the current pain points faced by corporations in cross-border transactions. These issues stem primarily from gaps in the existing correspondent infrastructure setup and the lack of legal, regulatory, and operational consistency across multiple jurisdictions. While these economies may also be exploring or developing retail and domestic CBDCs, they are more incentivized to explore wholesale cross-border CBDC initiatives that can promote their global position and international trade.

- **Intermediation vs. disintermediation forces:** Most countries are contemplating a "two-tier" CBDC model, which is indirect in nature. In this model, central banks issue a CBDC to commercial banks, who then distribute it to consumers. From a technological perspective, while some are exploring decentralized models, the majority are leaning toward centralized or permissioned systems. In the context of wholesale cross-border CBDCs, there is little debate. International money movements will either be permissioned transactions between governments/central banks or conducted using floating cryptocurrencies or private stablecoins.

  However, the question arises when considering retail domestic CBDCs: Will non-bank payment system providers have the ability to distribute them? In such a scenario, there may be fewer funds flowing into deposit accounts from the unbanked, since a traditional bank account would no longer be necessary to access a CBDC. However, if CBDC data is shareable, as might be the case in an Open Banking/Finance regulatory framework with banks, people without bank accounts can still build credit and access loans at lower interest rates. Some specialists argue that this design is optimal for welfare if the benefits of increased access to a CBDC outweigh the reduction in lending.[14]

Implications for payment actors

We can now contemplate how these elements and trends that would define any scenario might influence the different players in the payments ecosystem and examine their potential roles and involvement in the implementation of CBDCs.

- **Central banks:** In the scenario in which CBDCs are exclusively adopted for cross-border payment applications, as discussed earlier, central banks would require bilateral or multilateral cooperation, demanding a high level of coordination among central banks and governments.

  The introduction of CBDCs into domestic payment applications could introduce further complexities and require additional policy and regulatory considerations, particularly concerning macroeconomic policies and currency/exchange rates. Furthermore, central banks would need to evaluate how these added complexities would affect existing financial entities to ensure the ongoing stability of the financial system.

- **Payments networks:** In advanced CBDC scenarios, the system may largely function independently of legacy payment networks, whether local or cross-border, along with their traditional clearing, settlement, and payment solutions.

  Nevertheless, industry players can harness existing efforts to seize new opportunities. For instance, Visa is actively exploring digital currency-related APIs and settling transactions through stablecoins. Mastercard is set to launch a CBDC testing platform for central banks, while SWIFT is working to expand its role as a carrier of authenticated information regarding CBDC transactions. These initiatives provide a strong foundation for players to unlock the full potential of CBDCs.

- **Commercial banks:** In the case of cross-border payment applications, the adoption of CBDCs could lead to the elimination or reduction of multiple correspondent banks involved in the payment cycle. This has the potential to diminish revenue from

14 Refer to Tan, B. (2023). **Access here.**

cross-border transactions. Furthermore, as corporations may require less liquidity in their accounts, commercial banks could witness a significant reduction in overnight balances, which would affect their traditional revenue streams from overdraft fees and interest. Lastly, in a world in which both traditional cross-border payments and CBDC solutions coexist, commercial banks may need to manage the operation of two parallel cross-border payment systems.

In a scenario involving retail and domestic CBDCs, as mentioned earlier, the implications may vary, depending on whether non-bank payment providers are allowed to distribute CBDCs. The potential outcomes include increased funding for overall lending, the ability to offer innovative on-chain products and services (such as smart contract-enabled cash management services), and the leverage of in-house technological capabilities to participate in infrastructure development. Commercial banks with strong technical capabilities, like JP Morgan with its Onyx blockchain technology, could potentially become private CBDC issuers on behalf of central banks or provide value-added services, such as on-chain compliance utilities and network operations.

- **Non-bank payment service providers:** In both scenarios, whether it involves a retail and domestic CBDC or a wholesale, cross-border CBDC, players will need to support payment orchestration requirements, which will involve new challenges and responsibilities related to KYC (Know Your Customer), AML (Anti-Money Laundering), CFT (Counter Financing of Terrorism), and sanctions screening. If these users are allowed to issue CBDCs, they will also need to be able to mint and redeem CBDCs, as well as have expertise in blockchain and smart contracts, among other necessary skills.

- **Other relevant players:** Some actors will also face challenges and will need to enhance their skills in a CBDC scenario — or they may face competition from new entrants. For instance, technology service providers, law firms, hosting providers, and others in the ecosystem will need to adapt to the evolving landscape, particularly in terms of skills related to smart contracts, cloud services, Distributed Ledger Technology (DLT) platforms, and more.

As we can observe, all players in the CBDC space will encounter both opportunities and challenges. In addition to the business model impacts, CBDC solutions will necessitate technology enhancements across the board. While certain legacy technology components, such as onboarding and compliance systems and capabilities, can be repurposed in a CBDC environment, a significant number of new ones will need to be developed. This presents opportunities for players to compete by offering more innovative, efficient, and secure technology solutions.

For instance, market participants involved in the issuance and distribution of CBDCs, including central banks and financial institutions, will need to upgrade their technical skills to handle tasks like minting and redeeming CBDCs, integrating CBDCs into their existing or new digital wallets, and enhancing client onboarding and offboarding processes, among other responsibilities. Proficiency in DLT platforms and smart contracts — along with a broader understanding of the API economy — will all be essential for all players involved. Additionally, specialized expertise in areas like token conversion, blockchain-based payment processing, and on-chain KYC, AML, and CFT processes will be in high demand.

Lessons and recommendations: What can the payments industry do?

As we have discussed throughout this analysis, the CBDC landscape continues to evolve at lightning speed, resulting in a range of implications for the players in the payments sector. However, as we have observed, these implications vary widely depending on the type of CBDC initiative being analyzed.

The next steps for service providers in the financial industry are to mitigate risks and capitalize on opportunities by enhancing the quality and relevance of the services they offer. It is imperative for payments networks and institutions to rapidly adapt.

To this end, PCMI has identified specific areas for payments networks and banks to focus on to better navigate the future implications of CBDCs.

Card and other payment networks

- **Interconnection with CBDCs:** Card networks like Visa and Mastercard could establish systems that enable users to load their CBDCs onto physical or virtual cards, allowing them to use these CBDCs for in-store and online transactions. Such an endeavor would necessitate close collaboration with central banks and robust technical integration.

- **Instant conversion:** Card networks could provide instant conversion services between CBDCs and traditional currencies. For instance, if a user holds CBDCs and needs to make a payment in a foreign country using a different currency, Visa or Mastercard could offer real-time conversion at competitive rates.

- **Payments infrastructure:** Visa and Mastercard have well-established and dependable infrastructures for processing large-scale transactions. They could potentially make these infrastructures available to facilitate transactions involving CBDCs, which could be of particular value to central banks who are in the process of developing their own payments infrastructure.

- **Collaboration with banks:** As central banks contemplate advancing their CBDC projects, Mastercard and Visa can offer banks a vital resource that governments are less likely to provide, such as customer service, consultancy, technology partnerships, and more.

- **Collaboration with merchants:** Visa and Mastercard could engage in collaborations with merchants to enable the acceptance of CBDCs as a form of payment. Such initiatives could spur the adoption of CBDCs and ensure the continued relevance of these payment giants in the evolving payments ecosystem. This is also an opportunity for alternative payment networks like PayPal.

- **Digital financial ecosystems:** Card networks and their partners could expand into areas such as issuing digital wallets or applications that enable users to conveniently and securely manage and use their CBDCs. Visa and Mastercard could capitalize on their brands to provide dependable and secure CBDC management solutions.

- **New value-added services:** Card networks could innovate by creating value-added services centered on CBDCs. These services might encompass advanced security features, rewards programs, fraud detection solutions, spend analysis tools, and more.

Banks and non-bank payment providers

- **Trust, custody, and regulatory compliance:** Banks and payment service providers may receive the endorsement of central banks to act as custodians of CBDCs on behalf of their customers. To fulfill this role effectively, stringent security protocols and meticulous compliance measures will be imperative. Given that CBDCs carry the imprimatur of central banks, financial institutions stand to gain by adhering to more rigorous regulations and aligning with established industry standards.

- **Streamlining transactions and enhancing accessibility for users:** An opportunity within the payments landscape lies in the seamless integration of CBDCs into the digital ecosystem. Banks and payments service providers can take the lead by incorporating CBDC functionality into their online banking platforms and mobile applications. Such a move empowers users to effortlessly engage in a wide array of transactions and payments, utilizing CBDCs as a medium of exchange.

- **Educational outreach and promotion:** Financial institutions possess a unique opportunity to embark on educational initiatives designed to enlighten their clientele about the intricacies of CBDCs and the advantages they offer. These efforts can serve as a catalyst for boosting the adoption rate of CBDCs while nurturing trust and confidence in these digital currencies.

- **Seamless integration into global payments:** Collaboration between banks and fellow financial service providers can usher in an era of streamlined cross-border transactions facilitated by CBDCs. Such partnerships hold the promise of diminishing the inherent complexities and expenses associated with international fund transfers, thereby enhancing the efficiency of global payments.

- **Value-added services:** To safeguard their market presence, financial institutions can embark on the development of supplementary services centered around CBDCs. These value-added offerings may encompass loyalty programs, personalized financial management, and bespoke investment services. By harnessing the potential of CBDCs, banks can lead the way in pioneering innovations spanning CBDC-based lending, trade finance, and remittance solutions.

In the realm of CBDCs, there remains a substantial journey ahead, and it's vital to recognize that today's requirements may not mirror those of tomorrow. Much work remains to be done. Thus, maintaining a stance of constant vigilance, embracing experimentation, and engaging in novel product design is imperative.

Moving forward, the payments industry, in its entirety, must craft more precise strategies tailored to CBDCs. Banks and non-bank payment providers should lead the charge in innovating approaches and enhancing the quality of their products and services.

Simultaneously, card networks ought to support them, along with merchants, in boosting marketing and communication efforts, improving user experiences and security protocols, introducing value through cutting-edge digital identity tools (such as tokenization, blockchain, and other cutting-edge technologies), expanding acceptance, and contributing to the education and motivation of regulatory bodies.

Forming strategic partnerships among traditional market players, public-sector entities, and emerging technological providers can wield substantial influence.

These lessons underscore the importance of continual updates, research, and innovation, all focused on human-centered design principles and guided by a deep understanding of the use-cases, pain points within traditional financial systems, and the evolving needs of customers. Progressing toward an improved financial industry within a future CBDC landscape necessitates the active involvement of all ecosystem participants. Challenges and opportunities await — and require collective efforts from all stakeholders.

Next Steps

PCMI specializes in research engagements to help clients define and implement strategies around emerging tech, including CBDCs.

Contact us to:

- Map CBDC activity at a deeper level around the globe
- Conduct scenario forecasting to determine your optimal approach
- Understand how your company might fit into the CBDC value chain
- Understand more broadly how tokenization of assets will be leveraged to move and secure value
- Answer questions, such as:
  - Will CBDCs ostensibly serve wholesale purposes, rather than retail?
  - How and when will CBDCs disrupt SWIFT and other cross-border payment rails?
  - How and when will consumers interact with CBDCs? What role will financial institutions play in furnishing access to CBDCs?
  - What new business models and revenue streams will CBDCs unlock for the private sector and how can my company seize such opportunities?

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