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Central Bank Digital Currency: The Series, Vol. 3

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

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Abstract

This paper is the third in Payments Canada's series exploring the implications of a central bank digital currency (CBDC). This paper explores key global developments of retail CBDC, while the rest of the papers in this series have focused on a Canadian context. While it is clear that many central banks have taken an interest in CBDC research and development, motivations vary across jurisdictions, ranging from attempts to raise financial inclusion to eliminating cash use. In this paper, we look at developing retail CBDC approaches in four different jurisdictions: Sweden, the Bahamas, China, and the Eurozone.¹

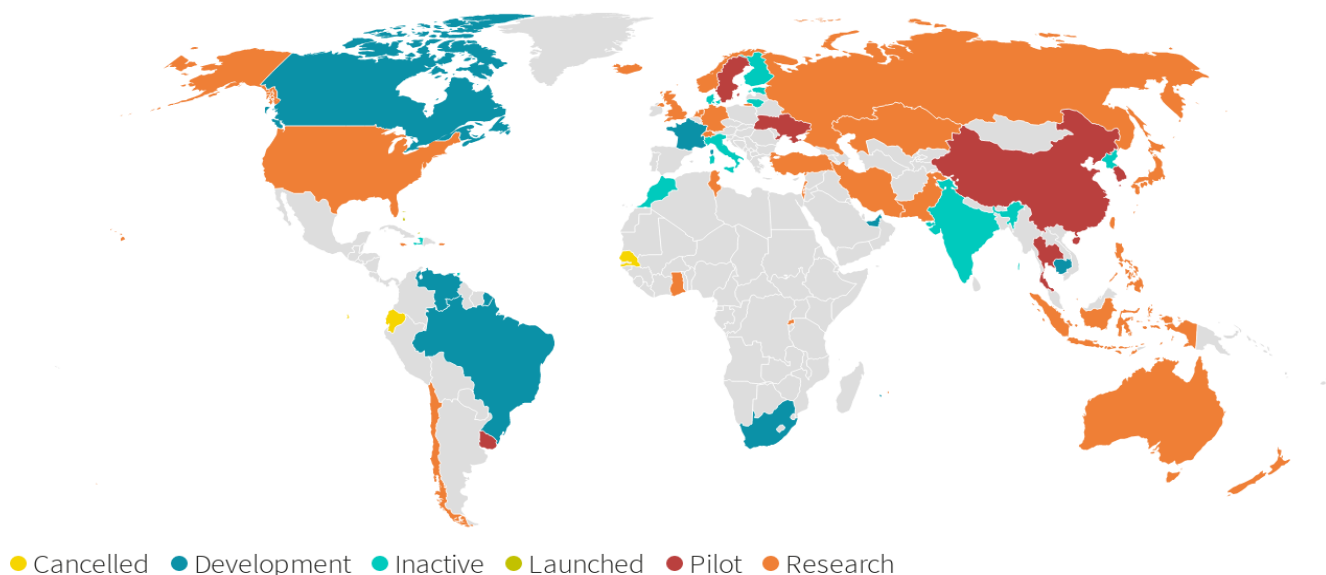
¹ NOTE: This paper takes into consideration updates up until February 15, 2021.

Global Retail CBDC Developments

As more central banks move towards assessment of CBDCs, many are looking specifically at the development of a retail, or “general-purpose” CBDC that would add to the reserves of fiat currency available to the public.² A retail CBDC would ideally be able to take on the role of cash in a digital format for consumers and provide businesses and financial institutions ease of access to central bank money without being reliant on commercial bank deposits.³ Central banks have a significant role to play in terms of the general public’s access to secure, efficient payments and a retail CBDC can work to address gaps in financial systems across jurisdictions

Central bank digital currencies across the world

CBDC projects are moving ahead across the world - though few have gone past the drawing board



Note: European Central bank is conducting research for euro zone

Source: Harvard Kennedy School Belfer Center & Atlantic Council, Reuters research

Last updated: Dec, 2020

² It should be noted that while many central banks are assessing CBDCs, few have shown intention of actually implementing CBDCs. [A Survey of Research on Retail Central Bank Digital Currency. International Monetary Fund, 2020.](#)

³ For more on retail CBDC and its implications in a Canadian context, see payments.ca.

Wholesale CBDC implications and global developments will be covered in a later volume of Payment Canada’s CBDC Series.

Key Motivations for Retail CBDC Issuance

In previous volumes of the CBDC series, Payments Canada has covered the key motivations for issuance specifically in Canada.⁴ This volume looks at motivations for retail CBDC that span globally looking at results of central bank surveys from the International Monetary Fund (IMF) and the Bank for International Settlements (BIS) to assess the case for the issuance of retail CBDC, respective to various jurisdictions.⁵ While there is still no “catch-all” disparity that can be solved with the implementation of a retail CBDC, the following are some key motivations for its issuance⁶:

Domestic Payments Resilience

Retail CBDC issuance can be a preventative measure against a monopoly of payments held by a concentration of a few key players. In regions like China and Sweden (discussed below) where there are alternative payment service providers (PSPs) consolidating financial services that are being widely adopted (i.e., AliPay and WeChat Pay), issuance of a retail CBDC could help abate wider adoption and use of PSPs. It can also work towards driving competition and innovation in the payments sector.

PSPs often create economies of scale and scope, making them ideal for the end user in terms of cost. However, since they tend to be profit-driven entities, rather than welfare-driven, they pose a risk to end users as well. User data is at risk of being commodified. There are risks of creating a monopolistic industry with high entry barriers for other players, and security breaches which private issuers might not be prepared for. Additionally, in regions where the use of local fiat currency is low and dollarization is prominent, a retail CBDC can work to restore confidence in the stability and use of local fiat currency, while providing increased access.

In addition, retail CBDCs can offer heightened visibility of transactions, which can enhance current know-your-customer (KYC) and anti-money laundering and terrorist financing (AMLTF) practices and work to reduce illicit financial activity.

Monetary Policy Transmission

Widespread adoption of retail CBDCs can help the issuing central bank maintain control over monetary policy transmission dependent on the design of the CBDC itself. If the CBDC were to be interest-bearing, it could act as an instrument to reinforce interest rates set by the central bank to the wider economy.⁷ A retail CBDC could also provide visibility and traceability of transactions,

⁴ [Central Bank Digital Currency: The Series. Payments Canada, 2020.](#)

⁵ [Central Bank Digital Currencies: Foundational Principles and Core Feature. Bank for International Settlements, 2020.](#)

⁶ This is not an exhaustive list of all motivations for retail CBDC issuance.

⁷ [A Survey of Research on Retail Central Bank Digital Currency. International Monetary Fund, 2020.](#)

allowing for more informed monetary policy making decisions. In addition to enhancing monetary policy transmission, a CBDC can also help the central bank maintain their sovereignty as third party PSPs and alternative currency adoption rises in popularity.

Financial Inclusion

A retail CBDC is ideal for financial inclusion in emerging economies that have large unbanked populations and/or underdeveloped financial infrastructures in place.⁸ As motivations vary by levels of economic development, emerging economies are more likely to lean towards the issuance of a retail CBDC specifically for the purpose of increasing financial inclusion. CBDC deployment would minimize the amount of infrastructure and third party involvement needed in order to successfully drive towards a fully developed economy.

A retail CBDC is also an opportunity to improve the fiscal stimulus disbursement process. As established by the COVID-19 pandemic and a global effort to get stimulus funds into the wallets of residents, the process of receiving government funds can be a lengthy process. The development of a universally accessible retail CBDC can make the process faster as accounts denominated in central bank money can be directly deposited and settled, reducing the complexity of transactions.⁹

Cash Use

This pertains to jurisdictions with both low and high cash use. Low cash use generally stems in highly developed economies where there is a high rate of banked citizens, or those that have access to traditional banking services. This leads to cash no longer being a competitive payments offering as it does not provide many of the advantages that come with electronic payment methods, boosting the use of “b-money” (i.e., credit and debit cards) or “e-money” (i.e., stored value cards like Alipay).¹⁰

A disproportionately high use of cash can also have negative implications. There are many costs associated with the handling and issuance of physical cash, as well as implicit costs lost to the “underground economy”.¹¹ A recent assessment by the Committee on Payments and Market

⁸ [Impending arrival- a sequel to the survey of central bank digital currency. Bank For International Settlements, 2020.](#)

⁹ [Ready, steady, go? – Results of the third BIS survey on central bank digital currency. Bank for International Settlements, 2021.](#)

¹⁰ Ibid.

¹¹ [Casting Light of Central Bank Digital Currency, International Monetary Fund. November, 2020.](#)

The underground economy can be defined as consisting of market-based economic activities, whether legal or illegal, that escape measurement because of their hidden, illegal or informal nature.

Infrastructures (CPMI) found that more fiat currency is being circulated but is not being used for payments from 2012-2018, indicating that cash is being held as a store of value rather than being used for payments. This is especially consistent in emerging economies, where access to cash may be limited.¹²

The following case studies look at the key motivations for retail CBDC across four varying jurisdictions: Sweden, the Bahamas, China and the Eurozone. All of these cases vary by development of financial infrastructure, key motivations of CBDC issuance, design and implementation of CBDCs and are at different stages of progress in issuance.

Case One: Sweden/Riksbank

Motivations

Sweden's motivations for CBDC issuance:

- *Low cash use* - Sweden has had a traditionally low use of cash due to a highly digitized economy. Less than two percent of money used for payments are central bank notes, which diminishes the central bank's ability to provide universal access to fiat currency.¹³ The BIS (Bank for International Settlements) also classified Sweden as the world's most cashless society, making it a prime candidate for the introduction of CBDC.¹⁴
- *Rise of alternative payment service providers* - Concentration of payment services by third party PSPs like [Swish](#) are rising in popularity in Sweden. Nearly 80 percent of the Swedish population used *Swish* for payments, and as of July 2020, averaging around 50 million transactions a month.¹⁵ As *Swish* is on the path to creating a payments monopoly, the ability of the central bank to ensure a competitive and innovative market for payments becomes hindered.
- *Domestic payments safety* - As central bank money use is at an all time low, there is a need for the central bank to provide a competitive offering. This can allow for the central bank to continue to maintain sovereignty of monetary policy transmission and provide capacity for the central bank to continue acting as a lender of last resort.

¹² [Impending arrival- a sequel to the survey of central bank digital currency. Bank For International Settlements, 2020.](#)

¹³ [Sveriges Riksbank Economic Review 2, Riksbank. February, 2020.](#)

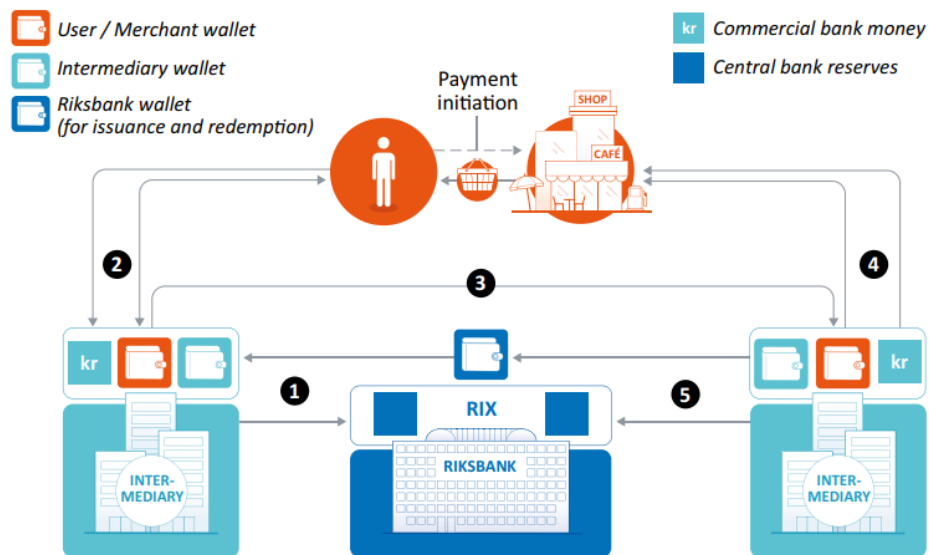
¹⁴ [Going Cashless, International Monetary Fund. 2018.](#)

¹⁵ [Sveriges Riksbank Economic Review 2, Riksbank. February, 2020. Number of Swish Customers in Sweden, Statista, 2020.](#)

e-Krona Pilot

The e-Krona pilot currently in place is a two tier decentralized retail CBDC design, meaning that while the CBDC has a direct claim on the central bank, the Riksbank, Sweden's central bank, is not responsible for consumer facing operations.

Figure 3. Flow of e-kronor in a decentralized ledger system



Source: The Riksbank

The first tier will involve the Riksbank issuing e-Krona to incumbent financial institutions and intermediaries. The second tier allows the financial intermediaries to disburse the e-Krona to end-users, facilitate the onboarding of users and carry out KYC/AML due diligence. Notably, the e-Krona uses R3's Corda as the base DLT for transactions, which was specifically created to target financial institutions as an alternative to permissionless DLTs like those used by cryptocurrencies like Bitcoin.¹⁶ The Riksbank has limited visibility of transactions, maintaining the privacy and anonymity typically attributed to physical cash and coins.

¹⁶ <https://www.r3.com/>

The e-Krona is currently in Phase 3 of its pilot, an effort that began in February 2020 and is expected to run until February 2022.¹⁷ The first three phases of the pilot, conducted in collaboration with Accenture, tested various functionalities of the e-Krona such as making payments, deposits and transfers within the Riksbank provided e-wallets. As of now, no end-users or intermediaries are involved in the pilot, with testing being limited within the Riksbank's private network.¹⁸ The future phases of the pilot will aim to test e-Krona functionalities with actual and simulated users for transactions.

Case Two: Bahamas/ Central Bank of the Bahamas (CBB)

Motivations

Bahama's motivations for CBDC issuance:

- *High paper use* - Cash and cheques, while on a slight decline in use, remained the primary payment instruments in the Bahamas, as of 2019.¹⁹ The high use of cash has also been associated with high underground economic activity, particularly money laundering.²⁰
- *High financial exclusion and intermediation* - The Bahamas are made up of hundreds of islands, making it extremely difficult to maintain a brick-and-mortar financial infrastructure and access to cash. With the recent push in data safety standards and due diligence for financial institutions, more residents are excluded from traditional banking services. Around 20 per cent of adult Bahamians are unbanked, (i.e., without accounts at established financial institutions).²¹
- *High smartphone penetration* - As of 2017, around 90 per cent of the Bahamian population has smartphones with mobile wallet capabilities. Financial literacy surveys conducted by the CBB showed that a high share of the population would be likely to use digital financial services.²²
- *Use of local currency* -The Bahamian dollar (\$B) is pegged to the US Dollar (USD) allowing for parity of acceptance for both currencies in the region. Retail CBDC provides an

¹⁷ [Riksbank extends e-krona testing, Finextra. February, 2021.](#)

¹⁸ [The Riksbank's e-krona Pilot, Riksbank. February, 2020.](#)

¹⁹ [The Bahamas Financial Sector Assessment Program. International Monetary Fund, July 2019.](#)

²⁰ [Anti-Money Laundering Provisions in Bahamian Law, GS Chambers, 2017.](#)

²¹ [PROJECT SANDDOLLAR: A Bahamian Payments Systems Modernization Initiative, Central Bank of Bahamas. December, 2019.](#)

[The Bahamas Financial Sector Assessment Program. International Monetary Fund, July 2019.](#)

²² [PROJECT SANDDOLLAR: A Bahamian Payments Systems Modernization Initiative, Central Bank of Bahamas. December, 2019.](#)

opportunity to encourage use of local currency while still allowing for the use of USD for those that prefer it.

The Sand Dollar

The Sand Dollar is also a decentralized hybrid CBDC, meaning that while the CBDC has a direct claim on the central bank, financial intermediaries are responsible for disbursement of the Sand Dollar to end users. The Sand Dollar is issued directly into digital wallets facilitated by financial intermediaries, working interoperably with existing legacy systems.²³ It is also available in an offline physical format as a payment card that is linked to an associated digital wallet. Mastercard also recently issued a Sand Dollar prepaid card in collaboration with Island Pay, a Bahamian PSP, that allows users to convert Sand Dollars to traditional Bahamian dollars.²⁴ End users can use the physical card, QR codes or unique alias to access funds.

In 2019, the CBB began piloting the Sand Dollar on the islands of Exuma and Abaco, and released the first nationwide retail CBDC in October 2020.²⁵ The Sand Dollar is backed 1:1 to the Bahamian dollar, which is also pegged to the U.S. dollar and there are \$130,000 USD worth of Sand Dollars in circulation as of December 2020.²⁶ The launch involved the CBB working with financial intermediaries (i.e., banks and credit unions) to ensure that the personal and business wallets facilitating the Sand Dollar were compliant with KYC (know-your-customer) and cybersecurity regulations through provision of multi-factor authentication within the digital wallets. There were also social-media campaigns in place in order to engage end-users and promote adoption of the Sand Dollar.

One of the key benefits for smaller businesses since the launch is the bypassing of transaction fees that are typically associated with other digital payment instruments like credit cards. Additionally, the ability to avoid the handling of physical cash during the COVID-19 pandemic is another benefit for businesses.²⁷

²³[Public Update - The Bahamas Digital Currency Rollout, SandDollar. December, 2020.](#)

²⁴[Mastercard and Island Pay launch Sand Dollar CBDC card, Finextra. February, 2021.](#)

²⁵[Central Bank of Bahamas Launches Landmark 'Sand Dollar' Digital Currency, Coindesk. October, 2020.](#)

²⁶[Central bankers comb for crypto clues as Bahamas launches 'Sand Dollar', Reuters. November, 2020.](#)

²⁷ Ibid.

Case Three: China/People's Bank of China (PBC)

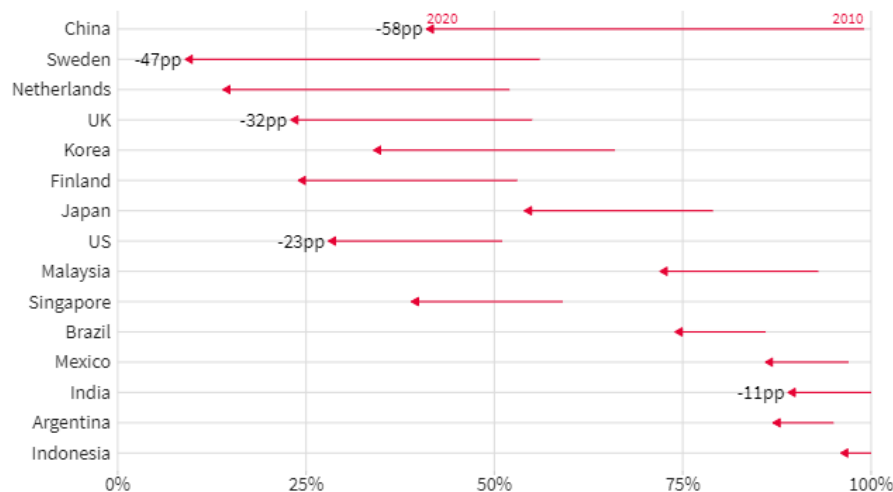
Motivations

China's motivations for CBDC issuance:

- *Rise of alternative payment service providers and decreased cash use* - Around 94 per cent of all mobile transactions in China are facilitated by either Tencent or Alibaba payment services (WeChat Pay and Alipay, respectively).²⁸ Both these services provide ease of access to financial infrastructure to businesses, which has given them a nearly universal use by merchants and consumers alike. Both PSPs also have consolidated financial services (i.e., e-commerce purchases, point-of-sale purchases, peer-to-peer transactions, investments and loans) with social messaging services on one platform, making them ideal for day-to-day consumer use as well. This widespread adoption by both businesses and consumers effectively led to a wide drop in the use of cash in China as the majority of businesses only accept digital payments facilitated by Alibaba or Tencent.²⁹ The decline in the use of physical cash (yuan) has also been accelerated by the COVID-19 pandemic and concerns of transmitting the virus via contact with cash and/or coins.

China's cash use has collapsed over the past 10 years

Share of transactions in cash in 2010 vs estimated 2020



²⁸ [FinTech and market structure in financial services: Market developments and potential financial stability implications, Financial Stability Board. February, 2019.](#)

²⁹ [Don't Even Try Paying Cash in China, New York Times. October, 2020.](#)

The above figure, from [Mckinsey](#) looks at the declining cash use in China over a 10 year period.

- *Rise of digital currencies* - The PBC has been traditionally against the use of cryptocurrencies within their jurisdiction but the potential threat of unregulated cryptocurrencies like Diem (previously known as Libra)³⁰ and Bitcoin developing strong network externalities has pushed them towards creation of a CBDC.
- *High Financial Exclusion* - China has the largest number of citizens that are unbanked (i.e., without accounts at established financial institutions) globally.³¹
- *Reaching international reserve status* - While this [may not be an intentional motivation](#), the creation of a digital yuan can drive its potential to replace the U.S. dollar for international trade as a digital version can help speed up international settlement. However, it is extremely unlikely that digital yuan will reach the same status as USD as the USD still accounts for 88.3 per cent of all international transactions.³²

Digital Currency Electronic Payment (DCEP) Pilot

The digital yuan currently uses a centralized hybrid CBDC model, meaning that while the CBDC has a direct claim on the central bank, the PBC is not responsible for consumer facing operations. This falls onto financial institutions and intermediaries that facilitate the onboarding of users, disbursement of funds and carrying out KYC/AML due diligences. However, the PBC still has full visibility of all transactions made, removing the “anonymity” attributed with physical fiat currency. Digital yuan is disbursed in a digital wallet app that is compatible with existing mobile wallets such as Alipay and WeChat Pay. There is also an “offline” capacity, with the distribution of payment cards that can be used at the point-of-sale and to transfer funds to mobile wallets.

China’s CBDC pilot is arguably the most well known CBDC project globally for a myriad of reasons. This is currently the most advanced CBDC project to be done by a major economic power. China is also the first country to disburse their CBDC pilot using a lottery form to reach end users. In October 2020, the PBC distributed around \$1.5 million USD in digital yuan via mobile app to 50,000 residents in Shenzhen, allowing them to spend it at over 3,000 pre-selected merchants within the region in a week-long trial. The pilot was successful because of the lottery distribution as well as a defined collaboration between the PBC and the private sector. In addition to a rooted collaboration with financial institutions and intermediaries, the PBC also worked with lifestyle apps and service

³⁰ <https://www.diem.com/en-us/>

³¹ FSB.

³² [Comparing Means of Payment: What Role for a Central Bank Digital Currency, Federal Reserve. August 2020.](#)

providers to ensure that the digital yuan would be accepted and promoted. Notably, the PBC worked with popular ride-hailing apps (i.e., Didi Chuxing), food delivery apps (i.e., Meituan) and retailers (i.e., Walmart) to encourage use of digital yuan. A second trial began January 2021, doubling the efforts of the first trial, with the PBC distributing around three million USD in digital yuan to 100,000 residents in Shenzhen and giving them two weeks to spend the funds via the digital yuan mobile wallet app.³³

Case Four: Eurozone/ European Central Bank (ECB)

Motivations

ECB's motivations for CBDC issuance:

- *Low Cash Use* - Across the Eurozone, there have been declines in the overall use of cash and increased demand for electronic payments, which has been accelerated by the COVID-19 pandemic and risks of transmitting the virus via physical contact. It is expected that a digital euro could replicate key attributes of cash (i.e., offline functionality) and guarantee access to central bank money while providing benefits that typically come with digital payments.
- *Reduce overall costs and ecological footprint* - While a digital euro is not expected to replace cash, but rather act as a complement, the ecological impact of printing currency can be reduced with the implementation of a digital euro.
- *Innovation* - It is expected that a digital euro can increase domestic payments efficiency while also working alongside third party PSPs to drive innovation in the retail payments space.³⁴
- *Adoption of other payment methods* - If there was widespread adoption of private currencies (i.e., Diem) and/or other jurisdictions' CBDCs, this could negatively impact the regulatory capacity of the ECB.³⁵

³³ [China's digital currency trial returns to Shenzhen for round two, with twice the participants and double the payout, China Macro Economy. January, 2021.](#)

³⁴ [Report on a Digital Euro, European Central Bank, October 2020.](#)

³⁵ Ibid.

Digital Euro Consultation

The ECB released their consultation on the potential for a retail digital euro in October 2020, positioning key considerations for future design and implementation. The ECB established the following requirements for any potential digital euro:

- 1) Convertibility to fiat currency, central bank reserves and commercial bank deposits.
- 2) Must be a liability of the Eurosystem with the Eurosystem having full autonomy on issuance.
- 3) Universal accessibility.
- 4) Encourage competition within the payments ecosystem; the digital euro should not discourage third party PSPs or financial institutions from continuing to innovate with retail payment offerings.
- 5) A digital euro should be trusted by end users.

The consultation does not signal any preference for a specific CBDC design. As of January 2021, the ECB stated that the response to the consultation on the digital euro received a record of over 8,000 responses from European citizens and institutions. Out of all the responses privacy, security and the ability to use anywhere in Europe were the most important attributes in a digital euro.³⁶ The ECB has established a high-level task force on CBDC involving 19 Eurozone-based central banks to work on the development of a potential digital euro. Currently, the ECB has stated that they will confirm if they will move forward with the launch of a digital euro project in mid-2021. An analysis of the responses to the original consultation report is expected to be published beforehand.³⁷

³⁶ [ECB digital euro consultation ends with record level of public feedback, European Central Bank, January 2021.](#)

³⁷ Ibid.

Appendix³⁸

Region	Project (s)	Stage
Argentina, Banco Central de la Republica Argentina	Proof-of- Concept, based on RSK smart contract network	Assessment
Australia, Reserve Bank of Australia	Initial Research	Assessment
Bahamas, Central Bank of Bahamas	Sand Dollar	Launched
Barbados, Central Bank of Barbados	Digital Barbadian Dollar	Assessment
Brazil, Central Bank of Brazil	SALT	Assessment
Cambodia, Bank of Cambodia	Bakong	Launched
Canada, Bank of Canada	BIS Working Group Contingency Planning	Assessment
Chile, Central Bank of Chile	Initial Research	Assessment
China, People's Bank of China	Digital Currency Electronic Payment Project/ Digital Yuan	Pilot
Eastern Caribbean, Eastern Caribbean Central Bank	DXDC/ Sand Dollar	Assessment
Egypt, Central Bank of Egypt	Initial Research	Assessment
Estonia, Eesti Pank	Estcoin	Assessment
Eswatini, Central Bank of Eswatini	e-Lilangeni	Assessment
Eurozone, European Central Bank	Digital Euro ³⁹	Assessment
Ghana, Bank of Ghana	Initial Research	Assessment
Hong Kong, Hong Kong Monetary Authority	Use of Digital Yuan for cross-border payments	Pilot

³⁸ The appendix takes into consideration “in-progress” retail CBDC projects up until the date of February 15, 2021. List is non-exhaustive - wholesale and cross-currency CBDC projects are not accounted for.

³⁹ France, Italy, Finland, Denmark, Estonia, Lithuania, Netherlands and Norway central banks are all in the research phase of CBDCs but are anticipated to work with ECB moving forward.

India, Reserve Bank of India	Initial Research	Assessment
Iran, Central Bank of Iran	Paymon Crypto-Rial	Assessment
Jamaica, Bank of Jamaica	Initial Research	Assessment
Japan, Bank of Japan	Offline CBDC BIS Working Group	Assessment
Kazakhstan, Central Bank of Kazakhstan	Digital Tenge	Assessment
Kenya, Central Bank of Kenya	Initial Research	Assessment
Lebanon, Banque du Liban	Digital Lebanese Pound	Pilot
Malta, Central Bank of Malta	Initial Research	Assessment
Mauritius, Central Bank of Mauritius	Retail CBDC	Pilot
Norway, Norges Bank	Initial Research	Assessment
Pakistan, State Bank of Pakistan	Initial Research	Assessment
Russia, Bank of Russia	Ruble Stablecoin	Assessment
Rwanda, National Bank of Rwanda	Initial Research	Assessment
Singapore, Monetary Authority of Singapore	Project Ubin	Assessment
South Africa, South Africa Reserve Bank	Khokha	Assessment
South Korea, Bank of Korea	Piloting use of blockchain-based CBDC in a virtual environment	Pilot
Sweden, Riksbank	e-Krona	Pilot
Switzerland, Schweizerische Nationalbank	Partnership with National Stock Exchange of Switzerland (SIX)	Assessment
Thailand, Bank of Thailand.	Digital Baht Project Inthanon	Assessment
Tunisia, Banque Centrale de Tunisie	e-Dinar	Assessment
Turkey, Central Bank of the Republic of	Digital Lira	Pilot

Turkey		
U.S.A., Federal Reserve	Digital Dollar Project	Assessment
Venezuela, Central Bank of Venezuela	Oil-backed Bolivar	Launched