

A Central Bank Digital Currency for India | Proceeding with Cautious Optimism

Working Paper | 31 March 2021

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Acknowledgements

The authors are grateful to: (1) Akihiro Yoshinaga (Senior Consulting Counsel, Legal, International Monetary Fund); (2) Anubhuti Sahay (Head, South Asia Economic Research, Standard Chartered); (3) Arghya Bhattacharya (Assistant Professor, Economics, Ashoka University); (4) Ashraf Khan (Senior Financial Sector Expert, International Monetary Fund); (5) Bornali Bhandari (Senior Fellow, National Council of Applied Economic Research); (6) Indrajit Thakurta (Faculty Member, Indian Institute of Management, Indore); (7) Luciano Somoza (PhD Scholar (Economics), Swiss Finance Institute); (8) Maria S. Martinez Peria (Assistant Director, Research Department, International Monetary Fund); (9) Partha Chatterjee (Professor and Head of Department of Economics, Shiv Nadar University); (10) Rudra Sensarma (Professor, Economics, Indian Institute of Management, Kozhikode); (11) Rahul Bajoria (Chief Economist, Barclays Investment Bank); (12) Tamaro Terracciano (PhD Scholar (Economics), Swiss Finance Institute); (13) Shekhar Tomar (Assistant Professor, Economics and Public Policy, Indian School of Business); (14) Vishwanath Pingali (Associate Professor, Economics, Indian Institute of Management, Ahmedabad), for sharing their valuable insights on central bank digital currencies. Their insights have been instrumental in guiding our research for this working paper.

The authors are also thankful to Jai Vipra (Senior Resident Fellow, Centre for Applied Law and Tech Research, Vidhi Centre for Legal Policy) for her comments on an earlier draft of this paper.

We are also thankful to Aryan Babele (Research Fellow, Fintech) and Vidhi interns Manvi Khanna and Rashi Sharma for their research assistance.

Errors (if any) rest with the authors.

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I. Setting the Context

The history of central banking began with payment services. Since then payment-related innovation has always been an integral part of central banking. Modern examples include the establishment of systems allowing for immediate interbank gross settlement and the recent increased emphasis on faster retail payment systems. Central bank digital currencies (CBDCs) represent another such potential innovation.

Benoît Cœuré and Jacqueline Loh, Bank for International Settlements (March 2018)¹

The worldwide payments landscape is witnessing large-scale changes, as a direct result of technologically mediated interventions. The increasing permeation of digital products has stepped up the demand for an easier, faster, and more cost-efficient global payments system. Across the world, countries are individually considering proposals for and the implications of issuing central bank digital currencies (“CBDCs”) - a digital version of the fiat currency that central banks issue in modern economies.

Digital money is not a new concept. However, the popularity of new technologies, including the distributed ledger technology (“DLT”)² and the rise of new privately issued currencies (stablecoins and cryptocurrencies) has triggered a strong interest in a central bank issued and backed digital money for everyday use. The interest in a centrally operated and possibly cryptographically secured digital cash-equivalent stands in stark contrast to the idea of decentralization first floated by Satoshi Nakamoto in the white paper on “Bitcoin” more than a decade ago.³ The research on CBDCs is still at a nascent stage – however, wide international interest has fuelled progress particularly over the last few years. The Bank for International Settlements (“BIS”) that has been tracking CBDC developments in different countries notes that over the last four years, CBDC work in surveyed jurisdictions grew by one third - with 86% of the 67 central banks participating in BIS’ survey confirming CBDC research in their respective jurisdictions.⁴ Many advanced jurisdictions as well as emerging economies are exploring the possible issuance of a CBDC alongside cash to pursue specific policy priorities relevant for their respective jurisdiction, with many countries testing their pilots. While CBDC is viewed to have the “potential to be the next step in the evolution of money”,⁵ CBDC issuance calls for cautious optimism. The novelty and complexity associated with CBDC involves important questions about its possible impact on the financial system and its stability.

In several countries, CBDCs are increasingly being studied as a potential tool to enable financial inclusion and increase the efficiency of domestic and cross-border payments. Such research is particularly relevant to India which is currently witnessing one of the highest global growth rates of cashless payments⁶ and also has a huge share of unbanked and underbanked population.⁷ However, there is a striking paucity of research and public discourse on both the desirability as well as viability of a CBDC in India. In India, while the reference to CBDC first appeared in 2016, it is only in 2021 that the Reserve Bank of India (“RBI”), India’s central bank formally acknowledged that it has constituted an internal working group⁸ and is examining the need for a CBDC in India.⁹

¹ Committee on Payments and Market Infrastructure, Bank for International Settlements, ‘Central Bank Digital Currencies’ (2018) <<https://www.bis.org/cpmi/publ/d174.pdf>> accessed 22 March 2021.

² “DLT is a way of recording and sharing data across multiple data stores (also known as ledgers), which each have the exact same data records and are collectively maintained and controlled by a distributed network of computer servers, which are called nodes.” See European Parliament, ‘Cryptocurrencies and blockchain’ (2018) <<https://www.europarl.europa.eu/cmsdata/150761/TAX3%20Study%20on%20cryptocurrencies%20and%20blockchain.pdf>> accessed 20 March 2021.

³ Satoshi Nakamoto, ‘Bitcoin: A Peer-to-Peer Electronic Cash System’ (2008) <<https://bitcoin.org/bitcoin.pdf>> accessed 22 March 2021.

⁴ Codruta Boar and Andreas Wehrli, Bank for International Settlements, ‘Ready, Steady, Go? – Results of the third BIS survey on central bank digital currency’ (2021) <<https://www.bis.org/publ/bppdf/bispap114.pdf>> accessed 21 March 2021.

⁵ Bank for International Settlements (BIS), ‘BIS Annual Economic Report’ (2020) <<https://www.bis.org/publ/arpdf/ar2020e3.pdf>> accessed 21 March 2021.

⁶ BIS, Red Book Statistics, Use of payment services/instruments: volume of cashless payments (2019) <<https://stats.bis.org/statx/srs/table/CT5>> accessed 21 March 2021.

⁷ World Bank Group, ‘The Global Findex Database 2017’ (2017) <<https://globalfindex.worldbank.org/>> accessed 21 March 2021.

⁸ “RBI internal panel working on model of central bank’s digital currency, decision very soon”, *The Economic Times* (6 February 2021) <<https://bfsi.economictimes.indiatimes.com/news/policy/rbi-internal-panel-working-on-model-of-central-banks-digital-currency-decision-very-soon/80718180>> accessed 21 March 2021.

⁹ RBI, ‘Booklet on Payment Systems’ (2021) <<https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=20315>> accessed 21 March 2021.

However, unlike many jurisdictions, there is not much publicly available information on India's approach towards CBDC. Research into possible use cases of a CBDC for India appears to be the next logical step in India's journey towards a 'less-cash society'. While many CBDC projects across the globe primarily have a domestic focus, some countries have also conducted bilateral experiments to explore the cross-border use case of CBDC. The G20 has made cross-border payments as a priority. As India prepares to take on the presidency of the G20 countries in 2023, it has the opportunity to set a global discourse on CBDC developments particularly from a cross-border payments perspective.¹⁰

Against this backdrop, this working paper seeks to contribute to the ongoing discourse on CBDC by providing an overview of CBDC developments across the globe, along with an analysis of how such developments compare with the specificities of the Indian context. The working paper does not address the normative question of whether India should issue a CBDC. The working paper hopes to initiate the discussion of a possible digital rupee in India.

Scope and Methodology

While it may be argued that some form of CBDC exists even today in the form of reserve accounts held by financial institutions with the central bank, the transformative nature of recent CBDC initiatives is the retail focus. Such initiatives intend to democratise access to central bank accounts for households and businesses or alternatively, make digital central bank liabilities available to such users. Therefore, this working paper focuses on retail CBDC, and not a wholesale CBDC, which is primarily intended for inter-bank payments. Further, the opportunities, challenges and design choices of a retail CBDC will vary from a wholesale CBDC and accordingly, we propose to study them separately.

The methodology for this working paper incorporates a qualitative review of the extant literature on CBDC developments across the globe. This has been complemented with consultations with experts and academics in the fields of law, economics, and finance to gain insights into how a CBDC may operate in India. In studying geographies, we have attempted to cover a gamut of jurisdictions with diverse social and economic backgrounds, and have relied predominantly on official sources of information. Specifically, we have traced the CBDC research in 43 countries (including the European Union ("EU") and Eastern Caribbean) ("**Surveyed Jurisdictions**")¹¹ which have either published any official report, issued a statement, or released any other document on the official website of the central bank describing or acknowledging its CBDC research. The only exception to this approach has been adopted for the CBDC research in China, for which the authors have relied on secondary literature. Please note that the Surveyed Jurisdictions also include countries that are pursuing research on a wholesale CBDC. For reports on CBDC published on the official website of the central banks, this working paper specifically excludes those reports that have been published with a caveat that the report does not reflect the views of the central bank. This working paper focuses on such reports that have been released by the concerned central bank or has been endorsed by it. The authors believe that such filtration is necessary so that this paper can capture the most accurate stand taken by a particular central bank on CBDC.

In the analysis of potential motivations, risks and design choices, this draft of the working paper does not focus on economic or technical implications and considerations associated with CBDC issuance, as we believe that the same is still evolving and we hope to address the same in our upcoming work.

¹⁰ Financial Stability Board (FSB), 'Enhancing Cross-border Payments: Stage 3 roadmap' (13 October 2020) <<https://www.fsb.org/2020/10/enhancing-cross-border-payments-stage-3-roadmap/>> accessed 21 March 2021.

¹¹ Please note that some projects in certain countries being reported as CBDC projects by news reports have not been considered for this working paper. For instance, the eCFA in Senegal is not included because it is not issued by a central bank. Similarly, Project Bakong in Cambodia is a form of payments infrastructure and not a CBDC. Similarly, in Venezuela, the government has issued a commodity backed crypto-asset. It is will be backed by one barrel of oil, or any other commodity (hydrocarbons or minerals as will be notified by the government from time to time). We are not including the same in the list of Surveyed Jurisdictions given that this may not qualify as a CBDC as the same is not issued by a central bank.

II. Money and CBDC

Money and the Payments System

Money is the central component of all modern economies. To understand digital currencies, it is useful to revisit the concept of money. Broadly, in economic terms, money is understood to serve three functions - a store of value, unit of account, and a medium of exchange.¹² As a store of value, the value of money remains relatively predictable over a large period; as a unit of account, it facilitates a measure of value; and finally, as a medium of exchange, money is used to sell and purchase goods and services.¹³

In modern economies, central banks are the most familiar issuers of money.¹⁴ Central bank money is a claim against the central bank and typically takes two forms - current accounts held with the central bank by designated financial institutions (mostly banks) and cash (banknotes and coins) issued by the central bank that is accessible to the general public as well as to financial institutions and companies. While commercial banks and key financial institutions hold accounts with a central bank, the general public can only hold central bank liabilities in the form of cash.

The central bank is not the only issuer of money. The scope of money also includes money created by the private sector, specifically deposits held by the general public at commercial banks.¹⁵ Therefore, in a modern economy, both central bank and commercial bank money co-exist. Unlike the central bank money, commercial bank money in the form of deposits is a liability against the concerned bank where such deposits are held. This liability is not at par with central bank liability, as commercial banks may default. To mitigate these risks faced by depositors, financial regulation seeks to increase public trust and confidence in such banks, through various means such as deposit insurance, prudential regulation and resolution powers in case of financial distress.¹⁶ The general public, however, perceives and uses these forms of money interchangeably as long as the same is denominated in the same currency. The Committee on Payments and Market Infrastructure (“CPMI”)¹⁷ notes¹⁸ that there are primarily two factors relevant for this - (a) existence of a form of money that has the support of the state / central bank (i.e. the central bank money); and (b) the convertibility of other forms of money (such as commercial bank deposits) into central bank money, and vice versa. The CPMI goes on to note that irrespective of the form that money takes, it is broadly these factors that give rise to the “single character” of currency, which is necessary (though not sufficient as clarified) for money to become the measure of economic value or the unit of account.¹⁹

One of the defining features of money is its ability to serve as a medium of exchange, accepted as means of payment for goods and services.²⁰ To support this function, economies rely on payment systems which are broadly defined as a “set of instruments, procedures and rules for the transfer of funds among participants”.²¹ Generally, payment systems are classified as retail and wholesale payment systems. Retail payment systems cater mostly to households and businesses handling large volumes of low-value payments. This includes payment systems

¹² Arthur Nussbaum, *Basic Monetary Conceptions in Law*, 35 MICH. L. REV. 867 (1937); Michael McLeay, Amar Radia and Ryland Thomas, ‘Money in the modern economy: an introduction’ (*Bank of England Quarterly Bulletin*, 14 March 2014). <<https://www.bankofengland.co.uk/quarterly-bulletin/2014/q1/money-in-the-modern-economy-an-introduction>> accessed 21 March 2021.

¹³ See also N Gregory Mankiw, ‘Macroeconomics, Chapter four: Money and Inflation’ sixth edition (2009) 30 December 2020

¹⁴ CPMI, BIS, ‘The role of central bank money in payment systems’ (2003) <<https://www.bis.org/cpmi/publ/d55.pdf>> accessed 20 March 2021.

¹⁵ Sayuri Shirai, ‘Money and Central Bank Digital Currency’ (*Asian Development Bank Institute Working Paper Series*, February 2019) <<https://www.adb.org/sites/default/files/publication/485856/adb-wp922.pdf>> accessed 21 March 2021.

¹⁶ Anton N. Didenko and Ross P. Buckley, ‘The Evolution of Currency: Cash to Cryptos to Sovereign Digital Currencies’ (2019) 42 *Fordham Int’l L.J.* 1041 (2019)

¹⁷ CPMI is an international standard-setting body that promotes, monitors and makes recommendations for the safety and efficiency of payment, clearing, settlement and related arrangements. The CPMI also serves as a forum for central bank cooperation in related oversight, policy and operational matters, including the provision of central bank services. See also, BIS, ‘CPMI – overview’ (2021) <<https://www.bis.org/cpmi/about/overview.htm>> accessed 20 March 2021.

¹⁸ CPMI, BIS, ‘The role of central bank money in payment systems’ (2003) <<https://www.bis.org/cpmi/publ/d55.pdf>> accessed 20 March 2021.

¹⁹ CPMI, BIS, ‘The role of central bank money in payment systems’ (2003) <<https://www.bis.org/cpmi/publ/d55.pdf>> accessed 20 March 2021.

²⁰ BIS, ‘Central Banks and payments in the digital era’ (*BIS Annual Economic Report*, 2020) <<https://www.bis.org/publ/arpdf/ar2020e3.pdf>> accessed 20 March 2021.

²¹ CPMI, BIS, ‘Principles for financial market infrastructures’ (2012) <<https://www.bis.org/cpmi/publ/d101a.pdf>> accessed 20 March 2021.

facilitating card payments and e-money / e-wallet transactions. A wholesale payment system processes large value payment for interbank settlements, such as the real-time gross settlement system (“RTGS”) typically operated by central banks. Wholesale payment systems tend to settle in central bank money due to the exposure that can arise between the settlement institution and the participants.²² The use of central bank money as a settlement asset in wholesale payment systems reflects the safety and reliability of such form of money. Therefore, the foundation of a safe and efficient payment system is closely tied to the trust in money.

While most transactions in modern economies continue to be supported by central banks, the last few decades have witnessed a radical transformation in payments landscape, with the emergence of new payment methods and interfaces developed by the private sector. Such payment methods appear to have leveraged technological innovations to serve the end-users better. These developments have pushed central banks in several countries to consider whether and how to respond to these market developments in the field of retail payment intermediation, with many central banks focusing on whether to issue a digital version of the central bank currency i.e., a CBDC. The next section seeks to deconstruct the concept of a CBDC as is currently being explored through ongoing research.

Deconstructing a CBDC

There is no well-settled universal definition of a CBDC. The CPMI (2018) notes²³ - “CBDC is not a well-defined term. It is used to refer to a number of concepts. However, it is envisioned by most to be a new form of central bank money. That is a central bank liability, denominated in an existing unit of account, which serves both as a medium of exchange and a store of value.”

A Staff Discussion Note issued by the International Monetary Fund (“IMF”) in 2018 further throws some light on the definition of a CBDC by clarifying that it is ‘a new form of money, issued digitally by the central bank and intended to serve as legal tender’ and which is distinct from other forms of money typically issued by a central bank i.e. banknotes and traditional reserve accounts maintained by banks with the central bank.²⁴

To locate CBDC in the taxonomy of money and to understand the different forms of CBDC, existing literature on CBDCs have relied on the ‘money flower’ designed by M L Bech and Rodney Garratt.²⁵

Bech and Garratt identify four key properties of money: issuer (central bank or other); form (digital or physical); accessibility (wide or restricted); and technology (account or token-based). The CPMI notes that central bank digital money is located at the center of the money flower and highlighted in grey. As discussed above, a CBDC must be distinguished from central bank money in the form of reserves and settlement accounts currently maintained by financial institutions with the central bank (highlighted in the light grey shaded area in the money flower). Based on the properties mentioned in Figure 1, the CPMI notes²⁶ that a CBDC may assume different forms, out of which two are token-based forms of CBDC (token-based general purpose CBDC and token-based wholesale CBDC) and one is an account-based CBDC (account-based general purpose CBDC). While a general purpose CBDC (also referred to as a retail CBDC) would be primarily targeted at households and businesses and

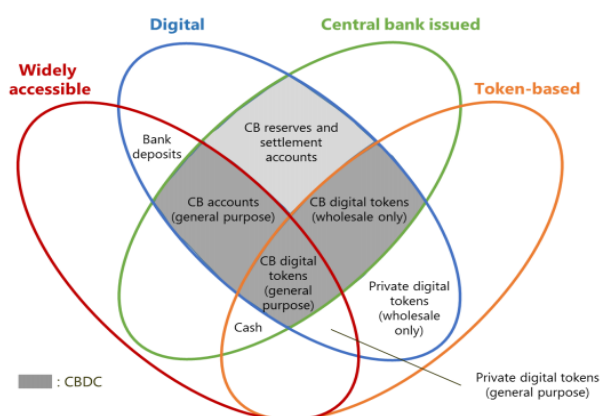


Figure 1: Money Flower [Source: M L Becht and Rodney Garratt, *Central bank cryptocurrencies* (2017)]

CPMI, BIS, 'The role of central bank money in payment systems' (2003) <<https://www.bis.org/cpmi/publ/d55.pdf>> accessed 20 March 2021.

²³ CPMI, BIS, 'Central Bank and Digital Currencies' (2018) <<https://www.bis.org/cpmi/publ/d174.pdf>> accessed 20 March 2021.

²⁴ Tommaso Mancini Griffoli; Maria Soledad Martinez Peria; Itai Agur, et al, 'Casting Light on Central Bank Digital Currency' (*International Monetary Fund (IMF)*, 12 November 2018) <<https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>> accessed 21 March 2021. See also CPMI, BIS, 'Central Bank and Digital Currencies' (2018) <<https://www.bis.org/cpmi/publ/d174.pdf>> accessed 20 March 2021.

²⁵ M L Becht and Rodney Garratt, 'Central bank cryptocurrencies' (*BIS Quarterly Review*, 17 September 2017) <https://www.bis.org/publ/qtrpdf/r_qt1709f.htm> accessed 21 March 2021.

²⁶ CPMI, BIS, 'Central Bank and Digital Currencies' (2018) <<https://www.bis.org/cpmi/publ/d174.pdf>> accessed 20 March 2021.

be made widely available, a wholesale CBDC would only be used for inter-bank payments, security settlements, or other wholesale transactions.

Next, it may be useful to briefly discuss the distinction between an account-based and a token-based CBDC. Broadly, an account-based system is distinguished²⁷ from a token-based system by way of identification requirements. An account-based system relies on the ability of its participants to verify the identity of the account holder. In contrast, a token-based or a store of value system is founded on the transfer of some payment object (banknotes, electronic stored value) between the payer and the payee and depends on the ability of the payee to verify the genuineness of the object / token being transferred - as opposed to the identity of the payor under the account-based system. From a design perspective, an account-based and a token-based CBDC corresponds²⁸ to the two existing types of central bank money - i.e., deposit accounts held at the central bank by commercial banks (account-based) and banknotes (token-based). The distinction between account-based and token-based systems assume significance from a design perspective of a CBDC since regulatory considerations may differ based on the choice of validation. This design may also impact the role of banks and private players in facilitating access to CBDC.

In its simplest form, an account-based CBDC may resemble the existing deposit accounts held by customers with commercial banks, except that in the case of an account-based CBDC, such an account will be held directly with the central bank. Further, unlike, deposits with commercial banks, this form of money will be a claim against the central bank. Transaction will involve transferring CBDC balances from one account to another and will depend on the ability to verify that a payor has the authority to use the account and has sufficient funds in her account.²⁹ Given that such a model may involve central banks assuming functions of account servicing on such a huge scale, which may strain its resources, many commentators have argued that central banks may consider outsourcing the daily operation of core infrastructure, including user-facing and account servicing functions to the private sector.³⁰

Contrary to this, a token-based or a value-based CBDC is likely to involve a digital token issued by and representing a claim on the central bank.³¹ Like banknotes, whoever 'holds' the tokens at a given point in time would be presumed to own the token.³² Transactions in token-based CBDC may depend on the ability to verify

²⁷ See Charles Kahn, Francisco Rivadeneyra, and Tsz-Nga Wong, 'Should the central bank issue e-money?' Federal Reserve Bank of St. Louis Working Paper 2019-003 <<https://s3.amazonaws.com/real.stlouisfed.org/wp/2019/2019-003.pdf>> accessed 20 March 2021; David Chaum, Christian Grothoff, and Thomas Moser, 'How to issue a central bank digital currency' (*Swiss National Bank Working Papers*, 2021-03, 2021) <https://www.snb.ch/en/mmr/papers/id/working_paper_2021_03> accessed 21 March 2021.

²⁸ David Chaum, Christian Grothoff, and Thomas Moser, 'How to issue a central bank digital currency' (*Swiss National Bank Working Papers*, 2021-03, 2021) <https://www.snb.ch/en/mmr/papers/id/working_paper_2021_03> accessed 21 March 2021

²⁹ Tommaso Mancini Griffoli, Maria Soledad Martinez Peria, Itai Agur, et al, 'Casting Light on Central Bank Digital Currency' (*International Monetary Fund (IMF) Staff Discussion Paper*, 12 November 2018) <<https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>> accessed 21 March 2021; Tony Richards, Chris Thompson and Cameron Dark; 'Retail Central Bank Digital Currency: Design Considerations, Rationales and Implications' (*Reserve Bank of Australia Bulletin*, 17 September 2020) <<https://www.rba.gov.au/publications/bulletin/2020/sep/retail-central-bank-digital-currency-design-considerations-rationales-and-implications.html>> accessed 21 March 2021;

David Chaum, Christian Grothoff, and Thomas Moser, 'How to issue a central bank digital currency' (*Swiss National Bank Working Papers*, 2021-03, 2021) <https://www.snb.ch/en/mmr/papers/id/working_paper_2021_03> accessed 21 March 2021.

³⁰ Norges Bank, 'Central Bank Digital Currencies, No 1|2018' (2018) <<https://www.norges-bank.no/contentassets/166efadb3d73419c8c50f9471be26402/nbpapers-1-2018-centralbankdigitalcurrencies.pdf?v=05/18/2018121950&ft=.pdf>> accessed 20 March 2021; Tony Richards, Chris Thompson and Cameron Dark; 'Retail Central Bank Digital Currency: Design Considerations, Rationales and Implications' (*Reserve Bank of Australia Bulletin*, 17 September 2020) <<https://www.rba.gov.au/publications/bulletin/2020/sep/retail-central-bank-digital-currency-design-considerations-rationales-and-implications.html>> accessed 21 March 2021;

David Chaum, Christian Grothoff, and Thomas Moser, 'How to issue a central bank digital currency' (*Swiss National Bank Working Papers*, 2021-03, 2021) <https://www.snb.ch/en/mmr/papers/id/working_paper_2021_03> accessed 21 March 2021.

³¹ Tony Richards, Chris Thompson and Cameron Dark; 'Retail Central Bank Digital Currency: Design Considerations, Rationales and Implications' (*Reserve Bank of Australia Bulletin*, 17 September 2020) <<https://www.rba.gov.au/publications/bulletin/2020/sep/retail-central-bank-digital-currency-design-considerations-rationales-and-implications.html>> accessed 21 March 2021.

³² Tony Richards, Chris Thompson and Cameron Dark; 'Retail Central Bank Digital Currency: Design Considerations, Rationales and Implications' (*Reserve Bank of Australia Bulletin*, 17 September 2020) <<https://www.rba.gov.au/publications/bulletin/2020/sep/retail-central-bank-digital-currency-design-considerations-rationales-and-implications.html>> accessed 21 March 2021.

the authenticity of the token (to avoid counterfeits) rather than establishing the account holder's identity.³³ Settling a transaction using token-based CBDC would require external verification of the tokens. Therefore, transactions might not be entirely anonymous, like cash.³⁴ Considering the novelty of such digital tokens, research on this area is still emerging. To highlight how a token-based system may function, a research report by officers of Sveriges Riksbank ("Riksbank") seeks to explain the transfer of digital tokens authorised through a digital signature using public and private key cryptography, as highlighted in Figure 2.³⁵

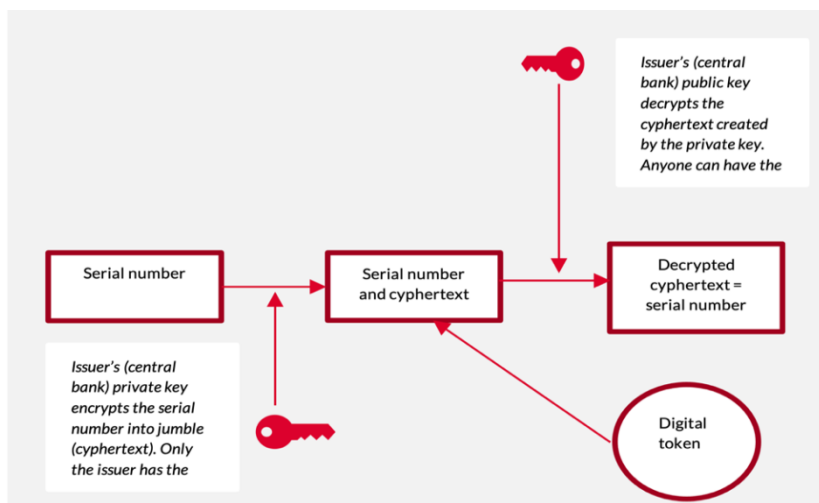


Figure 2: Illustration of how digital tokens may work [Source: Hanna Armelius, et al, *On the Possibility of a cash-like CBDC* (February 2021)]

While the discourse surrounding the taxonomy of digital currencies adopts the account versus token distinction, some have argued that digital currencies can be both token and account-based, and therefore this taxonomy should be shelved until a clearer distinction may be established.³⁶ However, there are some commentators³⁷ that still maintain that such distinction is essential. They observe that there is a distinction between the two insofar as the information that is carried by the information asset. In an account-based system, the assets (accounts) are associated with transaction histories that include all the credit and debit operations involving the accounts. In a token-based system, the assets (tokens) carry information about the value and the entity that issued the token.

This paper does not particularly take into account the specific distinction between an account-based and a token-based CBDC and focuses on retail CBDC, irrespective of the design being account or token-based.

How are CBDCs different from cryptocurrencies and stablecoins?

Following the release of the famous white paper on bitcoin by the anonymous Satoshi Nakamoto in 2008,³⁸ the discourse on cryptocurrencies such as Bitcoin and Ethereum has only amplified, both for its underlying DLT as well as the currency's high volatility. Moreover, Facebook's announcement of the Diem (formerly Libra) project in 2019

³³ Norges Bank, 'Central Bank Digital Currencies, No 1|2018' (2018) <<https://www.norges-bank.no/contentassets/166efadb3d73419c8c50f9471be26402/nbpapers-1-2018-centralbankdigitalcurrencies.pdf?v=05/18/2018121950&ft=.pdf>> accessed 20 March 2021

³⁴ Tommaso Mancini Griffoli, Maria Soledad Martinez Peria, Itai Agur, et al, 'Casting Light on Central Bank Digital Currency' (*International Monetary Fund (IMF) Staff Discussion Paper*, 12 November 2018) <<https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>> accessed 21 March 2021.

³⁵ Hanna Armelius, Carl Andreas Claussen and Isaiah Hull, "On the possibility of a cash-like CBDC" (*Sveriges Riksbank Staff Memo*, February 2021) <<https://www.riksbank.se/globalassets/media/rapporter/staff-memo/svenska/2021/on-the-possibility-of-a-cash-like-cbdc.pdf>> accessed 21 March 2021;

"Public-private key cryptography is a mathematical method for encrypting and decrypting instructions. It uses a widely broadcasted public key as an identifier (akin to a bank account number) and a secretly held private key. Both keys are a string of numbers that are mathematically related to each other via "one-way" mathematical functions. The latter are harder to reverse than to compute.." See BIS, 'BIS Quarterly Review: International banking and financial market developments' (March 2020) <https://www.bis.org/publ/qtrpdf/r_qt2003.pdf> accessed 20 March 2021.

³⁶ Rod Garratt, Michael Lee, Brendan Malone, and Antoine Martin, 'Token- or Account-Based? A Digital Currency Can Be Both' (*Federal Reserve Bank of New York Liberty Street Economics*, 12 August 2020) <<https://libertystreeteconomics.newyorkfed.org/2020/08/token-or-account-based-a-digital-currency-can-be-both.html>> accessed 21 March 2021; Hanna Armelius, Carl Andreas Claussen and Isaiah Hull, "On the possibility of a cash-like CBDC" (*Sveriges Riksbank Staff Memo*, February 2021) <<https://www.riksbank.se/globalassets/media/rapporter/staff-memo/svenska/2021/on-the-possibility-of-a-cash-like-cbdc.pdf>> accessed 21 March 2021.

³⁷ David Chaum, Christian Grothoff, and Thomas Moser, 'How to issue a central bank digital currency' (*Swiss National Bank Working Papers*, 2021-03, 2021) <https://www.snb.ch/en/mmr/papers/id/working_paper_2021_03> accessed 21 March 2021.

³⁸ Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System' (2009) <<https://bitcoin.org/bitcoin.pdf>> accessed 1 January 2020

attracted widespread attention to stablecoins, and thrust yet another term to the world of digital currencies.³⁹ As authorities across the world grapple with the rise of these privately issued digital currencies and related regulatory issues, central banks across several countries are exploring a CBDC as a safe alternative to these privately issued currencies. Therefore, to appreciate such concerns and motivations of central banks, it may also be useful to situate CBDC in the context of such digital currencies.⁴⁰

Historical accounts of monetary instability and failed currencies underscore the significance of the institutional framework through which money is supplied.⁴¹ For money to effectively perform the functions discussed earlier there must be trust in the stability of its value.⁴² Trust in fiat currency stems from the public's belief and trust that the central bank will not go bankrupt and default.⁴³ Over the years, governments have sought to instil such trust and confidence in the fiat currency through the institution of an independent central bank. As discussed above, in modern economies, money is provided through central banks and commercial banks. The previous section already highlights the key role of the central bank as the issuer of currency, provider of safe infrastructure for payments in such currency and in ensuring safe, scalable and efficient payment systems, which in turn generates public confidence in money and the payment systems. While most modern day transactions happen through money and payment systems supported by central banks, the last few years have witnessed the emergence of a variety of private means of payments.

Broadly, cryptocurrencies and stablecoins aspire to be a new form of currency.⁴⁴ Cryptocurrencies rely on cryptography and seeks to be a means of payment. Unlike banknotes which are the liability of the central bank, such currencies are no one's liability and cannot be redeemed, and their value is derived from the expectation that they will be valued and used by others. They allow for digital peer-to-peer exchange and employ DLTs.⁴⁵ Unlike centralised ledgers maintained by central banks to record transactions, in a distributed ledger system, "multiple copies of the central ledger are maintained across the financial system network by a large number of individual private entities."⁴⁶ These ledgers and transactions are validated using cryptography.⁴⁷ Such technologies "allow a consensus to be achieved across members of the network regarding the validity of the ledger."⁴⁸ Economically, although cryptocurrencies are capable of serving the three economic functions of money (store of value, unit of account, and means of payment), it currently fails to fulfil these attributes effectively. Even though there are businesses which have started accepting cryptocurrencies as payment, it can be arguably said to function as means of payment as reports suggest that such businesses remain limited in number.⁴⁹ Further, cryptocurrencies also fail to perform the other two functions of money - store of value and unit of account. The prices of cryptocurrencies fluctuate extremely, sometimes even on an intraday basis. Therefore, the ability to purchase certain goods and

³⁹ See Diem, 'White Paper' (2019) <<https://www.diem.com/en-us/white-paper/>> accessed 1 January 2020

⁴⁰ The term "digital currencies" is broadly used to refer to all forms of digital currencies whether issued by the central bank or private entities. While there may be different types of privately issued digital currencies, this section focuses on cryptocurrencies and stablecoins.

⁴¹ BIS, 'Cryptocurrencies: looking beyond the hype', (BIS Annual Economic Report, 17 June 2018) <<https://www.bis.org/publ/arpdf/ar2018e5.pdf>> accessed 20 March 2021; Agustín Carstens; 'Money in the digital age: what role for central banks?' (February 2018) <<https://www.bis.org/speeches/sp180206.pdf>> accessed 21 March 2021.

⁴² BIS, 'Cryptocurrencies: looking beyond the hype', (BIS Annual Economic Report, 17 June 2018) <<https://www.bis.org/publ/arpdf/ar2018e5.pdf>> accessed 20 March 2021; Agustín Carstens; 'Money in the digital age: what role for central banks?' (February 2018) <<https://www.bis.org/speeches/sp180206.pdf>> accessed 21 March 2021.

⁴³ Amber Wadsworth, 'What is digital currency?' (Reserve Bank of New Zealand, Bulletin Vol. 81, No.3, April 2018) <<https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Bulletins/2018/2018apr81-03.pdf?revision=986f16e9-262e-4e60-b789-f46a44eeb858>> accessed 21 March 2021.

⁴⁴ BIS, 'Cryptocurrencies: looking beyond the hype', (BIS Annual Economic Report, 17 June 2018) <<https://www.bis.org/publ/arpdf/ar2018e5.pdf>> accessed 20 March 2021

⁴⁵ BIS, 'Cryptocurrencies: looking beyond the hype', (BIS Annual Economic Report, 17 June 2018) <<https://www.bis.org/publ/arpdf/ar2018e5.pdf>> accessed 20 March 2021.

⁴⁶ Dong He, Karl Habermeier, Ross Leckow, et al, 'Virtual Currencies and Beyond: Initial Considerations' (IMF Staff Discussion Note, 2016) <<https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>> accessed 21 March 2021.

⁴⁷ Dong He, Karl Habermeier, Ross Leckow, et al, 'Virtual Currencies and Beyond: Initial Considerations' (IMF Staff Discussion Note, 2016) <<https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>> accessed 21 March 2021

⁴⁸ Dong He, Karl Habermeier, Ross Leckow, et al, 'Virtual Currencies and Beyond: Initial Considerations' (IMF Staff Discussion Note, 2016) <<https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>> accessed 21 March 2021.

⁴⁹ Reserve Bank of Australia, 'Cryptocurrencies' <<https://www.rba.gov.au/education/resources/explainers/cryptocurrencies.html>> accessed 28 March 2021; Deutsche Bank Research, 'Part III. Digital Currencies: the Ultimate Hard Power Tool' (2020) <https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD000000000504589/The_Future_of_Payments_-_Part_III_Digital_Currenc.pdf?undefined&reload=X1g6gsYcZciRck3pr4ShAJMW8eblekM41~u~ZLHIQzdEITXI4HBozExiafe/Vv19xSEp mSRyOv89FRu~M2IRUQ==> accessed 28 March 2021; Garrick Hileman and Michel Rauchs, 'Global Cryptocurrency Benchmarking Study' (2017) <<https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2017-04-20-global-cryptocurrency-benchmarking-study.pdf>> accessed 29 March 2021.

services (purchasing power) using cryptocurrencies varies over time, and makes it a poor store of value.⁵⁰ There is not much evidence to support that cryptocurrencies are used as a unit of account. The extreme volatility of such currencies is likely to prevent them from becoming a useful unit of account. As mentioned earlier the value of such currencies may change on a day to day basis, thereby requiring retailers to recalculate prices frequently, which can be costly and confusing. Therefore, the uncertainty in their market value often makes cryptocurrencies difficult to be used a valid reference point for setting consumer prices.⁵¹

To deal with some of the shortcomings of cryptocurrencies especially concerns relating to the volatility of such currencies, some privately issued crypto-assets known as 'stablecoins' have emerged, which tie the value of such stablecoins to some underlying asset such as fiat currencies.⁵² The Financial Stability Board ("FSB") notes that a stablecoin "commonly refers to a crypto-asset that aims to maintain a stable value relative to a specified asset, or a pool or basket of assets. In turn, the value of these assets typically determines or affects the market value of a stablecoin."⁵³ The FSB further notes that while stablecoins may have the potential to bring efficiencies to payments (including cross-border payments), a widely adopted stablecoin (commonly referred to as 'global stablecoins'), with a potential reach and use across multiple jurisdictions could become systemically important across one or more jurisdictions, thereby giving rise to systemic risks if not regulated. While there are several arguments for and against such cryptocurrencies and stablecoins, the discussion on the same is outside the scope of this working paper. This section seeks to set out the basic distinction between these currencies and CBDC to set the context for a discussion on why certain Surveyed Jurisdictions are looking at CBDCs as an alternative to deal with the concerns that emanate from such privately issued currencies.

	Fiat currency	CBDC	Cryptocurrency	Stablecoin
Issuer	Central bank/state	Central banks are envisaged to issue CBDC	Private entity	Private entity
Intrinsic Value	None	None	None	Value may be pegged to some underlying asset such as fiat currencies
Legal Tender ⁵⁴	Yes	Likely to be conferred a legal tender	No	No
medium of exchange	Yes	Likely to be designed as a generally acceptable means of payment	Yes, but in limited cases. Not acceptable if a jurisdiction bans the same.	Yes, but in limited cases
Regulation	The central bank retains control over issuance. The powers of the central bank are commonly circumscribed through legislation.	No regulation in place, since CBDC is yet to be issued.	The regulatory regime for cryptocurrencies is still evolving, with ban / restrictions on use being witnessed in many jurisdictions. Many regulate them as crypto-assets or securities. ⁵⁵	No definitive legal scheme has been enacted so far.

⁵⁰ Reserve Bank of Australia, 'Cryptocurrencies' <<https://www.rba.gov.au/education/resources/explainers/cryptocurrencies.html>> accessed 28 March 2021; Committee on Banking, Housing, and Urban Affairs, 'Senate Hearing on Exploring the Cryptocurrency and Blockchain Ecosystem' (2018) <<https://www.govinfo.gov/content/pkg/CHRG-115shrg34525/pdf/CHRG-115shrg34525.pdf>> accessed 28 March 2020.

⁵¹ Eddie GERBA, Margarita RUBIO, 'Virtual Money: How Much do Cryptocurrencies Alter the Fundamental Functions of Money?' (December 2019) <<https://www.europarl.europa.eu/cmsdata/207652/12.%20PE%20642.360%20LSE%20final%20publication-original.pdf>> accessed 29 March 2021; Reserve Bank of Australia, 'Cryptocurrencies' <<https://www.rba.gov.au/education/resources/explainers/cryptocurrencies.html>> accessed 28 March 2021; Committee on Banking, Housing, and Urban Affairs, 'Senate Hearing on Exploring the Cryptocurrency and Blockchain Ecosystem' (2018) <<https://www.govinfo.gov/content/pkg/CHRG-115shrg34525/pdf/CHRG-115shrg34525.pdf>> accessed 28 March 2020.

⁵² Bank of England, 'Discussion Paper: Central Bank Digital Currency Opportunities, challenges and design' (2020) <<https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf?la=en&hash=DFAD18646A77C00772AF1C5B18E63E71F68E4593>> accessed 20 March 2021.

⁵³ Financial Stability Board, 'Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements' (2020) <<https://www.fsb.org/wp-content/uploads/P131020-3.pdf>> accessed 20 March 2021.

⁵⁴ "Legal tender status is an important statutory characteristic of cash. Such status means that a party to a payment may demand cash settlement unless the parties agree otherwise." Norges Bank, 'Central Bank Digital Currencies, No 1|2018' (2018) <<https://www.norges-bank.no/contentassets/166efadb3d73419c8c50f9471be26402/nbpapers-1-2018-centralbankdigitalcurrencies.pdf?v=05/18/2018121950&ft=.pdf>> accessed 20 March 2021.

⁵⁵ See for example Library of Congress, 'Regulation of Cryptocurrency Around the World' (2018) <<https://www.loc.gov/law/help/cryptocurrency/world-survey.php>> accessed 1 January 2020.

III. Analysis of CBDC Developments in Surveyed Jurisdictions

As research on CBDC development picks up in different jurisdictions, this section focuses on various motivations and opportunities driving CBDC research in the 43 Surveyed Jurisdictions. In doing so, this section briefly discusses the challenges and the possible designs which are being explored in Surveyed Jurisdictions. Key findings from this analysis will be relevant to inform the CBDC research in India. A detailed list of all the Surveyed Jurisdictions along with their status of CBDC developments is set out in **Annexure A**.⁵⁶

KEY FINDINGS

- *Most Surveyed Jurisdictions have adopted either a positive or a neutral stance towards CBDC issuance. Irrespective of their stance, most Surveyed Jurisdictions continue to research on CBDC, should the need to issue a CBDC may arise in the future.*
- *Most Surveyed Jurisdictions (around 26) are exploring a retail or general purpose CBDC and around 8 Surveyed Jurisdictions are exploring a wholesale CBDC, primarily for cross-border payments. There is limited information available on the design of the CBDC for the remaining Surveyed Jurisdictions.*
- *19 Surveyed Jurisdictions have published a report on their CBDC research. This includes reports published by 6 Surveyed Jurisdictions on their cross-border wholesale CBDC tests. As discussed in the project methodology, this report excludes reports which have been published by individual authors at central banks and which have been issued with a disclaimer that the report does not reflect the official position of the central bank.*
- *8 Surveyed Jurisdictions have either completed their pilots or are in the process of conducting their pilots on retail CBDCs. Out of these, only Bahamas has announced a national rollout of its CBDC.*
- *2 Surveyed Jurisdictions have completed their call for applications from private players for testing their CBDC pilots.*
- *CBDC developments in 18 Surveyed Jurisdictions are based on official statements made by the central bank officers (published on the website of the central bank) or any statement in an official document released by the central bank. This also includes countries which have made announcements to launch their pilots.*
- *The research work, announcements, launch of pilots and release of reports in the Surveyed Jurisdictions have occurred primarily between the years 2017-2020, with the exception of Ecuador. Notably, around 20 Surveyed Jurisdictions have witnessed official announcements or have released reports on CBDC last year, post the outbreak of the COVID-19 pandemic.*
- *The motivation for CBDC issuance and its design is linked to local circumstances of Surveyed Jurisdictions. Broadly, advanced jurisdictions where penetration of digital payments is high and cash use is declining, CBDC development is motivated by policy priorities such as dealing with the decline in the use of cash and promoting innovation, competition and resilience in the payments landscape. In emerging economies with a lower penetration of digital payments, financial inclusion appears to be an important driver.*

⁵⁶ For referring to the source of the official position of any Surveyed Jurisdiction as cited in this chapter, the reader may refer to the reports cited in Annexure A.

- The analysis also reflects some common motivations, approaches and features for CBDC issuance among several Surveyed Jurisdictions. Pertinently, Surveyed Jurisdictions view CBDC as a complement to cash and not its substitute. Many jurisdictions are also exploring a possible role for private players as intermediaries in the provision of CBDC. None of the Surveyed Jurisdictions are pursuing a synthetic CBDC, where a CBDC is a claim on intermediaries rather than on central banks.

Status of CBDC Research

The Surveyed Jurisdictions are in different stages of their respective CBDC research. Most jurisdictions are in an exploratory research phase to identify the opportunities, use cases, possible designs and potential risks associated with CBDC issuance. Even at this stage, while certain countries have made only announcements regarding their CBDC projects, a few countries have released reports on the findings of their ongoing research. For instance, Surveyed Jurisdictions like Australia, Brazil, United States of America (“USA”), Malaysia, South Africa, etc. have only made announcements regarding their CBDC research. On the other hand, Surveyed Jurisdictions like United Kingdom (“UK”), Russia, Japan, Sweden, Iceland, Eswatini, Norway, etc. have released reports on their CBDC research. Even within this group of countries, countries like UK, Iceland and Sweden are exploring specific models in their reports.

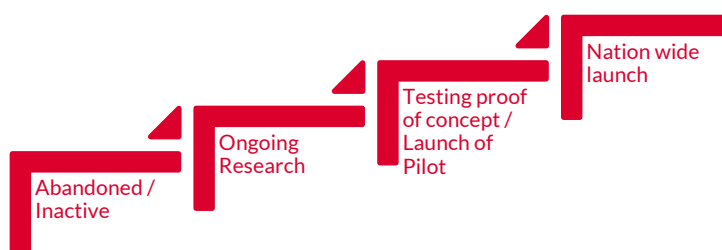


Figure 3: Status of CBDC Research in Surveyed Jurisdictions

Around 8 Surveyed Jurisdictions are in the process of testing or have conducted tests of their pilots / proof of concepts. Under these pilots, CBDC is typically issued on an experimental basis in a controlled environment to identify use cases, and assess the opportunities and risks associated with such issuance. This also includes Surveyed Jurisdictions that are exploring the application of a wholesale CBDC to cross-border payments such as Hong Kong, Thailand, Switzerland, Australia, United Arab Emirates and Saudi Arabia. Similarly, in the case of retail CBDCs, countries like China and Eastern Caribbean are at an advanced stage of pilot launches. In the case of China, it is reported that the People’s Bank of China has piloted its retail CBDC known as the Digital Currency Electronic Payment in four cities.⁵⁷ The Eastern Caribbean Central Bank (“ECCB”) has also launched DXCDCaribe pilot for their retail CBDC.⁵⁸ In Ukraine, the National Bank of Ukraine (“NBU”) has completed and published the findings of a pilot project that envisaged the creation of the “Electronic Hryvnia (e-hryvnia) platform”, issuance of a limited amount of the e-hryvnia and testing of e-hryvnia transactions made by NBU personnel and companies participating in this project. All these pilots appear to involve a tiered CBDC model, which also involves entities from the private sector - typically regulated financial institutions. In 2014, the Central Bank of Ecuador launched a project “Dinero electrónico” (electronic money) allowing retail customers to make mobile payments through a central bank operated system.

No advanced jurisdiction has formally issued a CBDC on a large scale. However, in October 2020, the Central Bank of Bahamas issued a notice stating that pursuant to its CBDC project, the 'sand dollar' which is a digitized version of the Bahamian dollar was available for nationwide use.⁵⁹ On 15 February 2021, the central bank has issued a

⁵⁷ Raphael Auer, Giulio Cornelli and Jon Frost, ‘Rise of the central bank digital currencies: drivers, approaches and technologies’ (BIS Working Papers No 880, August 2020) <<https://www.bis.org/publ/work880.pdf>> accessed 21 March 2021.

⁵⁸ Eastern Caribbean Central Bank, ‘ECCB Digital EC Currency Pilot’ (2019) <<https://www.eccb-centralbank.org/p/about-the-project>> accessed March 2021.

⁵⁹ Sand Dollar, ‘Nationwide Launch’ (2020) <<https://www.sanddollar.bs/publicupdates/nationwide-launch>> accessed 20 March 2021

consultation paper setting out the proposed regulatory framework for wallet providers that will hold the sand dollar.⁶⁰

Certain Surveyed Jurisdictions such as Canada and Switzerland have also announced that they do not plan to issue a retail CBDC anytime soon.⁶¹ It is due to their finding that CBDC will not provide any value addition to the existing retail payments infrastructure. However, even in such jurisdictions, central banks continue to research on CBDCs, should a need arise in the future. Notably, while jurisdictions like Australia and Switzerland have decided to not issue a retail CBDC, they continue to explore a wholesale use case for CBDC.

Preliminary Motivations driving CBDC Research

There are different factors responsible for pushing central banks in different countries to warm up to the idea of a CBDC. This section highlights some common motivations / opportunities in many Surveyed Jurisdictions. Pertinently, the opportunities presented by a CBDC may vary depending on the stage of economic development of a country and whether a country is considering a wholesale or a retail CBDC. Existing literature also points out that the increasing emphasis on digital payments during the COVID-19 crisis and the ensuing national lockdowns may have further provided an impetus to CBDC research in different jurisdictions.⁶² Notably, around 20 Surveyed Jurisdictions witnessed some official announcements or release of a report on CBDC in the last year, post the outbreak of the COVID-19 pandemic.

Responding to decline in the use of cash

Access to CBDC as a digital alternative to cash is being explored in certain Surveyed Jurisdictions (primarily in the EU) witnessing a decline in the usage of cash. Such developments appear to be a consequence of the general trend towards digitisation in society and the emergence of private players in the payments space that are offering different forms of digital payment solutions. The access to risk-free assets in the form of central bank money is feared to cease in case of a decline in cash with no other alternative.⁶³ CBDC may ensure continued access to legal tender for households and companies even without cash. However, given that the usage of cash and digital payments varies from country to country, the decline in cash is not a relevant factor for all countries to explore CBDC. This factor has been mostly discussed in the context of countries like Sweden,⁶⁴ Norway, Canada, and the UK. The relevance of this factor in such countries is evident from the ratio of cash in circulation to gross domestic product (GDP) in these countries. For instance, the percentage of cash in circulation to GDP in Sweden and the UK is 2.3% and 3.4% as compared to 12% in India.⁶⁵ In many developing and emerging economies, cash is still a dominant form of payment. In such countries, this may not be a relevant motivation for CBDC research. However, there are exceptions like Japan which despite having a high ratio of cash in circulation to nominal GDP (i.e. around 20%) is exploring a CBDC to account for a scenario where the cash in circulation drops sharply in the future.⁶⁶

Responding to the evolution of privately issued digital currencies

The rise of privately issued digital currencies (whether cryptocurrencies or stablecoins) and the desire to provide a risk-free alternative to such currencies appears to have driven CBDC research in some advanced jurisdictions.

⁶⁰ The Central Bank of the Bahamas, 'Consultation Paper: Proposed Legislation for the Regulation of the provision and use of Central Bank issued Electronic Bahamian Dollars' (2021) <<https://www.centralbankbahamas.com/viewPDF/documents/2021-02-15-11-24-12-Central-Bank-Electronic-Bahamian-Dollars-Regulations-2021.pdf>> accessed 20 March 2021.

⁶¹ This includes jurisdictions like Canada, Israel, Denmark, Trinidad & Tobago and Australia (for retail CBDC).

⁶² BIS, 'Covid-19, cash and the future of payments' (BIS Bulletin No. 3, 3 April 2020) <<https://www.bis.org/publ/bisbull03.pdf>> accessed 20 March 2021.

⁶³ Sveriges Riksbank, 'The Riksbank's e-krona project Report 1' (September 2017) <https://www.riksbank.se/globalassets/media/rapporter/e-krona/2017/rapport_ekrona_uppdaterad_170920_eng.pdf> accessed 20 March 2021.

⁶⁴ "The picture of rapidly-declining cash usage becomes stronger when we examine other sources. Interview surveys by the Riksbank indicate that the proportion of cash payments in the retail sector have fallen from close to 40 per cent in 2010 to about 15 per cent in 2016. Two-thirds of consumers say they can manage without cash and just as many mostly use cards for payments under SEK 100. The Riksbank's own investigations reveal that 97 per cent of consumers never or less often than once a month experience that they cannot pay in cash. It is thus the consumers that are abandoning cash, not the retailers. The problems primarily seem to revolve around the possibility of depositing cash in bank accounts. At more than half of all bank branches, it is not possible to conduct over-the-counter cash transaction". See Sveriges Riksbank, 'The Riksbank's e-krona project Report 1' (September 2017) <https://www.riksbank.se/globalassets/media/rapporter/e-krona/2017/rapport_ekrona_uppdaterad_170920_eng.pdf> accessed 20 March 2021.

⁶⁵ BIS, Red Book Statistics, 'Banknotes and coins in circulation' (2019) <<https://stats.bis.org/statx/srs/table/CT5>> accessed 21 March 2021.

⁶⁶ Bank of Japan, 'The Bank of Japan's Approach to Central Bank Digital Currency' (2020) <https://www.boj.or.jp/en/announcements/release_2020/data/rel201009e1.pdf> accessed 20 March 2021.

Existing literature points out that a “tipping point” in CBDC research was the announcement of Facebook’s Libra.⁶⁷ Surveyed Jurisdictions like Canada, EU, UK, the Netherlands and Norway specifically refer to digital currencies issued by private players as an important factor motivating the central banks towards initiating CBDC research. The concerns associated with such privately issued currencies have already been discussed earlier, which includes payment risks, systemic risks and volatility, stemming from fluctuations in their value. Unlike bank deposits and e-money / prepaid payment instruments, which are governed by prudential regulations that protect against systemic risks, similar protections are not currently available in many countries for privately issued digital currencies.

Fostering digitisation of the economy

The issuance of a CBDC is also viewed by certain Surveyed Jurisdictions as a way to foster the digitisation of the economy and to support the development of innovative payment solutions. For instance, the Bank of England (“BoE”) notes that CBDC could facilitate ‘programmable money’ by enabling transactions to occur according to certain conditions. Possible applications discussed by BoE includes automatic routing of tax payments to tax authorities at point of sale, automatic payment of dividends to shareholders, or electricity meters paying suppliers directly based on power usage, etc. Notably, this issue has been discussed by EU, UK and Japan in the context of two-tiered CBDC model which envisages the involvement of private players to provide access to CBDC and other overlay or value added services to consumers.

Supporting a resilient payment system

The reliance on digital payments increases with the continued shift from cash to such modes of payments, which makes the operational resilience of payment systems critical. In the event, the payment systems operated by the private sector are disrupted due to some technical issue or financial distress of the concerned operator, it is argued that CBDC can provide an alternative to users.⁶⁸ This may be important if cash based payments gradually decline. In this regard, certain Surveyed Jurisdictions are also exploring if CBDC could contribute to the resilience of payment systems by providing an alternative to existing digital payment options. However, such concerns can also be mitigated by ensuring the operation of a large variety of payment systems.

Promoting efficiency, competition and innovation in the payments market

Some Surveyed Jurisdictions are exploring a CBDC model that can improve the efficiency of existing digital payment options by increasing competition and innovation in the payments market. This is an important motivation particularly in jurisdictions where existing digital payment solutions present opportunities for improvements. For instance, the BoE notes that while card payments appear near-instantaneous to the user, the merchant may have to wait up to three days to receive funds. Similarly, the ECCB launched its pilot CBDC project taking into account the high cost associated with existing banking services and current payment methods, inadequacy of banking services to address the needs of various customers and inefficient methods of settling cheque transactions.⁶⁹ The Bank of Japan (“BoJ”) takes note of the discrepancies in existing digital payment solutions and the incapacity to execute person-to-person transfers across payment platforms. In this regard, BoJ argues that CBDC may be able to improve the consumer convenience and the efficiency of payment systems by interlinking private digital money to make exchange easier.

The scope for improvement in the payments market is particularly critical in developing and lower-middle income countries. For instance, Eswatini published a report setting out the findings of a study where the central bank investigated CBDC issuance in relation to three core use cases - consumer demand, national payment efficiency, and economic policy. Analysis of all three use cases suggested that the payment use case displayed the strongest and most direct opportunity for the implementation of the retail CBDC in Eswatini. The central bank notes that this opportunity stems from the relative constraints faced by the current retail payment clearing house in facilitating real time, ubiquitous and intensively used digital payments.

⁶⁷Raphael Auer, Giulio Cornelli and Jon Frost, ‘Rise of the central bank digital currencies: drivers, approaches and technologies’ (*BIS Working Papers No 880*, August 2020) <<https://www.bis.org/publ/work880.pdf>> accessed 21 March 2021.

⁶⁸Sweden, EU and UK. Please refer to the reports released by the central banks in these countries and cited in Annexure A. For sake of brevity, the same are not separately cited here.

⁶⁹ Eastern Caribbean Central Bank, ‘ECCB Digital EC Currency Pilot’ (2019) <<https://www.eccb-centralbank.org/p/about-the-project>> accessed 20 March 2021.

Notably, the promotion of these objectives can also happen indirectly, through the creation of a competitive payments landscape, particularly in the context of CBDC models which involve public-private partnership. For instance, BoE notes that a CBDC platform as is being explored in the UK could enable the entry of private players to offer CBDC related payment services, which in turn can promote competition and may encourage such players to compete to offer CBDC related payment services and innovate for end users.

While central banks note that CBDC may play an important role in increasing payment diversity and become a common means to transfer between closed systems, they also point out that the same may be achieved through an accessible fast payment system.⁷⁰ This highlights that countries must undertake a cost benefit analysis of CBDC issuance *vis-à-vis* existing alternatives.

Promoting financial inclusion

CBDC could ensure continued access to central bank money for retail users (household and companies) even with the decline in cash. CBDC may promote financial inclusion as it can enable people to make digital payments using central bank money, while doing away with the need to open a separate bank account with a commercial bank. Such a motivation is primarily relevant for countries with underdeveloped financial systems and low financial penetration. This is the reason why certain Surveyed Jurisdictions like Ukraine, Eastern Caribbean and Jamaica are pursuing CBDC research to promote financial inclusion. However, even in Surveyed Jurisdictions with a well-developed payments market (such as Canada, EU, Japan, UK, Sweden, etc), central banks note that increasing digitalisation could leave some segments of the population behind due to potential barriers around trust, digital literacy and access to adequate infrastructure.⁷¹ In such cases, other forms of exclusion may arise. For instance, it is argued⁷² that certain groups in society, such as the elderly, or people with some disability may find it challenging to use digital payments. In case of Sweden⁷³ it has been pointed out that such segments of the population find it hard to make payments, since not all shops, restaurants and cafés accept cash, and their problems might increase in the future. Since these groups have very different needs, it may not be commercially viable for private firms with a large market share to develop different forms of payment methods suitable for specific needs of different segments of the society.

Reimagining the role of central bank in a digital economy

The central bank is typically the issuer of currency. With the rise of privately issued digital currencies and the decline in the use of cash in certain jurisdictions, it is necessary to reimagine the role of a central bank as an issuer currency in a digital world. CBDC is likely to ensure that citizens continue to have access to risk free central bank money in addition to cash and use it to make payments.

Responding to the rise of foreign CBDCs

A 2020 report⁷⁴ released by BIS pursuant to a collaboration between Bank of Canada, the European Central Bank (“ECB”), BoJ, Riksbank, Swiss National Bank, BoE, Board of Federal Reserve System and BIS, highlights the risks posed by foreign CBDCs and its impact on the national economy. Pertinently, central banks are quick to point out that the same may not be an imminent threat as the rise of challenger currencies have emerged in case of countries facing severe political or social unrest. However, it may be prudent to assess a potential scenario where a foreign CBDC assumes a major role in the domestic payment systems, raising concerns about its impact on “monetary sovereignty”. This may negatively impact the ability of the central bank to effect price and financial stability⁷⁵ as the spending of households will then be linked to a currency over which the central bank will have no control.

⁷⁰ ‘Central bank digital currencies: foundational principles and core features’ (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021. This is a Report no 1 in a series of collaborations from a group of central banks.

⁷¹ ‘Central bank digital currencies: foundational principles and core features’ (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

⁷² Sveriges Riksbank, ‘Second special issue on the e-krona’ (Sveriges Riksbank Economic Review, 2020) <<https://www.riksbank.se/globalassets/media/rapporter/pov/engelska/2020/economic-review-2-2020.pdf>> accessed 20 March 2021.

⁷³ Sveriges Riksbank, ‘Second special issue on the e-krona’ (Sveriges Riksbank Economic Review, 2020) <<https://www.riksbank.se/globalassets/media/rapporter/pov/engelska/2020/economic-review-2-2020.pdf>> accessed 20 March 2021.

⁷⁴ ‘Central bank digital currencies: foundational principles and core features’ (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

⁷⁵ Bank of Canada, ‘Contingency Planning for a Central Bank Digital Currency’ (2020) <<https://www.bankofcanada.ca/2020/02/contingency-planning-central-bank-digital-currency/>> accessed 19 March 2021.

Promoting efficiency in cross-border payments

For many advanced jurisdictions pursuing wholesale CBDC, improving the efficiency of cross-border payments has been a primary use case. Currently, cross-border funds transfers are costly and time-consuming, with one report suggesting that the transaction processing fee for such transfers can cost an average of 7% of a transaction.⁷⁶ There are time lags for such fund transfers, during which counterparties are exposed to credit and settlement risk.⁷⁷ Such cross border transactions typically involve domestic banks relying on correspondent banks.⁷⁸ The report by the Hong Kong Monetary Authority (“HKMA”) and Bank of Thailand (“BoT”) points out that such cross-border transactions involve multiple communications and transfers through correspondent banks, which ultimately results in an inefficient and lengthy process. To add to this, the report points out that different formats / standards for payment messages and technology pose further challenges to the correspondent banking model. In the context of retail CBDCs, BoE has discussed the possibility of central banks working together to link domestic CBDCs to ensure fast and efficient cross-border payments. BoE argues that this can be achieved through designing a common set of standards to support interoperability.

Possible Designs of a CBDC

The design of a CBDC is closely linked to its object and the possible use cases identified by the central bank its issuance. Most Surveyed Jurisdictions are in the process of exploring different designs, most of which appear to involve some form of public-private partnership in the form of a tiered CBDC. This section discusses several aspects of CBDC design that are being considered in the Surveyed Jurisdictions. As discussed above, this working paper does not deal with the technological and economic design aspects of CBDC.

Retail or wholesale

Around 26 Surveyed Jurisdictions are exploring a retail or a general purpose CBDC. However, Surveyed Jurisdictions like Australia and Switzerland have preferred to explore a wholesale CBDC over a retail CBDC. This is based on their finding that a retail CBDC does not have any value proposition for the existing retail payments market. A recent paper released by BIS⁷⁹ finds that countries with a larger informal economy are exploring retail CBDCs, while wholesale CBDCs are being explored in advanced economies with higher financial development. This is true to a certain extent as per our analysis, especially for wholesale CBDCs. For instance, wholesale CBDCs, mostly in the context of cross-border payments are being explored in advanced jurisdictions like Singapore, Australia, etc. However, in the context of retail CBDCs, our findings indicate that retail CBDC is also being explored in countries with lower financial penetration (based on World Bank Findex data)⁸⁰ such as Ghana, Madagascar, Uruguay and Ukraine as well as in advanced jurisdictions like UK, EU and Japan. In many advanced jurisdictions, the decline in the use of cash has brought to the fore the issue of CBDC.

Role of the central bank and the private players in the CBDC design

Different CBDC models are being explored by the Surveyed Jurisdictions. Particularly, many central banks are considering a CBDC structure that involves participation of private players. Broadly, CBDC models may be classified into two categories based on public-private participation - direct model and two-tiered / indirect model. Under the direct model, the central bank is broadly responsible for all aspects of CBDC issuance and providing CBDC access to end users. Under the indirect / two-tiered model (“**Two-tiered CBDC Model**”), some Surveyed Jurisdictions are exploring a platform model where the central bank develops a core system that third parties could use to build services for end users. Under both models, the CBDC is a claim against the central bank. The adoption of either of these CBDC models will be primarily related to the breadth and depth of the financial sector

⁷⁶ Rodrigo Mejia-Ricart, Camilo Tellez and Marco Nicoli ‘Paying across borders - Can distributed ledgers bring us closer together?’ (26 March 2019) <<https://blogs.worldbank.org/psd/paying-across-borders-can-distributed-ledgers-bring-us-closer-together>> accessed 20 March 2021

⁷⁷ BoT and HKMA, ‘Inthanon-LionRock: Leveraging Distributed Ledger Technology to Increase Efficiency in Cross-Border Payments’ (2020) <https://www.hkma.gov.hk/media/eng/doc/key-functions/financial-infrastructure/Report_on_Project_Inthanon-LionRock.pdf> accessed 19 March 2021.

⁷⁸ Financial Action Task Force (FATF) defines correspondent banking as the “provision of banking services by one bank (the “correspondent bank”) to another bank (the “respondent bank”). Such correspondent banks are necessary because it allows domestic banks to gain access to a wider global financial market without the hassle of opening overseas branches.” See FATF, ‘FATF Guidance on Correspondent Banking Services’, (October 2016) <<https://www.fatf-gafi.org/media/fatf/documents/reports/Guidance-Correspondent-Banking-Services.pdf>> accessed 20 March 2021.

⁷⁹ Raphael Auer, Giulio Cornelli and Jon Frost, ‘Rise of the central bank digital currencies: drivers, approaches and technologies’ (BIS Working Papers No 880, August 2020) <<https://www.bis.org/publ/work880.pdf>> accessed 21 March 2021.

⁸⁰ World Bank Group, ‘The Global Findex Database 2017’ (2017) <<https://globalfindex.worldbank.org/>> accessed 21 March 2021.

of a particular country, the financial market infrastructure, standards and supervisory authority of the central bank, and the resource and capacity constraints.

By way of illustration, a transaction involving a direct CBDC model is likely to resemble a transaction with commercial banks, with the exception that the funds will be held with the central bank. Through this model, the central bank can assume more control over the design, issuance and implementation of CBDC and its systems. However, it also requires the central bank to assume a more active role in the payment services associated with CBDC transactions, primarily consumer facing services. This is likely to exceed the core mandate of a central bank in many cases and may also pose challenges to the institutional capacity of a central bank to execute the entire process. There will be a range of customer facing activities⁸¹ such as account-keeping services, customer verification processes such as know your customer (“KYC”), anti-money laundering (“AML”) and combating the financing of terrorism (“CFT”) checks, transaction verification, etc., which a central bank may not be well-equipped to perform, especially when technology is constantly evolving. Under this model, there is also a concern that in economies with a well-developed digital payments market, the central bank may end up competing with the existing payment service providers, thereby raising concerns about disintermediation. It has been suggested that⁸² this model may be relevant for a country with an underdeveloped financial sector where there are no players from the private sector to assume the role of providing payment solutions. A type of possible direct CBDC model as discussed by the Bank of Russia in its consultation paper for a ‘digital ruble’ is set out below in Figure 4.

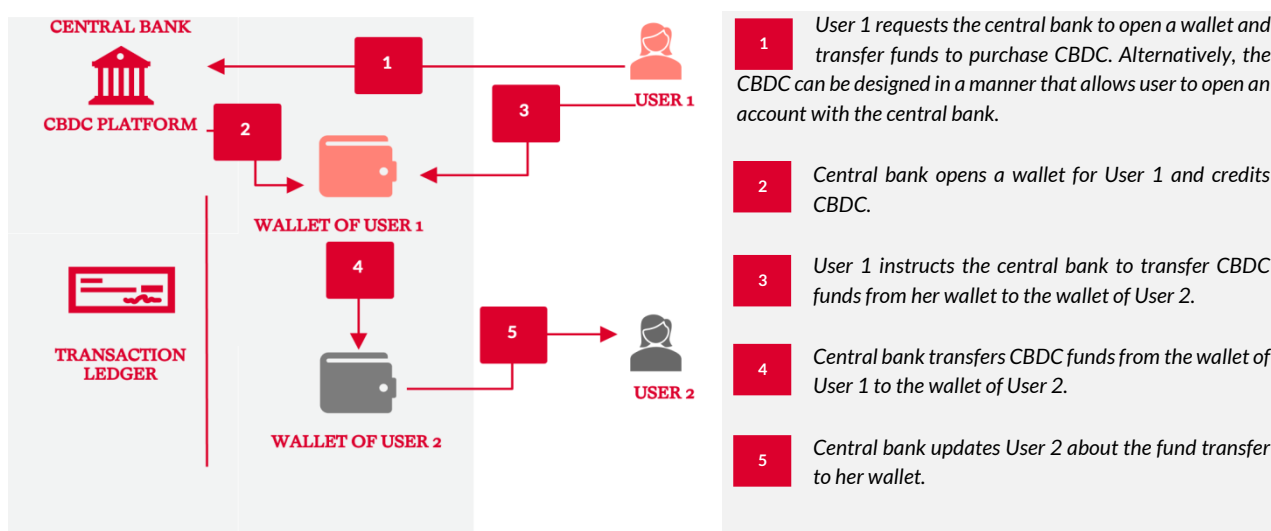


Figure 4 - Possible direct CBDC model [Source: Bank of Russia, A Digital Ruble (October 2020)]

Contrary to this in a Two-tiered CBDC Model, while a central bank issues the CBDC, it outsources some or all activities relating to the administration of the accounts and associated payment services. For instance, in the platform model that the BoE proposes, the private sector players will be responsible for the following - provide user-interface, apply KYC to verify users, register accounts, authenticate users when they initiate transaction, apply AML sanctions and develop “overlay” services,⁸³ which are provided as value added services to users. Despite the involvement of third parties, the CBDC will remain the liability of the central bank and accordingly, users are not subject to the default risk of the third parties, as in the case of existing digital payment solutions. The adoption of this model will require designing a legal framework for regulating these third-party payment service providers (“CBDC Intermediaries”). To protect users from the default risk of CBDC Intermediaries in such a

⁸¹ Reserve Bank of Australia, ‘Payments System Board Update: August 2020 Meeting’ (2020) <<https://www.rba.gov.au/media-releases/2020/mr-20-19.html>> accessed 20 March 2021.

⁸² John Kiff ; Jihad Alwazir ; Sonja Davidovic, ‘A Survey of Research on Retail Central Bank Digital Currency’ (26 June 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/06/26/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49517>> accessed 21 March 2021.

⁸³ Bank of England, ‘Central Bank Digital Currency’ (2020) <<https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf?la=en&hash=DFAD18646A77C00772AF1C5B18E63E71F68E4593>> accessed 20 March 2021. The BoE notes that this can include services which can meet future payment needs by enabling programmable money, smart contracts and micropayments.

model, it has been suggested⁸⁴ that the legal framework may require such intermediaries to segregate user's CBDC funds from their balance sheet so that such funds are not considered part of a failed intermediaries' estate available to creditors. Notably, many Surveyed Jurisdictions are exploring some form of a Two-tiered CBDC Model. A type of a possible Two-Tiered CBDC Model as discussed by the Bank of Russia in its consultation paper for a 'digital ruble' is set out below in Figure 5. This is one of the possible models of a Two-tiered CBDC Model. There may be other designs to implement this model where the role of the central bank and the intermediary may vary.

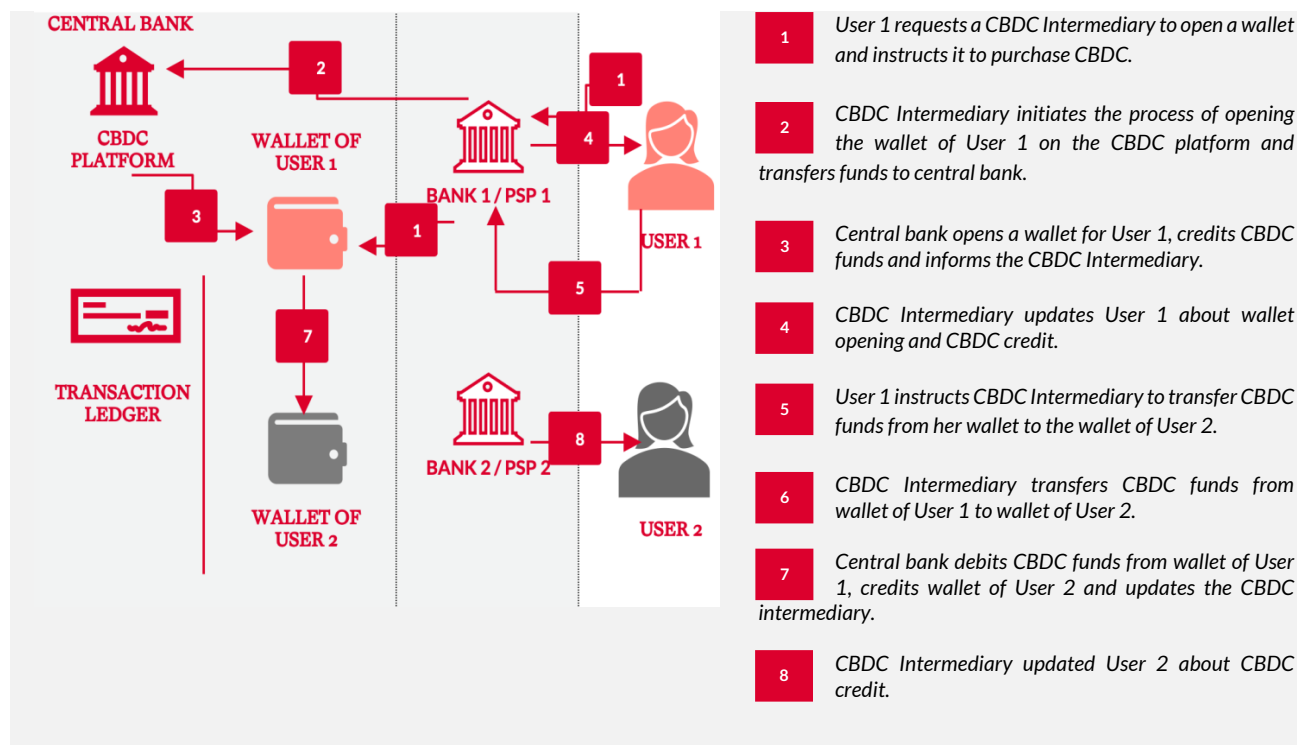


Figure 5 - Possible hybrid CBDC model [Bank of Russia, A Digital Ruble (October 2020)]

Existing literature⁸⁵ on CBDC also refers to an alternative CBDC model known as the synthetic CBDC, where private sector entities issue liabilities that is fully backed by funds held at the central bank by such entities. These entities would act as intermediaries between the central bank and the end-users. Notably, these liabilities would not be central bank money, as holders would not have a direct claim on the central bank. In many Surveyed Jurisdictions, this is not considered as a CBDC. No Surveyed Jurisdiction appears to be considering a synthetic CBDC.

The economic and institutional characteristics of each Surveyed Jurisdiction will shape the technological and design choices of the CBDC in that jurisdiction. However, there is great value that central banks may draw from the models being considered by other countries and findings of other central banks in their CBDC research.

Common Essential Features of a CBDC as identified by Surveyed Jurisdictions

Central banks will design their CBDC based on their unique needs and specific policy priorities identified by them for CBDC issuance. However, there are some functional features that are common across reports released by

⁸⁴ Raphael Auer and Rainer Boehme, 'The technology of retail central bank digital currency' (BIS Quarterly Review, 1 March 2020) <https://www.bis.org/publ/qtrpdf/r_qt2003j.htm> accessed 21 March 2021.

⁸⁵ Tobias Adrian; Tommaso Mancini Griffoli, 'The Rise of Digital Money' (IMF Fintech Notes, 15 July 2019) <<https://www.imf.org/en/Publications/fintech-notes/Issues/2019/07/12/The-Rise-of-Digital-Money-47097>> accessed 20 March 2021; Raphael Auer and Rainer Boehme, 'The technology of retail central bank digital currency' (BIS Quarterly Review, 1 March 2020) <https://www.bis.org/publ/qtrpdf/r_qt2003j.htm> accessed 21 March 2021; Bank of England, 'Central Bank Digital Currency' (2020) <<https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf?la=en&hash=DFAD18646A77C00772AF1C5B18E63E71F68E4593>> accessed 20 March 2021.

some Surveyed Jurisdictions. Pertinently, in the implementation of a CBDC, there may be trade-offs⁸⁶ in the incorporation of these features in the final CBDC design. Some common features include:⁸⁷

- Resilient: A CBDC and its system should be resilient to operational disruptions and natural disasters, with some central banks (BoE, Russia) focussing on offline features.
- Available: A CBDC system should be available to make payments on a 24/7 basis.
- Accessible: A CBDC should be designed in a manner that it minimises barriers to use and avoids excluding certain segments of the population or devices. This is particularly relevant for jurisdictions with high financial and digital illiteracy. For instance, BoE notes that it may be useful to avoid reliance on latest smartphones to provide CBDC payment services. In this regard, offline means of payments may be considered. Along with these, some jurisdictions also highlight the need for the CBDC to be user-friendly so that the same can be used by everyone.
- Secure: It should incorporate the highest security standards to protect the system and users from security breaches, cyber-attack or any attempt of counterfeiting (in case of tokens).
- Scalable: The technology employed for CBDC should be flexible enough to allow the system to respond to changes in the volume and the value of transactions throughout its lifecycle.
- Instant: In line with many fast payment systems operating in different countries, a CBDC should offer real time settlement of transactions.
- Interoperable: A CBDC design should allow interoperability as far as possible, allowing payments between users of CBDC with other payment service providers and deposit accounts. This is necessary to pursue the the objective of promoting competition, efficiency and innovation through CBDC issuance.
- Extensible: To enable tiered models of CBDC, it may also be necessary to allow CBDC Intermediaries to build additional services on the CBDC platform and support innovative use cases of CBDC that can meet the changing payment needs and behaviour of users.

⁸⁶ For example, the BoJ notes that a design that supports offline payments with CBDC may adversely impact the security (e.g., effectiveness of counterfeit deterrence features), and one that aims to achieve universal access could push up the cost for developing and deploying devices.

⁸⁷ 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021; Japan, Canada, EU, UK, Russia.

Assessing Potential Challenges

Potential disintermediation of banks

Some Surveyed Jurisdictions (such as UK, EU, Norway, Canada, Switzerland) have highlighted the impact of a possible CBDC issuance on the disintermediation of the banking sector. Upon CBDC issuance, existing depositors of commercial banks may wish to exchange these deposits for CBDCs, leading to contraction of the balance sheet of banks and forcing banks to take steps to deal with the loss of deposit funding. One such possible reaction from banks may be to increase their deposit rate to remain competitive. Given that higher deposit rates are likely to reduce profit margins, banks may be prompted to increase lending rates, thereby impacting the overall volume of lending by banks. Therefore, a high CBDC demand may have considerable consequences for bank funding and activity,

and for the structure of the banking sector. However, the extent to which CBDC will compete with commercial bank deposits will depend on the economic design of the CBDC, including interest payable (if any) on such CBDC. Having said that, central banks⁸⁸ are quick to point out that the scale of these changes is very difficult to forecast at this stage, and should be investigated with respect to different CBDC models.

To deal with these, central banks are exploring different features in the CBDC design. For instance, Bank of Canada notes that a CBDC may be designed to resemble cash and limit its attractiveness as a competitor to bank deposits, using features like non-payment of interest on CBDC.

Notably, the Federal Council in Switzerland also points out that the risk of a flight to CBDC adoption may also have a 'disciplining effect on banks' prompting them to make their business models more secure in order to prevent the outflow of customer deposits.

Accelerating bank runs

Few Surveyed Jurisdictions have highlighted that by providing depositors a safe and liquid alternative to bank deposits, CBDCs may accelerate bank runs during a period of financial stress, which may have systemic implications. It will, however, be wrong to assume that only CBDC issuance may give rise to such concerns for bank runs. The BoE notes that such bank runs from deposits to cash could happen even today, but perhaps are limited due to the costs involved in withdrawing and storing cash. Depending on the design, the possibility of converting deposits to CBDC may be lower and easier than cash. Notably, it has also been pointed out that such bank run is also seen in case of individual bank insolvency.⁸⁹ However, depending on the design of the CBDC, including potential convertibility limits, CBDC could increase the risk of generalised runs out of the banking sector. In its 2018 report on e-krona,⁹⁰ the Riksbank assesses that an e-krona of limited demand is not likely to have major consequences for banks in normal times. However, it points out that during times of financial distress "when the general public may wish to withdraw large values from weak banks, the e-krona enables a more general and faster

The Norges Bank summarizes possible consequences of a CBDC issuance on monetary and financial stability:

- Large-scale withdrawals of bank deposits.
- Motivate banks to raise deposit rates leading to a shift from deposit funding to wholesale funding. This may lead to increased credit provision by non-bank financial institutions.
- Substantial reduction in the demand for deposits may reduce bank lending and hence economic growth, unless other participants become important providers of credit.
- If demand for CBDC becomes very high, the central bank runs the risk of having to fund a large proportion of banks' assets, particularly loans.
- The interest rate on CBDC may set a floor under all short-term market rates and a CBDC may also result in runs on non-bank financial institutions.
- The central bank may become a direct competitor to payment service providers. This may have impacts on the earnings of banks and other payment providers.

- Norges Bank, *Central bank digital currencies (No 1|2018)*

⁸⁸ 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

⁸⁹ John Kiff, Jihad Alwazir, Sonja Davidovic, 'A Survey of Research on Retail Central Bank Digital Currency' (26 June 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/06/26/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49517>> accessed 21 March 2021.

⁹⁰ Sveriges Riksbank, 'The Riksbank's e-krona project Report 2' (October 2018) <<https://www.riksbank.se/globalassets/media/rapporter/e-krona/2018/the-riksbanks-e-krona-project-report-2.pdf>> accessed 21 March 2021.

run from the banking system to state-guaranteed money than a traditional run from the banking system to cash.” Nevertheless, the Riksbank notes that it has tools to cope with such situations if such runs tend to impact financial stability. Some central banks⁹¹ also note that a robust resolution framework along with protections like a deposit insurance scheme may dissuade such runs.⁹²

Competition to private payment service providers

While many central banks argue that CBDC may improve efficiency of existing payments landscape by promoting competition and innovation in the payments space, it is also feared that introducing a CBDC may reduce important payment service revenue for established operators. This may reduce their incentives to invest in innovation and product development.⁹³

Role of central banks

The issuance of a CBDC, more particularly a direct CBDC will require central banks to assume a larger role along with associated costs. This may put strain on the institutional capacity and resources of a central bank. The ECB also points out to reputational risks for central banks in issuance of CBDC. For instance, it refers to the reputational risks that may emanate in the event the infrastructure for CBDC is not stable, witnesses security breaches or if the CBDC is used for money laundering or terrorist financing. Such cases may dent public confidence in central bank money. Similarly, central banks may be subject to legal risks if there remains any uncertainty about the legal sanctity or basis for CBDC issuance and acceptance.

Security risks and financial system abuses

Like any other digital payment services, a CBDC may also be susceptible to cyber-attacks and other security breaches. Further, such attacks or breaches may be committed to misuse the CBDC for illicit activities. Such incidents could impact integrity of the data, thereby violating confidentiality of customer information and underlying financial transactions and impact the value of CBDC by denting public confidence in such currency.

The Bank of Canada points out that the potential abuses of the financial system may emerge if CBDC is designed with a degree of cash like anonymity. Accordingly, it has been pointed out that while a CBDC should be designed to allow a form of privacy, such a system should also be subjected to AMF and CFT laws.

⁹¹ 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

⁹² John Kiff; Jihad Alwazir; Sonja Davidovic, 'A Survey of Research on Retail Central Bank Digital Currency' (26 June 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/06/26/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49517>> accessed 21 March 2021.

⁹³ Norges Bank, 'Central Bank Digital Currencies, No 1|2018' (2018) <<https://www.norges-bank.no/contentassets/166efadb3d73419c8c50f9471be26402/nbpapers-1-2018-centralbankdigitalcurrencies.pdf?v=05/18/2018121950&ft=.pdf>> accessed 20 March 2021.

Spotlight on Select CBDC Projects in Surveyed Jurisdictions

RUSSIA

General Consultation Paper on a Digital Ruble (2020) - Four Possible Models

The consultation paper discusses four possible CBDC models without finalizing any particular model.

- Model A envisions a wholesale CBDC where Bank of Russia (BoR) opens a wallet solely for inter-bank settlements and transactions with securities on the CBDC platform. BoR clarifies that this model will not be pursued because it does not have any value proposition for households and businesses.
- Model B envisages a direct retail CBDC model where BoR opens and maintains customer wallets for individuals and legal entities on a CBDC platform created by BoR.
- Model C contemplates a tiered CBDC model where BoR maintains a CBDC platform and issues a CBDC for individuals and legal entities. Intermediaries (either banks or payment service providers) allow end users (individuals or businesses) to open and access wallets on the platform.
- Model D envisions that the central bank opens and maintains wallets in CBDC platform for banks / financial institutions, which in turn open and maintain customer wallets on the CBDC platform using them.

Source: Bank of Russia, 'A Digital Ruble' (2020)

UK

Discussion Paper on CBDC (2020) - A Platform Model for CBDC

The discussion paper sets out the Bank of England's (BoE) approach to a retail CBDC for domestic payments. The BoE paper moots a public-private platform model of a CBDC. Under the platform model:

- BoE provides and maintains a core ledger, which records CBDC value and processes transactions made using CBDC.
- This is supplemented by the private sector players who will participate as 'Payment Interface Providers' (PIPs) who will handle the interaction with end users of CBDC and provide additional functionality through "overlay" services.
- PIPs are proposed to be subject to regulatory supervision on an ongoing basis, to ensure consumer protection, interoperability and the resilience of the CBDC system.
- BoE can impose standards for these PIPs, the overlay services, alongside wider regulation.

Source: BoE, 'Central Bank Digital Currency Opportunities, Challenges and Design' (2020)

CHINA

Pilot launch in select cities (2020)

Unlike most Surveyed Jurisdictions, China has not yet released any official documentation on the CBDC model. Based on publicly available information in existing literature on China's proposed CBDC, it is understood that the People's Bank of China (PBoC) has conducted trials and issued a limited pool of users with e-wallets.

Against the background of a highly digitized economy, Auer, Cornelli and Frost notes that China views CBDC as an alternative to the highly concentrated payments market dominated by select private players and as a complement to cash.

China's CBDC model is described as a "hybrid" structure, with intermediaries handling onboarding and real-time payment services. It is reported that the design appears to be account based. We also understand that the CBDC allows some degree of anonymity to counterparties, yet allowing the PBoC to monitor transaction data.

Source:

The Economist, 'China prepares to launch the world's first official e-currency' (2020))

Raphael Auer, Giulio Cornelli and Jon Fros, 'Rise of the central bank digital currencies: drivers, approaches and technologies' (2020)

Spotlight on Select CBDC Projects in Surveyed Jurisdictions

UKRAINE

Analytical Report on E-hryvnia - Findings of Pilot (2019)

In 2019, the National Bank of Ukraine (NBU) released an analytical report on the findings of its pilot CBDC project. Primary objectives of the pilot included testing DLT as technological basis for issuance of e-hryvnia, testing the NBU's capability to implement this project and studying the macroeconomic impact and legal aspects of the e-hryvnia issuance.

- The pilot envisaged creation of an electronic hryvnia platform, issuance of a limited amount of the e-hryvnia and testing of e-hryvnia transactions made by the NBU personnel and companies participating in this project.
- E-wallets were accounted for in a centralized registry of the platform operated by NBU. Banks and non-bank financial institutions were agents for settlement and distribution of e-hryvnia. They were also responsible for providing users with access to the platform and other services.
- The basic technological solution used to implement the platform was found to be suitable to perform the required tasks. At the same time, no fundamental advantages was found in using DLT to build a centralized e-hryvnia issuance system.
- Due to the limited scope of the project, the NBU notes that it did not fully uncover CBDCs attractiveness and the potential level of involvement of Ukraine's population in using it.

Source: National Bank of Ukraine, 'Analytical Report on the E-hryvnia Pilot Project' (2019)

SWEDEN

Technical Pilot for e-krona (2020)

Since 2017, Sveriges Riksbank (Riksbank) is exploring the issuance of an e-krona, which will give the general public access to a digital complement to cash.

The Riksbank in partnership with the consulting company Accenture is conducting a pilot project to develop a technical solution for an e-krona, a retail CBDC.

- In the pilot, users can hold e-kronas in a digital wallet and make payments, deposits and withdrawals via a mobile application.
- Only the Riksbank can create e-kronas, which are then distributed to the general public via participants in the e-krona network such as banks and payment service providers.
- The pilot's technical solution is based on DLT, blockchain technology.

Source: SverigesRiksbank, 'The Riksbank's e-krona pilot' (February 2020)

BAHAMAS

Nationwide launch of Project Sand Dollar (2020)

As a part of its payment modernisation initiative, the Central Bank of Bahamas launched the Project Sand Dollar initiative to issue its digital version of the Bahamian dollar and design a payments infrastructure for its operation.

In 2019, the central bank started its pilot in select cities. In October 2020, the central bank began issuing the sand dollar i.e. digital version of the Bahamian Dollar to select institutions and announced its national roll out.

The sand dollar is stored on digital wallets maintained and offered through commercial banks, money transmission businesses, credit unions and payment service providers. The sand dollar can be accepted by anyone with a central bank approved wallet.

As per the Central Bank of Bahamas Act, electronic money issued by the central bank is considered as legal tender. Accordingly, the sand dollar has a legal tender status in Bahamas.

Source:

Central Bank of Bahamas, Project Sand Dollar: A Bahamas Payments System Modernisation Initiative (December 2019)

Central Bank of Bahamas, Consultation Paper: Proposed Legislation for the Regulation of the provision and use of Central Bank issued Electronic Bahamian Dollars (February 2021)

IV. Payments Landscape in India - An Overview

To evaluate how policy considerations for CBDC issuance in Surveyed Jurisdictions play out in the Indian context, it is important to assess the evolution of the payments landscape in India. This will be necessary to identify the role of CBDC (if issued) in the Indian payments landscape.

In India, Reserve Bank of India Act, 1934 (“**RBI Act**”) empowers the RBI to issue banknotes. Every banknote issued by RBI enjoys the status of legal tender meaning that such a banknote is tenderable for discharge of debt or obligation.⁹⁴ Further, banks in India also maintain accounts with RBI to hold their statutory cash reserves and carry on inter-bank transactions through these accounts.⁹⁵ In line with other jurisdictions, central bank money in India exists in the form of banknotes issued by the RBI and accounts maintained by banks with the RBI. In line with most modern economies, the RBI also provides the payments infrastructure for central bank money in the form of the RTGS and the National Electronic Funds Transfer (“**NEFT**”).

One of the RBI’s key priorities in the payments ecosystem has been to reduce reliance on cash.⁹⁶ As a part of its Vision 2019-21 for payment systems, it prioritises progressing towards a ‘less-cash’ system and increase the permeation of digital payments system.⁹⁷ To realise this vision, it has undertaken various initiatives to encourage competition, improve customer convenience at affordable cost and increase customer confidence in the payment systems in India. RBI has played an instrumental role⁹⁸ in the setting up of the National Payments Corporation of India (“**NPCI**”), a payment systems operator that operates the Unified Payments Interface (“**UPI**”) and Immediate Payment Services (“**IMPS**”) that has played an instrumental role in India’s digital payments journey. Various initiatives undertaken by RBI for providing impetus to digital payments in India is highlighted in the corresponding box.⁹⁹

RECENT INITIATIVES TO PROVIDE IMPETUS TO DIGITAL PAYMENTS

Waiver of charges for RTGS and NEFT: Processing charges levied by RBI on banks for outward transactions using RTGS and NEFT have been waived. Banks have been advised to pass the benefit to customers.

24*7 Availability of RTGS and NEFT: These payment systems operated by RBI is now available on 24*7. With such availability of the RTGS, the RBI notes that India becomes one of the very few countries globally with a 24x7x365 large value real time payment system.

Creation of Payments Infrastructure Development Fund: RBI has set up this fund to encourage acquirers to deploy Points of Sale infrastructure (both physical and digital modes). RBI will make an initial contribution of ₹250 crores covering half the fund, with the remaining coming from the industry.

Encouraging the creation of NPCI type entities to promote competition and innovation: The RBI has issued a framework allowing the setting up of a pan India Umbrella Entity for Retail Payments to set up new payment systems in India.

Setting up a Regulatory Sandbox: It has issued a framework for regulatory sandbox allowing testing of innovative digital payment solutions in a controlled environment. It has two cohorts on digital payments - retail payments and cross border payments.

Encouraging Offline Payments: Announcement of pilot scheme allowing payment system operators to provide offline payments using cards, wallets or mobile devices for remote or proximity payments

⁹⁴ RBI, ‘Frequently Asked Questions’ (2020) <<https://rbi.org.in/Scripts/FAQView.aspx?Id=136>> accessed 20 March 2021.

⁹⁵ RBI, ‘Reserve Bank of India: Functions and Working’ <<https://rbidocs.rbi.org.in/rdocs/Content/PDFs/FUNCWWE080910.pdf>> accessed 20 March 2021.

⁹⁶ RBI, ‘Payment & Settlement Systems in India: Vision-2018’ (2018) <<https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/VISION20181A8972F5582F4B2B8B46C5B669CE396A.PDF>> accessed 21 March 2021.

⁹⁷ RBI, ‘Payment & Settlement Systems in India: Vision-2018’ (2018) <<https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/VISION20181A8972F5582F4B2B8B46C5B669CE396A.PDF>> accessed 21 March 2021.

⁹⁸ NPCI, ‘About us’ <<https://www.npci.org.in/who-we-are/about-us>> accessed 20 March 2021.

⁹⁹ RBI, ‘National Electronic Funds Transfer (NEFT) and Real Time Gross Settlement (RTGS) systems – Waiver of charges’ (2019) <<https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11586&Mode=0>> accessed 20 March 2021; RBI, ‘24x7 Availability of Real Time Gross Settlement (RTGS) System’ (2019) <<https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11998&Mode=0>> accessed 20 March 2021; RBI, ‘Availability of National Electronic Funds Transfer (NEFT) System on 24x7 basis’ (2019) <https://m.rbi.org.in/scripts/BS_CircularIndexDisplay.aspx?Id=11750> accessed 20 March 2021; RBI, ‘Statement on Developmental and

The RBI's emphasis on digital payments is not without success and formidable growth in that segment. India has witnessed a rapid growth in the volume of its digital transactions (including RTGS customer and interbank transactions), recording a growth rate of 58.8% during 2018-19, which is an increase from the 50.4% growth during 2017-18.¹⁰⁰ In terms of value, digital transactions retail transactions grew by 19.5%, compared to 22.2% growth in 2017-18.¹⁰¹

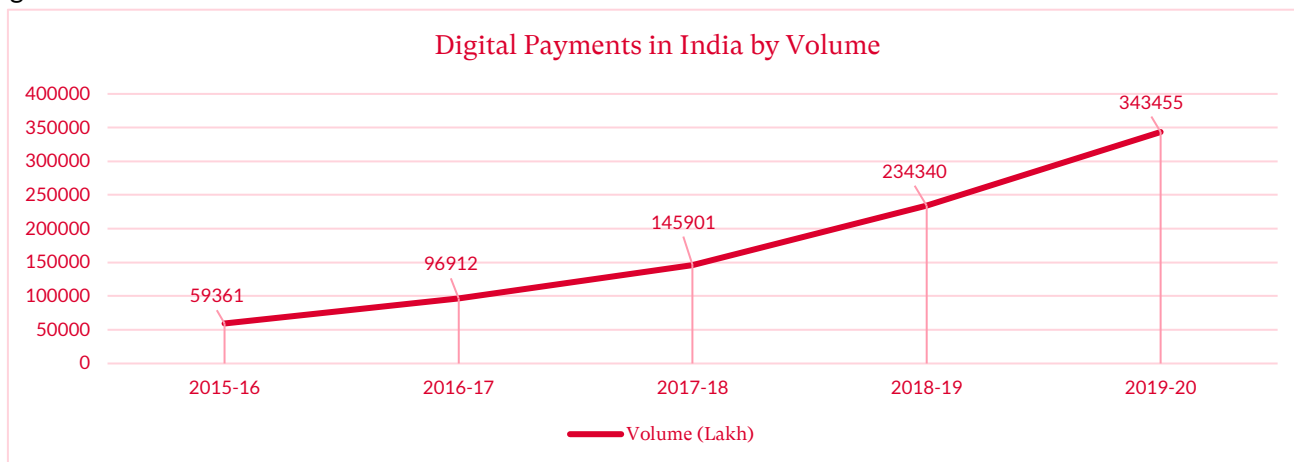


Figure 6: Digital Payments in India by Volume (Source: RBI)¹⁰²

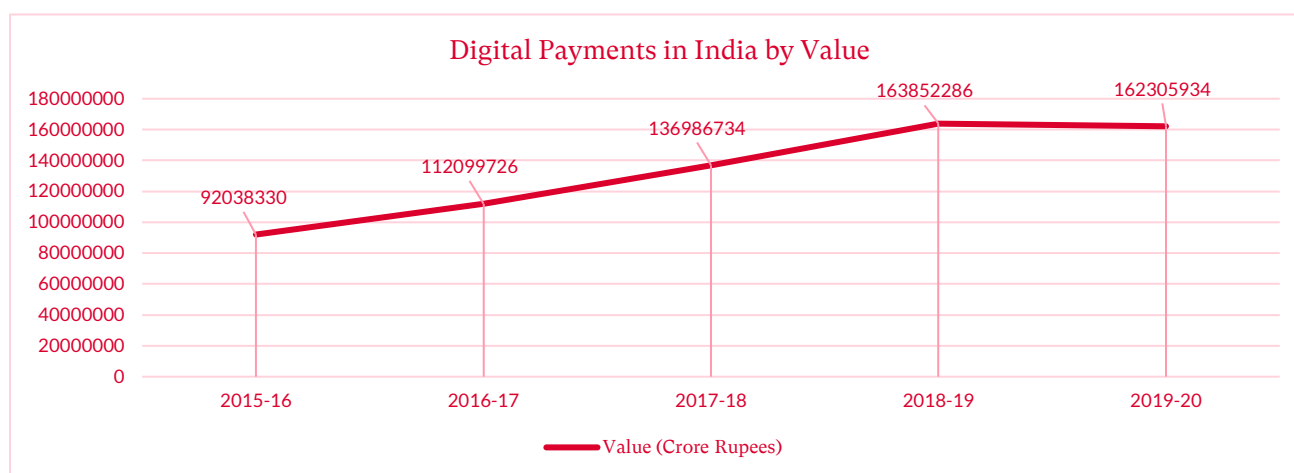


Figure 7: Digital Payments in India by Value (Source: RBI)¹⁰³

Regulatory Policies' (2020) <https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=50480> accessed 20 March 2021; RBI, 'RBI announces creation of Payments Infrastructure Development Fund' (2020) <https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=49905> accessed 20 March 2021; RBI, 'Framework for authorisation of pan-India Umbrella Entity for Retail Payments' (2021) <<https://www.rbi.org.in/Scripts/NotificationUser.aspx?id=11954&Mode=0>> accessed 20 March 2021; RBI, 'Reserve Bank announces opening of Second Cohort under the Regulatory Sandbox' (2020) <https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=50814> accessed 20 March 2021.

¹⁰⁰ Shashi Kant and Sarat Chandra Dhal, 'Payment and Settlement: The Plumbing in the Architecture of India's Financial System' (RBI Bulletin, 2019) <<https://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/02ART11062019C533BA89F9524DC8AD6184DB940199A9.PDF>> accessed 20 March 2021. This includes RTGS customers and interbank transactions, retail electronic clearing – ECS, EFT, NEFT, IMPS, NACH, card transactions at PoS, UPI (including BHIM and Unstructured Supplementary Service Data (USSD) (financial transactions)).

¹⁰¹ Shashi Kant and Sarat Chandra Dhal, 'Payment and Settlement: The Plumbing in the Architecture of India's Financial System' (RBI Bulletin, 2019) <<https://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/02ART11062019C533BA89F9524DC8AD6184DB940199A9.PDF>> accessed 20 March 2021. Note that the bulk of transaction by value is accounted for by Real Time Gross Settlement transactions.

¹⁰² RBI, 'Table 66 : Payment Systems Indicators' (RBI Handbook of Indian Statistics, 2020) <<https://www.rbi.org.in/scripts/PublicationsView.aspx?id=19799>> accessed 20 March 2021.

¹⁰³ RBI, 'Table 66 : Payment Systems Indicators' (RBI Handbook of Indian Statistics, 2020) <<https://www.rbi.org.in/scripts/PublicationsView.aspx?id=19799>> accessed 20 March 2021.

This growth is supported by active initiatives pursued by the RBI, such as launch of the NPCI, which now owns and operates some of the most widely used digital payments infrastructure in the country, including the successful UPI, which has witnessed an incredible growth over the years and has also picked up during the pandemic.

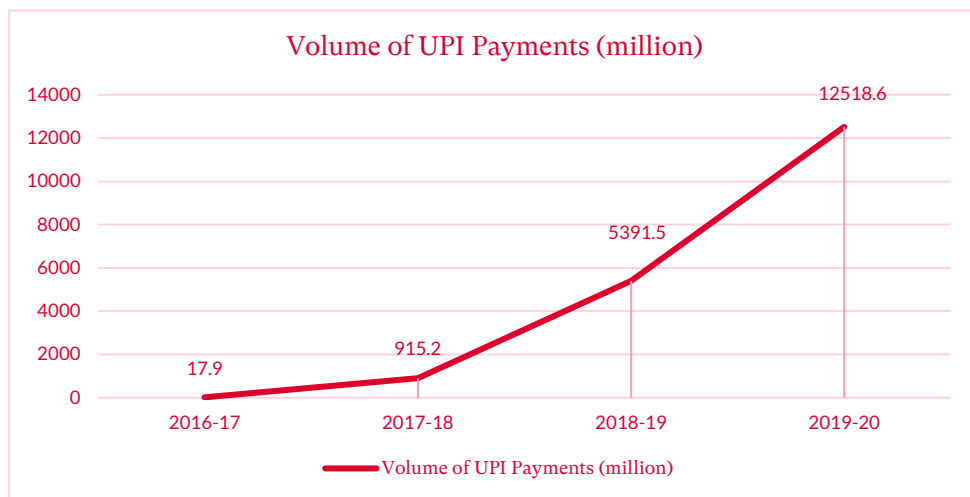


Figure 8: Volume of UPI Payments from 2016-17 to 2019-20 [Source: RBI (2020)]¹⁰⁴

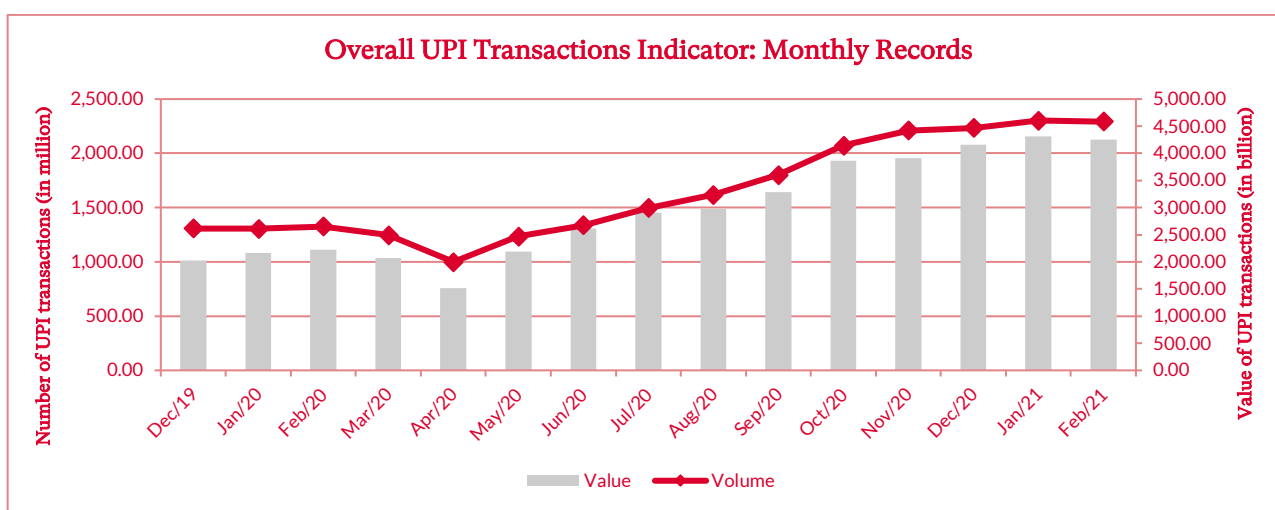


Figure 9: Volume and Value of UPI transactions (December 2019 - February 2021) [Source: NPCI - UPI Product Statistics¹⁰⁵]

While several initiatives have been launched with a view to further digital payments in the country, India is not at a stage where digital payments, or private payment providers, are replacing cash. Notably in February 2020, RBI published a report on the assessment of digitisation from cash to electronic payments.¹⁰⁶ The conclusion was clear: “while the use of non-cash payment methods is on the rise, cash remains the dominant mode of payment. Importantly, the demand for cash remains strong.”

Regulatory Stance on Privately issued Digital Currencies

While on one hand India is actively promoting digital payments, it has so far maintained a conservative view on the regulatory treatment of privately issued digital currencies or virtual currencies¹⁰⁷, such as cryptocurrencies. In 2017, the RBI through its press releases advised Indian consumers to exercise caution when trading in or purchasing “virtual currencies”.¹⁰⁸ On 6 April 2018, the RBI exercising its powers as the banking and payments regulator issued a circular (“**RBI Circular 2018**”) restricting all RBI regulated entities (such as banks and payment systems) from dealing in virtual currencies or providing services to facilitate any person or entity in dealing with

¹⁰⁴ RBI, ‘Annual Report of the RBI for the Year 2019-20’ (2020), <<https://m.rbi.org.in/Scripts/AnnualReportPublications.aspx?Id=1293>> accessed on 14 March 2021.

¹⁰⁵ NPCI, ‘UPI Product Statistics’ (2021) <<https://www.npci.org.in/what-we-do/upi/product-statistics>> accessed 20 March 2021.

¹⁰⁶ RBI, ‘Assessment of the progress of digitisation from cash to electronic’ (2020) <<https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=19417>> accessed 20 March 2021.

¹⁰⁷ The terms virtual currencies and digital currencies are used interchangeably in this section. The term virtual currencies has been specifically used in this section since this is the term that RBI has used in its circulars.

¹⁰⁸ RBI, ‘Reserve Bank cautions regarding risk of virtual currencies including Bitcoins’ (5 December 2017) <https://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=42462> accessed 20 March 2021; RBI, ‘RBI cautions users of Virtual Currencies’ (1 February 2017) <https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=39435> accessed 20 March 2021.

or settling in virtual currencies.¹⁰⁹ RBI's rationale for such a direction stemmed from potential risks associated with virtual currencies, including financial, operational, legal, consumer protection and security risks.¹¹⁰ Subsequently, the Internet and Mobile Association of India, an industry body, approached the Supreme Court of India challenging the constitutionality of the RBI Circular 2018.¹¹¹

Notably, on 4 March 2020, the Supreme Court of India struck down the RBI Circular 2018 on the grounds of proportionality.¹¹² The Court observed that the circular indirectly resulted in shutting down of crypto-exchanges even though the virtual currencies are not banned in India, as the circular denied the operators of crypto-exchanges the access to banking and payment channels.¹¹³ In the absence of a law banning virtual currencies and evidence that RBI regulated entities have suffered harm on account of the activities of virtual currency exchanges, the Court held that depriving exchanges the access to banking channels is disproportionate and would be violative of the rights of exchange operators under the Constitution of India to carry on their occupation, trade or business.¹¹⁴ The outcome of the case came as a huge relief for crypto-businesses in India but without a comprehensive legal framework recognizing virtual currencies in the country, the state of regulatory uncertainty still persists for the Indian crypto-industry.

While the petition challenging the RBI Circular 2018 was pending with the Supreme Court, in July 2019, an Inter-Ministerial Committee ("IMC") established by the Ministry of Finance, Government of India released a report on recommending a regulatory approach for virtual currencies in India ("IMC Report"). The IMC recommended a complete prohibition on dealing with private virtual currencies.¹¹⁵ IMC also suggested criminalising the carrying on of any activity connected with such private virtual currencies.¹¹⁶ The IMC reasoned that unlike a fiat currency, a private virtual currency lacks attributes necessary to be a currency, as it is highly volatile, pseudonymous and not backed by any sovereign authority, which makes it susceptible to illicit activities and consumer protection risks.¹¹⁷ Notably, the IMC recommended that India should consider to introduce a CBDC with the status of legal tender.¹¹⁸ The IMC also published a draft of the Banning of Cryptocurrency & Regulation of Official Digital Currency, 2019 along with the IMC Report,¹¹⁹ which proposed to ban all activities relating to virtual currencies in the territory of India, except the activities relating to government-backed digital currency.

Adding to the woes of virtual currency market in India, the list of bills proposed to be introduced in the budget session of the Indian Parliament that will conclude on 8 April 2021, referred to the Cryptocurrency and Regulation of Official Digital Currency Bill, 2021 (the "2021 Bill").¹²⁰ As per the list released by Lok Sabha, the 2021 Bill seeks to ban private cryptocurrencies in India and provide a legal basis for the creation of CBDC by RBI. It is understood that the draft law is still being finalized.¹²¹ Till the time any law is passed, the cryptocurrency industry in India continue to operate in legal vacuum and uncertainty. Separately, the bill to facilitate the issuance of a CBDC comes at a time when RBI is yet to take a call on the issuance of a CBDC.

¹⁰⁹ RBI, 'Prohibition on dealing in Virtual Currencies' (2018)

<<https://rbidocs.rbi.org.in/rdocs/Notification/PDFs/NOTI15465B741A10B0E45E896C62A9C83AB938F.PDF>> accessed 21 March 2021

¹¹⁰ RBI, 'RBI cautions users of Virtual Currencies against Risks' (24 December 2013) <https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=30247> accessed on 20 March 2021.

¹¹¹ Internet and Mobile Association of India v Reserve Bank of India, 2020 SCC OnLine SC 275 (henceforth referred to as 'IAMA case').

¹¹² IAMA case, para 7.1.

¹¹³ IAMA case, paras 6.171 and 6.172

¹¹⁴ IAMA case, paras 6.142 and 7.1

¹¹⁵ IMC Report, paras 2.7.2 and 2.7.4.

¹¹⁶ IMC Report, para 2.7.6.

¹¹⁷ IMC Report, para 2.4.

¹¹⁸ IMC Report, paras 4.3 and 3.5.

¹¹⁹ IMC Report, para 6.

¹²⁰ Lok Sabha, 'Bulletin Part - II (General Information relating to Parliamentary and other Matters)' (29 January 2021)

<<https://www.medianama.com/wp-content/uploads/2021/01/Lok-Sabha-Bulletin-Part-II.pdf>> accessed 20 March 2021.

¹²¹ 'Bill to regulate cryptocurrencies being finalised: Thakur', (*The Hindu Business Line*, 9 February 2021) <<https://www.thehindubusinessline.com/economy/bill-to-regulate-cryptocurrencies-being-finalised-thakur/article33792990.ece#>> accessed 20 March 2021.

CBDC Research in India

Basis the recent announcements of the RBI, it is evident that RBI is exploring as to whether there is a need for a CBDC in India and if there is a need, then the manner in which it can be operationalised.¹²² One of the earliest references to CBDCs by the government or the regulators in India was in 2016, when a committee constituted by the Ministry of Finance considered the possibility of CBDC adoption.¹²³ The next big push to CBDC research came in through the IMC which recommended that India should keep an open mind towards CBDC. It was only in early 2021 that the RBI in its Booklet of Payment Systems formally acknowledged that it is pursuing CBDC research. However, unlike many Surveyed Jurisdictions where central banks have publicly announced their CBDC research plans, released research reports citing their preliminary CBDC research findings or conducted pilot tests, RBI till date has till date not publicly shared any details of the CBDC research. Against this background, it is now pertinent to discuss the preliminary considerations for CBDC issuance in India.

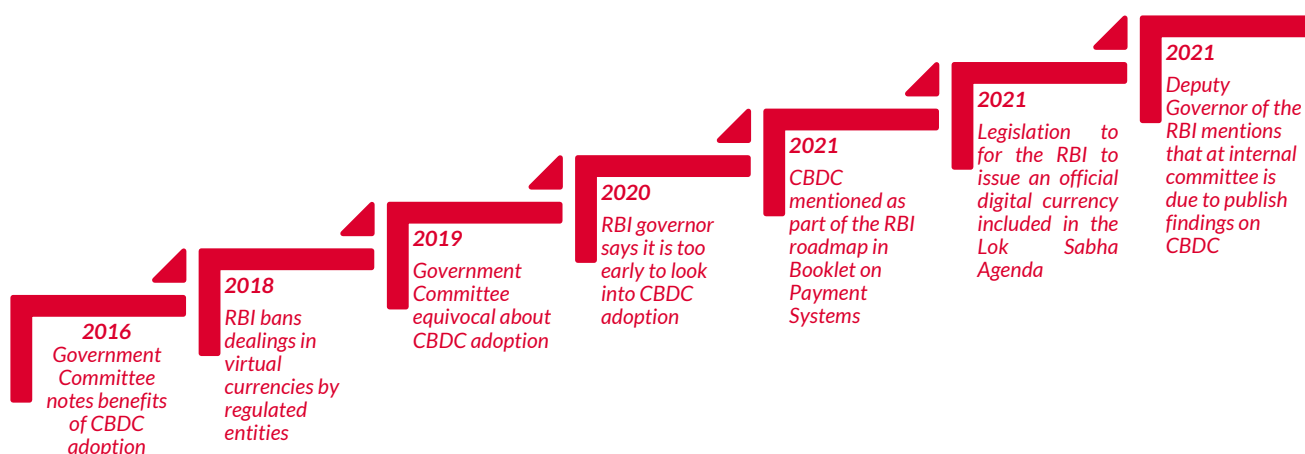


Figure 10: Timeline of CBDC research announcements in India

¹²² RBI, 'Payment and Settlement Systems in India: Journey in the Second Decade of the Millennium 2010-2020' (25 January 2021) <<https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/PSSBOOKLET93D3AEFDEAF14044BC1BB36662C41A8C.PDF>> accessed 20 March 2021.

¹²³ Committee on Digital Payments, 'Medium Term Recommendations to Strengthen Digital Payments Ecosystem' (2016) <https://dea.gov.in/sites/default/files/watal_report271216.pdf> accessed 21 March 2021.

What Central Bankers think of CBDC?

“The euro belongs to Europeans and we are its guardian. We should be prepared to issue a digital euro, should the need arise.”

Christine Lagarde, President of the ECB¹²⁴

“Recent private sector initiatives, including stablecoins, indicate the customers' need for convenient, fast and efficient payments. To meet this need, the central bank should cooperate with the private sector and continue to improve the payment and settlement infrastructures it offers. In this regard, the question as to whether the central bank should issue digital currency (CBDC) or not has become an important issue.”

Amamiya Masayoshi, Deputy Governor of the Bank of Japan¹²⁵

“The use of cash has been declining in many countries, including Ukraine. Thanks to FinTech, there are increasingly more ways to make electronic payments without using payment cards and banking services. And the second wave of cryptocurrency creation by private players – which is the arrival of stablecoins – gives regulators no time to rest. In these circumstances, central banks have to look for ways to retain their leadership in the payment system in order to ensure that the public has access to central bank money. In so doing, central banks should take care not to interfere with the development of innovations in the financial sector. It comes as no surprise that, every year, central banks are increasingly looking into the possibility of introducing their own digital currencies – some in theory, and some in practice, like we in Ukraine.”

Yakiv Smolii, Governor National Bank of Ukraine¹²⁶

“We Europeans cannot allow ourselves to lag behind on CBDC. That means that we may create if necessary, a retail CBDC, in order to ensure access to central bank money for the general public, in particular in countries where the use of cash is declining. It also means that we may decide to issue a wholesale CBDC, with the aim of improving the functioning of financial anchor role of central bank money for interbank transactions.”

François Villeroy de Galhau, Governor of the Banque de France¹²⁷

“First, introducing CBDC is a political decision rather than a technical decision. Therefore, a comprehensive conceptual analysis and assessment of CBDC relative to alternative options is necessary - especially in terms of the fulfilment of our mandate, but also regarding its impact on society as a whole.”

Burkhard Balz, Member of the Executive Board of the Deutsche Bundesbank¹²⁸

“CBDC, whilst offering much potential, also raises profound questions about the shape of the financial system and the implications for monetary and financial stability and the role of the central bank. There are fundamental questions in play. What might a CBDC mean for monetary policy transmission – would it bring new tools and fuller, faster transmission of policy choices? To what extent would a CBDC ‘disintermediate’ the banking sector, and what impact would this have on the cost and availability of credit, and the resilience of banking business models and funding? And what services and infrastructure should a central bank offer as part of a CBDC and what might best be left to the private sector?”

Andrew Bailey, Governor, Bank of England¹²⁹

¹²⁴ European Central Bank, ‘A digital euro’ (2020) <https://www.ecb.europa.eu/euro/digital_euro/html/index.en.html> accessed 20 March 2021.

¹²⁵ Amamiya Masayoshi, ‘Central Bank Digital Currency and the Future of Payment and Settlement Systems’ (27 February 2020) <https://www.boj.or.jp/en/announcements/press/koen_2020/ko200306a.htm/> accessed 20 March 2021.

¹²⁶ YakivSmolii, ‘Central Bank Digital Currencies: New Opportunities for Payments’ (2020) <<https://bank.gov.ua/en/news/all/vitalna-promova-golovi-natsionalnogo-banku-yakova-smoliya-na-mijnarodniy-konferentsiyi-tsifrovi-valyuti-tsentralnih-bankiv-novi-mojlivosti-dlya-platejiv>> accessed 20 March 2021.

¹²⁷ François Villeroy de Galhau, ‘The Pig, the Frog and the Elephant: Towards a better regulation of digital innovation’ (8 December 2020) <<https://www.bis.org/review/r201210j.pdf>> accessed 21 March 2021.

¹²⁸ Burkhard Balz, ‘Digital currencies, global currencies’ (2020) <<https://www.bis.org/review/r201020g.htm>> accessed 20 March 2021

¹²⁹ Andrew Bailey, ‘Reinventing the wheel (with more automation)’ (2020) <<https://www.bankofengland.co.uk/speech/2020/andrew-bailey-speech-on-the-future-of-cryptocurrencies-and-stablecoins>> accessed 20 March 2021.

V. Digital Rupee for India | Preliminary Considerations

CBDC design choices are not merely technical questions. They have policy and legal implications. This is why we are devoting so much attention to every detail.

Yves Mersch, European Central Bank (May 2020)¹³⁰

Introducing a retail CBDC or a 'Digital Rupee' for India, as a supplement to cash will entail offering a digital liability to RBI for use as a means of payment and store of value. It would constitute a government-guaranteed means of payment without credit risk and be available for the general public in digital form. A CBDC is likely to entail the creation of payments infrastructure / system that RBI will have full or partial responsibility for. This type of Digital Rupee could be regarded as a modernisation of the RBI's means of payment. A Digital Rupee could also function as a complement to the existing payment solutions currently offered in the private sector, which may possibly benefit competition in the payment market. However, one can only deliberate about such possible opportunities, which needs to be investigated further. The preceding sections indicates that CBDC issuance is a complex issue which calls for an in-depth research. The purpose of this paper is not to recommend the issuance of a CBDC by India, but to initiate and inform the public discourse on CBDC in India. In this regard, this section sets out preliminary considerations which the authors consider relevant in India's journey towards CBDC development. Ultimately, the decision to issue a CBDC must be based on a socio-economic cost benefit analysis, with specific emphasis on the impact of such a development on financial stability and monetary policy.

Assessing common motivations driving CBDC research in the Indian context

As discussed in Chapter III, there are a range of motivations driving CBDC research in Surveyed Jurisdictions. Pertinently, such motivations and opportunities identified by countries are key to understanding whether and why a country may prefer a particular design. Against this backdrop, it is critical that India identifies and articulates a cogent motivation for CBDC related initiatives. This section examines the commonly identified motivations / opportunities driving CBDC research in Surveyed Jurisdictions from the perspective of India.

Provide a complement to cash

As discussed above, some advanced Surveyed Jurisdictions, witnessing a decline in cash transactions is exploring CBDC as a complement to cash. For instance, Sweden has one of the highest numbers of electronic payments per person per year. As per the CPMI statistics, Sweden is one of the three countries where the ratio of cash in circulation to GDP has fallen between 2011 and 2015. At the same time, Sweden was the only country where

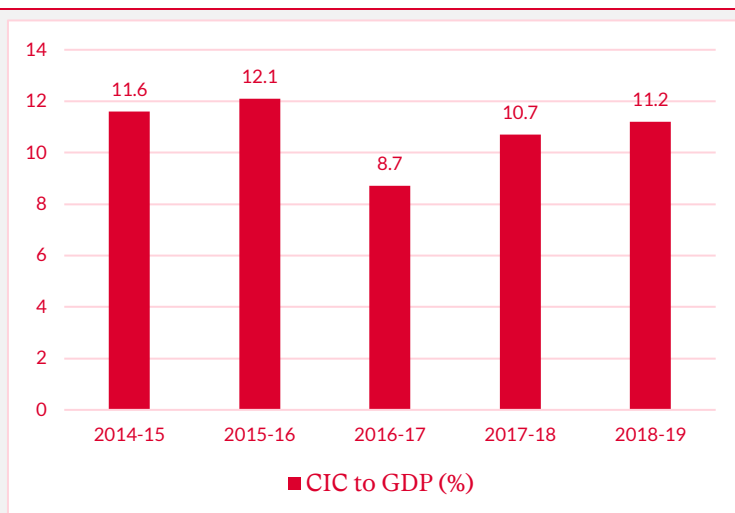


Figure 11: CIC to GDP Percentages (Source: RBI)

¹³⁰ Yves Mersch, 'An ECB digital currency - a flight of fancy?' (11 May 2020) <<https://www.bis.org/review/r200511a.htm>> accessed 25 January 2021.

nominal demand for banknotes and coins had fallen.¹³¹ To this extent, the Swedish payments market differs significantly from other countries.

Contrary to this, the cash use in India is still high. As per RBI, the currency in circulation (CIC) across India increased at a compounded annual growth rate (CAGR) of 10.2% between the financial years 2014-15 and 2018-19. A high CIC relative to GDP indicates that cash is a preferred payment instrument. Based on this assumption and the data set out in Figure 11 above, RBI notes that “India continues to have a strong basis for cash payments.” Given that India continues to have a high level of cash use and acceptance, this motivation may not be relevant at this juncture. The Federal Council of Switzerland also noted that due to the high usage of cash in Switzerland, CBDC may not be necessary in Switzerland at this juncture.

However, it may be useful to continually evaluate cash use and acceptance. Even in Japan, while cash is not declining, BoJ continues to pursue its CBDC research, should a need to issue CBDC arise and private digital payment solutions are not enough to meet the needs of the population. Given that a decline in cash could deny citizens the only means to access central bank money that takes into account their needs without any commercial perspective, India should also continually evaluate the level of cash usage and the payment habits of citizens. Notably, in the event a CBDC is issued, it should not be viewed as a substitute to cash, rather as a complement to it. In the event India pursues CBDC primarily to counteract the undesirable impact of decline in cash, it may have to at least incorporate certain distinctive positive features of cash especially in providing an easy access to vulnerable sections or financially excluded or underserved segments of the population. Accordingly, features such as provision for offline payments, low or no cost, etc. should be considered in the design.

Promote Financial Inclusion

Financial inclusion is a prominent argument for CBDC in countries where banking and payment systems are underdeveloped. In such countries, the provision of bank accounts and payment systems by the central bank for citizens could boost financial inclusion. The question of whether CBDC can foster financial inclusion amongst other issues depends on the extent to which cash use and acceptance is decreasing and access to central bank money by certain segments is restricted. Contrary to the decline in cash usage in countries like Sweden, India has not witnessed a massive decline in the use of cash.

In India, the government and RBI have been pursuing initiatives to promote financial inclusion, particularly in the form of Jan Dhan Yojana,¹³² Aadhaar and Mobile (JAM) trinity¹³³ to implement direct benefit transfers under social welfare schemes. Under the Pradhan Mantri Jan Dhan Yojana (“PMJDY”), 34.01 crore accounts have been opened (as of January 2019)¹³⁴ resulting in an increase in account ownership in India. The Global Findex Database Report (2017) released by the World Bank notes that while account ownership in India has almost doubled since 2011 to 79.9% due to government initiatives such as PMJDY, almost half of these accounts remain inactive.¹³⁵ Despite having high account ownership, the Findex Report goes on to add that due to its huge population size, India (190 million) continues to have a large unbanked population, next to China (225 million).¹³⁶ While this data pertains to the year 2017, such findings indicate that there is a case for improvement to promote financial inclusion in India. The RBI’s National Strategy for Financial Inclusion: 2019-2024, also notes that despite significant efforts, further steps are needed to ensure adequate access to financial services and usage of these services by various segments of the underserved and unserved

¹³¹ Sveriges Riksbank, ‘The Riksbank’s e-krona project Report 1’ (September 2017) <https://www.riksbank.se/globalassets/media/rapporter/e-krona/2017/rapport_ekrona_uppdaterad_170920_eng.pdf> accessed 20 March 2021.

¹³² Launched in 2014, this government programme leverages on the existing large banking network and technological innovations to provide every household with access to basic financial services. It envisages universal access to banking facilities with at least one basic banking account for every household, financial literacy, access to credit, insurance and pension. See <https://pmjdy.gov.in/about>

¹³³ Department of Telecommunications, ‘Jan Dhan Yojana, Aadhaar & Mobile connectivity (JAM) trinity’, Digital India, <https://digitalindia.gov.in/ebook/dot/page6.php> accessed on 14 March 2021. Indian Government’s JAM trinity is a model that involves integration of Jan Dhan Yojana scheme, Aadhaar database and mobile technology, shall help the Government in implementing Government’s Direct Benefit Transfers on a large scale by mapping an individual identity to one number across the nation.

¹³⁴ RBI, ‘National Strategy for Financial Inclusion (NSFI): 2019-2024’ (2020) <<https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1154#F2>> accessed 20 March 2021.

¹³⁵ World Bank, ‘The Global Findex Database 2017’ (2017) <<https://globalfindex.worldbank.org/>> accessed 20 March 2021

¹³⁶ World Bank, ‘The Global Findex Database 2017’ (2017) <<https://globalfindex.worldbank.org/>> accessed 20 March 2021

population.¹³⁷ To this extent, one may argue that India may explore CBDC as an option to promote financial inclusion. However, many central banks note¹³⁸ that for CBDC to increase financial inclusion, CBDC must be able to address the causes of exclusion, which can present complex issues running across several socio-economic factors. In the Indian context, RBI notes¹³⁹ that some key challenges to financial inclusion in India includes inadequate infrastructure, poor connectivity, socio-cultural barriers, digital literacy, etc. If financial inclusion stems from such factors or an aversion to or difficulties in achieving formalisation, a CBDC alone will not be enough to promote financial inclusion.¹⁴⁰ Any CBDC initiative to make a meaningful contribution to promote financial inclusion will have to be embedded in a wider set of reforms.

Fostering digitisation of the economy; Improve the efficiency of payment systems; Promoting competition and innovation

These are some policy objectives being explored in the Surveyed Jurisdictions. A retail CBDC would provide users with a new form of money and mode of payment, along with cash and existing payment solutions. Therefore, it is necessary to assess if a retail CBDC can offer any additional benefit and if yes, how can it fit within the existing payments landscape in India. This is particularly crucial for India as it has taken several steps in the last few years to promote digital payments through initiatives like - providing users with real-time and a 24/7 availability of payment options, promoting competition in the payments space through the setting up of a new umbrella entity for retail payments, similar to NPCI and providing payment solutions to users at optimal cost. Such initiatives, which have already been highlighted in the previous chapter forms part of the larger vision of the RBI and the government to move towards a 'less-cash India'. Further, it is also important to assess if potential benefits / opportunities which may be provided by a CBDC can be achieved through other ways such as reassessing existing policies and laws to promote the objectives mentioned above, rather than creating a new infrastructure for CBDC itself. This is an approach that has been stressed in countries like UK and Switzerland. In the case of Switzerland, while assessing efficiency gains of CBDC, the Federal Council notes that existing systems in Switzerland are efficient and secure and continuous efforts are being undertaken to reform the payment systems. While the Federal Council found that cross border payments is an area where there are some deficiencies, the Council concluded that the same may be dealt with through better interoperability and coordination between existing systems.

To the extent that a CBDC can fill the gaps in the provision of existing digital payment solutions and functionalities in India, a retail CBDC could play an important role in supporting the digital economy in India. To promote efficiencies and innovation, the CBDC design and the role of the private sector in the provision of CBDC payment solutions will be relevant. To that extent, the underlying system of CBDC will have to be flexible enough to support payment solutions required to meet the future needs of the digital economy. Considering that CBDC may impact bank intermediation and existing payment systems, the cost of disruption must be weighed against the policy objective of promoting efficiency and competition.

Supporting a resilient payment system

Certain Surveyed Jurisdictions are exploring CBDC to support the resilience in their payment systems. CBDC can diversify the payment options available to users and provide a safe and risk-free alternative to cash and existing digital payment solutions. It has been pointed out¹⁴¹ that, unlike cash, the CBDC system may provide a better alternative to distribute and use funds in geographically remote locations or during natural disasters, and perhaps even during a pandemic.

When it comes to increasing resilience, a Two-tiered CBDC Model provided through CBDC Intermediaries is likely to imply that RBI will not be able to supply an infrastructure that functions completely independently of other systems. In

¹³⁷ RBI, 'National Strategy for Financial Inclusion (NSFI): 2019-2024' (2020) <<https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1154#F2>> accessed 20 March 2021

¹³⁸ 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

¹³⁹ RBI, 'National Strategy for Financial Inclusion (NSFI): 2019-2024' (2020) <<https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1154#F2>> accessed 20 March 2021

¹⁴⁰ John Kiff ; Jihad Alwazir ; Sonja Davidovic, 'A Survey of Research on Retail Central Bank Digital Currency' (26 June 2020)

<<https://www.imf.org/en/Publications/WP/Issues/2020/06/26/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49517>> accessed 21 March 2021.

¹⁴¹ 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

case of disruptions in the intermediary's system, CBDC may not be available to users unless the central bank could provide a fall-back solution. For CBDC to improve operational resilience, the CBDC design may have to explore offline functionality.

Responding to the issuance of foreign CBDCs and privately issued virtual currency

In certain Surveyed Jurisdictions, the rise of privately issued virtual currencies such as cryptocurrencies and stablecoins has motivated central banks to look into the possibility of issuing a CBDC to avoid the risks associated with such privately issued currencies. Central banks¹⁴² point out that the significant adoption of such privately issued currencies or even foreign CBDCs could impact the ability of the central bank to execute its functions relating to monetary policy and financial stability. Having said that CBDC issuance in India should not be a reaction to cryptocurrencies or stablecoin proposals, but rather a focused effort to leverage technology to pursue public policy objectives.

Privately issued digital currencies will be widely adopted if they provide functionality and efficiency benefits over existing payment solutions. A well-designed CBDC that provides better payment services, backed by risk-free central bank money may be useful to reduce the demand for alternative currencies. This must be complemented with efforts to ensure that domestic payment systems are able to meet the payment needs of the population, both for domestic and cross border payments.

Improve cross-border payments

As discussed above, currently the correspondent banking model in cross border payments results in a costly and time-consuming process. With cross-border payments as a priority for G20 countries, India may play a leading role in identifying the possible use case of a CBDC for enhancing the efficiency of cross-border payments. While most pilots relating to cross-border payments in Surveyed Jurisdictions have been restricted to bilateral or tripartite arrangements, it may be worthwhile to explore a use case of CBDC for cross border payments on a large scale. Central banks point out¹⁴³ that a CBDC system could be designed to interoperate and to facilitate cross-border and cross-currency payments.¹⁴⁴ This will amongst other things requires developing relevant standards to ensure interoperability, which calls for coordination between countries. Apart from such technical standards, facilitating cross border payments will also require countries to reassess their legal framework, which may be challenging.

Reimagine the role of RBI

Currently, access to central bank money for general population is in the form of cash. With growing digitisation and if cash declines, the CBDC may help RBI to maintain a direct link between central banks and citizens, which could help foster the public's understanding of central banks' roles and need for independence. This will also be relevant if RBI wants to continue its autonomy in a prominent sector i.e. the retail payments.

Prevention of financial crime

It has been argued by some that CBDC could improve a country's ability to combat financial crime such as money laundering, tax offenses, etc.¹⁴⁵ This will be possible as CBDC may enable transactions to be tracked and identified easily. To meet this objective, the CBDC design will be crucial, as the same would allow traceability. It has been argued that an account-based CBDC may be better suited to achieve this traceability¹⁴⁶ as compared to a token-based design. In the Indian context to identify if CBDC is an optimal solution, it will be necessary to assess the enabling factors such as regulatory or enforcement gaps and evaluate the same against the opportunities that a CBDC may bring for preventing financial crimes. Nevertheless, if policymakers seek to use CBDC to prevent financial crime, CBDC will have to be designed restrictively, incorporate high security standards, and be subject to strict regulation to ensure transparency and traceability, which in turn may have an impact on the usability and convenience of a CBDC. In the absence of these features, CBDC itself may become a new channel for financial crimes. Separately, depending on the

¹⁴² 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

¹⁴³ 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

¹⁴⁴ See, Rapahel Aur, Philipp Haene and Henry Holden, 'Multi-CBDC arrangements and the future of cross border payments' (March 2021) <bis.org/publ/bppdf/bispap115.pdf> accessed 25 March 2021.

¹⁴⁵ Swiss Federal Council, 'Federal Council report in response to the Postulate 18.3159, Wermuth, of 14.06.2018' (2019) <<https://www.news.admin.ch/newsd/message/attachments/59639.pdf>> accessed 20 March 2021

¹⁴⁶ Swiss Federal Council, 'Federal Council report in response to the Postulate 18.3159, Wermuth, of 14.06.2018' (2019) <<https://www.news.admin.ch/newsd/message/attachments/59639.pdf>> accessed 20 March 2021

degree of traceability embedded in the CBDC design, its impact on privacy will have to be assessed. As the CBDC and its payments infrastructure are likely to have access to new forms of personal data, including transaction level data, policy questions about who can access such data and under what circumstances will emerge. This will require a balance to be struck between privacy considerations and the objective of preventing financial crime.

What will be the preliminary considerations for designing a Digital Rupee?

How effective a Digital Rupee would be in meeting the policy objectives discussed above or in confronting the potential problems we currently see in the payments market and what consequences a Digital Rupee could entail for the economy and society will depend on how it is designed, which characteristics it has and how it is provided. There are two main elements to any CBDC - the CBDC itself i.e. access to a new form of central bank money; and the CBDC infrastructure that allows CBDC to be transferred and used for payments. Different aspects that will require consideration are discussed below.

Who will have access to the CBDC?

As discussed, CBDC can be designed as a wholesale CBDC i.e. intended for inter-bank payments or retail CBDC i.e. intended to be used by everyone. Considering that banks already have accounts at the RBI, it may be useful to assess if and to what extent a wholesale CBDC could provide any improvements over the existing mechanism. One particular use case that is being considered is the use of wholesale CBDCs in the context of cross border payments. Retail CBDCs appear to be a popular choice across many Surveyed Jurisdictions - which may be also a good starting point for India. However, considering that India already has undertaken several initiatives to promote the retail digital payments, the value proposition of a retail CBDC will have to be undertaken through a cost-benefit analysis. If RBI intends to issue a retail CBDC, several issues especially the role of RBI and private players will have to be assessed.

What will be the functional features of a CBDC?

These features are essential to design how the CBDC will facilitate payments and how users will interact with the CBDC platform. This is relevant for a retail CBDC to ensure that it provides users with a safe, reliable and useful mode of payment. The functional features discussed in Chapter III will also be relevant in the Indian context. For instance, factors that may influence the demand for a CBDC for payment purposes will include - the payment needs met by the CBDC, how widely adopted it is, cost of using, security, availability, convertibility into other forms of money, interoperability across other payment instruments, etc. Insofar as the factors influencing the CBDC's function as a store of value is concerned, factors such as remuneration (interest bearing), if any, limit on the amount of CBDC funds that can be held, security, convertibility into bank-deposits and vice versa, etc, will be relevant. Ultimately, for retail users, assessment of a CBDC with other existing means of payment will also influence the demand for such CBDC.

Economic and Technological aspects

Many Surveyed Jurisdictions are also exploring specific economic features of a CBDC such as whether it should be interest bearing or not, whether central banks should impose limits on the amount of CBDC that can be held and whether CBDC be freely convertible into other forms of central bank money or bank deposits. Similarly, jurisdictions are also exploring the technological designs (especially the use of DLT) that will be necessary to meet the functional features discussed above. For the purposes of this report, we have not explored these aspects as the research on these issues are at a preliminary stage in many countries without any conclusive finding.

Role of RBI in CBDC issuance & its impact on existing policy objectives and institutional capacity

An assessment of the CBDC issuance on existing policy objectives and mandate of RBI under different laws and its potential impact on the institutional capacity of RBI to execute the CBDC issuance process requires consideration.

Under the RBI Act, the RBI is expected to operate the credit and currency systems, maintain reserves to preserve monetary stability and operate the monetary policy framework in India. Over the years, RBI has assumed different roles and functions pursuant to different statutes - such as the regulator of banks, and non-banking financial companies under the Banking Regulation Act, 1949 ("**BR Act**") and the regulator of payment systems under the Payment and Settlements Systems Act 2007 ("**PSS Act**"). The RBI as the central bank also operates the large value payment systems in India. In these different capacities, RBI pursues other policy objectives, such as promotion of financial inclusion, digital payments and innovation in the financial sector. The issuance of a Digital Rupee will involve reassessing the role of RBI to consider how a CBDC would fit into or further these statutory objectives and mandate of RBI under existing laws. For instance, the economic implications of a CBDC, particularly its impact on monetary stability is critical since RBI is responsible for the same under the RBI Act. Similarly, the RBI has the mandate to regulate and supply banknotes in India, which effectively may be viewed that RBI will continue to issue such notes even with the issuance of CBDC. As the regulator of payment systems in India, RBI is responsible to promote a secure and efficient payment system. The impact of a payments infrastructure for CBDC payments on this policy priority will have to be assessed.

The introduction of a retail CBDC in India, irrespective of the model may lead to RBI introducing services for the general public. This marks a departure from its existing operations, in which RBI has no direct relationship with the end consumers. Irrespective of whether the CBDC is structured as a direct or a Two-tiered CBDC Model, RBI is likely to have more operative tasks - though the extent may vary with the design. Briefly, activities in CBDC issuance is likely to include - development and administration of CBDC system, customer onboarding and due diligence, transaction authorisation, maintaining system security, ensuring interoperability with other systems, executing partnerships with third parties, and designing and implementing a regulatory framework for CBDC issuance. Some of these functions may be outsourced to intermediaries in a Two-tiered CBDC Model. However, if the CBDC design involves RBI assuming responsibility for a large number of services linked to CBDC, it implies that RBI will be responsible for new areas of activities which will require new competencies within the bank. The costs, risks, responsibility and degree of the bank's operative control must be considered and assessed before a decision on the design of CBDC is taken. Alternatively, in a model where RBI assumes a less operative role, with most consumer facing services being outsourced to intermediaries, it will still need to develop monitoring, oversight and risk management functions, evaluate third-party risks, and establish systems to respond to potential CBDC disruptions that could result from operational failures or cyber breaches.

CBDC Issuance in India - Preliminary Legal Considerations

A possible introduction of a Digital Rupee raises important legal issues that require consideration. The design of the Digital Rupee will determine the legislative interventions required to issue a CBDC. At present, research and development on CBDC involves examining a range of designs, based on access, use case, technology, and the role of the private sector. Common differentiators therefore include retail and wholesale CBDC, account and token-based CBDC as well as synthetic CBDC. The legal treatment of each of these designs will differ.

Legal Treatment of CBDC

From a legal perspective, some commentators have drawn a distinction between three commonly used terms in the payment sphere - money, currency and payment instruments.¹⁴⁷ First, currency is an official means of payment that is denominated in the official monetary unit and recognized by a monetary law. This usually encompasses banknotes and coins. In India, the RBI Act and the Coinage Act, 2011 confers legal tender status to banknotes and coins respectively. Second, the concept of money is sometimes understood to be a broader concept - which includes legal tender as well as book money or broad money circulated by commercial banks. Third, payment instruments are used to effect payment - which includes cheques and bills of exchange. While terms relating to money, currency and payment system tend to be used interchangeably in the CBDC discourse, the legal treatment may not necessarily be the

same. In light of the varying designs of CBDC being explored by jurisdictions, this distinction is necessary to identify the legal treatment of a CBDC. Another important legal concept that is critical to the discussion for CBDCs is the definition of payment systems and its treatment under the payment systems law. In India, the PSS Act defines “payment systems” to mean “a system that enables payment to be effected between a payer and a beneficiary, involving clearing, payment or settlement service or all of them, but does not include a stock exchange.” In India, retail payment systems (such as UPI), wallets, card networks, etc. that facilitate payment processing is required to be authorised by RBI and is regulated under the PSS Act. Such payment systems facilitate transfer of funds denominated in the same currency as central bank or commercial bank money, as opposed to creating a new form of money. At this point, it is also useful to distinguish a retail CBDC from some other types of digital payment methods like e-money. E-money (also known as stored-value facilities) is a form of electronically stored monetary value that can be used to make payments. This encompasses a wide variety of facilities, including prepaid cards and digital wallets. Arguably, e-money is somewhat similar to bank deposits, though they are issued by non-banks and are typically covered by a different regulatory framework than banks. While the user interface and technology employed for a CBDC could be similar to that for e-money, the key difference is that e-money is not issued by a central bank and, therefore, presents some credit risk to the user.¹⁴⁸

In many countries, CBDC projects entails the creation of a payments infrastructure to facilitate transfer of funds. For instance, many reports¹⁴⁹ claim that Cambodia’s payments solution “Bakong” is a CBDC. The Bakong White

Key Features of the legal framework governing the issue of Sand Dollar in Bahamas

The Central Bank of Bahamas announced a national rollout of the Sand Dollar in 2020.

As per Central Bank of the Bahamas Act, 2020 (CBA Act), the central bank is responsible for the issuance of electronic money or other forms of stored value.

The CBA Act further confers legal tender status on electronic money issued by the central bank. Further, this Act empowers the central bank to issue regulations for issuance of electronic money by the central bank

Exercising these powers, the central bank has issued the draft Central Bank (Electronic Bahamian Dollars) Regulations, 2021. The proposed regulations deal with - qualification of wallet providers (wallets store the sand dollar), provisions relating to consumer protection, interoperability, limits on amount that can be held in wallets, etc.

The Payment Systems Act, 2012 which is relied on for the definition of electronic money under the CBA Act is also proposed to be amended to specifically empower the central bank to issue sand dollar.

¹⁴⁷ Wouter Bossu ; Masaru Itatani ; Catalina Margulis, et al, ‘Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations’ (IMF Working Papers, 20 November 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/11/20/Legal-Aspects-of-Central-Bank-Digital-Currency-Central-Bank-and-Monetary-Law-Considerations-49827>> accessed 21 March 2021; Dong He, Karl Habermeier, Ross Leckow, et al, ‘Virtual Currencies and Beyond: Initial Considerations’ (IMF Staff Discussion Note, 2016) <<https://www.imf.org/external/pubs/ft/sdn/2016/sdn1603.pdf>> accessed 21 March 2021.

¹⁴⁸ Tony Richards, Chris Thompson and Cameron Dark; ‘Retail Central Bank Digital Currency: Design Considerations, Rationales and Implications’ (Reserve Bank of Australia Bulletin, 17 September 2020) <<https://www.rba.gov.au/publications/bulletin/2020/sep/retail-central-bank-digital-currency-design-considerations-rationales-and-implications.html>> accessed 21 March 2021.

¹⁴⁹ ‘Cambodia’s Central Bank Pioneers Digital Currency in South East Asia with Launch of Bakong’ (Fintech Singapore, 30 October 2020) <<https://fintechnews.sg/44810/blockchain/cambodia-pioneers-digital-currency-in-south-east-asia-with-launch-of-bakong/>> accessed 20 March 2021; Keita Sekiguchi and Tomoyo Onishi, ‘Cambodia debuts digital currency as emerging countries lead charge’ (Nikkei Asia, 29 October 2020) <<https://asia.nikkei.com/Spotlight/Cryptocurrencies/Cambodia-debuts-digital-currency-as-emerging-countries-lead>>

Paper states that “Project Bakong is designed as a new platform for a payment system that uses DLT to enhance efficiency (cost, speed and security) of the payment system.....The implementation of Bakong would connect all financial institutions and payment service providers under single payment platform which will allow for fund transfers to be processed on real-time basis without the need of a centralized clearing house.”¹⁵⁰ A reading of this model indicates that Bakong appears to be more of a payments infrastructure operated by the central bank backed by fiat currency, as opposed to a new form of central bank money. Central bank officials have also clarified that Bakong is not a CBDC issued by the central bank.¹⁵¹ Irrespective of nomenclature, legal treatment of a CBDC is intrinsically linked to the design of the CBDC.

Legal Mandate to issue retail CBDC

Any CBDC issuance by the central bank must be backed by statute. This is particularly significant since CBDC is a novel concept and any lack of legal certainty regarding the same in case India decides to issue a CBDC will expose the central bank to legal, financial and reputational risks. The need for an express mandate and legal certainty is also evident from existing legislative provisions under the RBI Act which empowers RBI to issue banknotes and open accounts for banks. To assess if the issuance of a CBDC is within the mandate of RBI, an analysis of existing provisions of law and the mandate of RBI is relevant.

Existing Powers of the RBI to issue currency and open accounts

Power to issue currency: Under section 22 of the RBI Act, RBI has the sole right to issue banknotes. RBI’s Issue Department is tasked with the responsibility of issuing and maintaining bank notes and bears liabilities equal to the total amount of currency in circulation.¹⁵² For coins, the RBI has a relatively circumscribed role. Under the Indian Coinage Act, 2011, RBI’s duties are limited to distributing coins supplied by the central government, with the latter assuming responsibility for the design and minting of coins.

Power to open accounts with RBI: Under the RBI Act, the RBI is empowered to act as a banker to the country’s banks. As a result, scheduled and non-scheduled banks¹⁵³ may maintain current accounts with the RBI for three reasons: *one*, to fulfil statutory obligations, such as maintaining a prescribed reserve account; *two*, to settle clearing house positions; *three*, to settle inter-bank transactions and transactions with governments.¹⁵⁴ Notably, while the RBI Act does not have an express provision empowering RBI to open and maintain accounts for commercial banks, a review of section 42 of the RBI Act indicates that banks can open such accounts with the RBI.

Assessing the Legal Mandate of RBI to issue retail CBDC

The power to issue currency is relevant for a retail token-based CBDC. To understand if RBI is empowered to issue retail token-based CBDC, it is necessary to assess if the existing currency issuance power is broad enough to empower RBI to issue all types of currency or is it restricted to physical notes. The IMC Report relies on section 25 of the RBI Act which provides that the design, form and material of banknotes shall be such as may be approved by the central government after consideration of the recommendations made by the central board of the RBI. The IMC Report notes that section 25 of the RBI Act does not expressly require a banknote to be made of a particular technology or form (i.e. physical). Given that the provisions allows the central government to specify the design, form and material, the IMC Report argues that section 25 of the RBI Act can be interpreted to envisage a banknote

charge> accessed 20 March 2021; Global Blockchain Business Council, ‘The rise of central bank digital currencies spotlight on project bakong’ (2021) <<https://medium.com/gbbc/the-rise-of-central-bank-digital-currencies-spotlight-on-project-bakong-5ec5c5969c47>> accessed 20 March 2021; ‘Cambodia officially launches digital currency backed by central bank’ (Bangkok Post, 28 October 2020) <<https://www.bangkokpost.com/business/2009915/cambodia-officially-launches-digital-currency-backed-by-central-bank>> accessed 20 March 2021

¹⁵⁰ National Bank of Cambodia, ‘Project Bakong Next Generation Payment System’ (June 2020) <https://bakong.nbc.org.kh/download/NBC_BAKONG_White_Paper.pdf> accessed 19 March 2021

¹⁵¹ Emmanuel Daniel, ‘Cambodia’s Serey clarifies: Bakong is not a digital currency’ (Radio Finance, 11 November 2020) <<https://www.radio.finance/episodes/nbcs-serey-bakong-is-not-a-cbdc-it-is-a-backbone-payment-system-built-on-dlt>> accessed 20 March 2021; May Kunmakara, ‘NBC’s Serey: ‘Bakong not a CBDC’’ (The Phnom Penh Post, 17 November 2020) <[https://www.phnompenhpost.com/business/nbcs-serey-bakong-not-cbdc#:~:text=National%20Bank%20of%20Cambodia%20\(NBC\)%20assistant%20governor%20Chea%20Serey%20on,and%20is%20wholly%20fiat%20backed](https://www.phnompenhpost.com/business/nbcs-serey-bakong-not-cbdc#:~:text=National%20Bank%20of%20Cambodia%20(NBC)%20assistant%20governor%20Chea%20Serey%20on,and%20is%20wholly%20fiat%20backed)> accessed 21 March 2021.

¹⁵² Section 23 read with Section 34, RBI Act.

¹⁵³ Section 42 of the RBI Act; Section 18 of the BR Act.

¹⁵⁴ RBI, ‘Report of the Inter-Departmental Group to study the Rationalisation of Current account Facility with Reserve Bank of India’ (2001) <<https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?ID=249>> accessed 20 March 2021.

in any form, including digital as long as the same is approved by the central government after considering the recommendations of the central board of RBI. Accordingly, the IMC Report recommended that CBDC can be issued in India if the central board of the RBI makes a recommendation to the central government to declare a CBDC to be within the meaning of “bank note” under section 25 of the RBI Act, and the recommendation is “approved” by the central government.

Contrary to this, some researchers view that any argument that the power of a central bank to issue specifically “banknotes” and coins can be interpreted to mean both physical and digital currency may be a “stretched legal interpretation.”¹⁵⁵ Equating a CBDC to a “bank note” may have a restrictive impact on the CBDC design which will then have to work within the framework for banknotes.¹⁵⁶ Some aspects which may get impacted with such an interpretation is the remuneration (if any) associated with a CBDC, the denomination of CBDC, etc.¹⁵⁷ At the time of the enactment of the RBI Act, the legislature did not envisage banknotes to be in any form other than physical notes. Given the novelty and complexity associated with a CBDC and by way of abundant caution, policymakers in case of a retail token-based CBDC must consider an express provision enabling RBI to issue a currency in digital form. Pertinently, this is a common issue that most jurisdictions will face in the issuance of such token-based CBDC. A study released by the International Monetary Fund (“IMF”) notes that among the 171 central banks that are members of IMF, almost 61% of central bank laws limits the authority of issuance of currency to banknotes and coins. Notably, the power to issue currency is also supplemented with other provisions in the RBI Act relating to legal tender status and withdrawal of such status, production of notes, denomination of such notes, etc. The legal treatment of such issues in the context of CBDC will also have to be considered.

The power of the RBI to open account is also relevant for a retail account-based CBDC. While currently only banks are allowed to open and maintain accounts with RBI, in case of a retail account-based CBDC, the law will have to expressly empower RBI to open accounts for other users. According to an IMF study, out of its 171 central bank members, almost 85% of central banks limit the power of central banks to open accounts for financial institutions.

It is pertinent to note that the aforesaid considerations will be relevant in the context of a direct CBDC. In the event, India decides to adopt a Two-Tiered CBDC Model, as discussed earlier, necessary amendments facilitating the entry of CBDC Intermediaries will be required. This is discussed in detail below.

Payment systems law and CBDC issuance

The issuance of a retail CBDC - either as token-based or account-based must be supported by a payments infrastructure to process such CBDC payments. In the event, a separate payments infrastructure for processing such CBDC payments have to be set up, the legal implications of this system, which is likely to qualify as a “payment system” under the PSS Act will have to be considered.

The PSS Act designates the RBI as the authority for the regulation and supervision of payment systems in India. Notably, RBI not only regulates payment systems in India, but is also the operator of RTGS and NEFT. The PSS Act exempts RBI from obtaining an authorisation under the Act to operate a payment system in India. If a CBDC were to be introduced through an RBI-operated infrastructure, then this would presumably resemble a payment system. There does not appear to be any hindrance under the PSS Act to allow RBI to operate such a payment system. However, in case of Two-tiered CBDC Model which allows entry of third parties as CBDC Intermediaries, the implications under the PSS Act will have to be explored.

¹⁵⁵ Wouter Bossu ; Masaru Itatani ; Catalina Margulis, et al, ‘Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations’ (IMF Working Papers, 20 November 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/11/20/Legal-Aspects-of-Central-Bank-Digital-Currency-Central-Bank-and-Monetary-Law-Considerations-49827>> accessed 21 March 2021. This study notes that contrary to this, jurisdictions where central banks have a general power to issue currency without specific reference to bank notes or coins may be within their legislative competence to issue a CBDC.

¹⁵⁶ Banque de France, ‘Central Bank Digital Currency’ (2 April 2020) < <https://publications.banque-france.fr/en/central-bank-digital-currency>> accessed 20 March 2021.

¹⁵⁷ Banque de France, ‘Central Bank Digital Currency’ (2 April 2020) < <https://publications.banque-france.fr/en/central-bank-digital-currency>> accessed 20 March 2021.

Other Legal Considerations

Legal Tender Status

One of the legal means for countries to sanction the use of currency is through the granting of legal tender status. Broadly, a legal tender status implies that the State recognises the payment in the currency (which has been granted a legal tender status) as a valid discharge of a debt.¹⁵⁸ In India, section 26 of the RBI Act confers legal tender status to banknotes issued by the RBI. As per the RBI Act, “every bank note shall be legal tender at any place in India in payment or on account for the amount expressed and shall be guaranteed by the Central Government.” Similarly, the coins issued by the Government of India under section 6 of the Indian Coinage Act, 2011 shall be legal tender in payment. A coin of any denomination not lower than one rupee shall be legal tender for any sum not exceeding one thousand rupees. Fifty paise (half rupee) coin shall be legal tender for any sum not exceeding ten rupees. Implications of legal tender status may vary across countries.¹⁵⁹ Broadly, the legal tender rules apply unless there is a contractual provision stipulating otherwise between the parties to the transaction.¹⁶⁰

Therefore, whether CBDC should be granted a legal tender status and if granted, what will be the implications of the same are issues that will have to be considered. Certain Surveyed Jurisdictions are exploring how the concept of legal tender will operate in the context of CBDC. In particular, Sweden has noted that the concept of legal tender “does not have a very great significance for payments in the retail trade or for banks either”¹⁶¹ as practically, there is an option to agree and to accept other forms of currency through an agreement. Accordingly, the Riksbank is considering if an “e-krona” should have the status of legal tender in addition to cash or the concept of legal tender itself should be reimagined¹⁶² for a digital economy. However, Norway views that the concept of legal tender is necessary from a consumer protection point of view and argues that a CBDC can expand the area of application of legal tender as CBDC can be used for distant payments.¹⁶³

Currently, there is no legal prohibition to confer a legal tender status to a CBDC. However, in the context of a retail CBDC, conferring a legal tender status on a CBDC will be fair only if a large segment of the population has the resources to pay and accept the same. It has been pointed out¹⁶⁴ that the obligation to accept a digital form of central bank money as a means of payment may give rise to questions regarding equal access as many payees may not have the technological interface to accept such payments. This must be contrasted with banknotes which is relatively easily accessible by all. These issues in turn raise the question of whether such a legal tender status to CBDC to be viewed as fair will require the state to ensure that such a means of payment is easily accessible.

CBDC and Unit of Currency

One of the functions of money as discussed above is that it serves as a “unit of account”. Therefore, countries have official monetary units or units of currency. For instance, Rupee in India, Dollar in USA, Yuan in China, etc.

¹⁵⁸ Arthur Nussbaum, *Basic Monetary Conceptions in Law*, 35 MICH. L. REV. 893 (1937)

¹⁵⁹ Wouter Bossu ; Masaru Itatani ; Catalina Margulis, et al, ‘Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations’ (IMF Working Papers, 20 November 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/11/20/Legal-Aspects-of-Central-Bank-Digital-Currency-Central-Bank-and-Monetary-Law-Considerations-49827>> accessed 21 March 2021.

¹⁶⁰ Wouter Bossu ; Masaru Itatani ; Catalina Margulis, et al, ‘Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations’ (IMF Working Papers, 20 November 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/11/20/Legal-Aspects-of-Central-Bank-Digital-Currency-Central-Bank-and-Monetary-Law-Considerations-49827>> accessed 21 March 2021.

¹⁶¹ Sveriges Riksbank, ‘The Riksbank’s e-krona project Report 1’ (September 2017) <https://www.riksbank.se/globalassets/media/rapporter/e-krona/2017/rapport_ekrona_uppdaterad_170920_eng.pdf> accessed 20 March 2021.

¹⁶² Sveriges Riksbank, ‘Petition to the Riksdag: The state’s role on the payment market’ (2019) <<https://www.riksbank.se/globalassets/media/betalningar/framstallan-till-riksdagen/petition-to-the-swedish-riksdag-the-states-role-on-the-payment-market.pdf>> accessed 19 March 2021. Having said that, countries like Norway argue that the concept of legal tender is essential from a consumer protection point of view, where bargaining power between two parties may not be symmetrical.

¹⁶³ Norges Bank, ‘Central Bank Digital Currencies: Second Report of Working Group No 2|2019’ (2019) < https://www.norges-bank.no/contentassets/79181f38077a48b59f6fbdd113c34d2c/nb_papers_2_19_cbdc.pdf?v=06/27/2019121511&ft=.pdf> accessed 19 March 2021.

¹⁶⁴ Wouter Bossu ; Masaru Itatani ; Catalina Margulis, et al, ‘Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations’ (IMF Working Papers, 20 November 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/11/20/Legal-Aspects-of-Central-Bank-Digital-Currency-Central-Bank-and-Monetary-Law-Considerations-49827>> accessed 21 March 2021; Banque de France, ‘Central Bank Digital Currency’ (2 April 2020) < <https://publications.banque-france.fr/en/central-bank-digital-currency>> accessed 20 March 2021; European Central Bank, ‘Report on a Digital Euro’ (2020) <https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf> accessed 19 March 2021.

Jurisdictions studying CBDC do not envisage that the introduction of a CBDC will change such unit of currency. A CBDC will simply be a central bank liability issued digitally in the official monetary unit.

Regulating intermediaries in a Two-tiered CBDC Model

The introduction of a Two-tiered CBDC Model will involve participation of actors from the private sector which can act as CBDC Intermediaries. This calls for designing a legal framework for supervision and regulation of such players. Depending on the final design of the CBDC, it will have to be explored whether such a legal framework for CBDC Intermediaries will have to be issued separately (like proposed by Bahamas) or will be accommodated within existing legislation. In any event, important issues for regulation of CBDC Intermediaries will include - qualification criteria for becoming CBDC Intermediaries, ensuring that such entities are subject to operational and financial resilience to mitigate any risk that may arise in the CBDC ecosystem in case of their failure, standards relating to access and interoperability, compliance with KYC, data protection law, AML laws, etc. Considering the impact of the CBDC system on systemic stability, the treatment of such CBDC Intermediaries under the RBI framework for financial market infrastructures will also have to be considered.¹⁶⁵ The imputation of liability between the RBI and the CBDC Intermediary in case of any loss suffered by a user due to an unauthorised transaction relating to her CBDC funds will also have to be determined.

Implications under other laws

Depending on the design of the CBDC, other laws that may have to be reviewed to facilitate CBDC issuance are - data protection laws¹⁶⁶ (in case CBDC systems store personal information), prevention of money laundering law and its applicability to RBI especially in the context of direct CBDC, criminal laws which deal with counterfeiting of currencies (relevant for token-based CBDC), etc. In case of a direct CBDC, in the event the central bank becomes a repository of economy wide transaction level data, the central bank may be solely responsible for protecting privacy and data of all users, which may be onerous. Similarly, in the absence of any public-private partnership, the compliance with anti-money laundering laws and tax laws, could also fall on the central bank.

¹⁶⁵ RBI, 'Oversight Framework for Financial Market Infrastructure (FMIs) and Retail Payment Systems (RPSs)' (2020) <https://www.rbi.org.in/scripts/bs_viewcontent.aspx?Id=3864> accessed 19 March 2021.

¹⁶⁶ The appropriate degree of anonymity that a CBDC transaction must allow is an important issue that is being deliberated in many jurisdictions. While CBDC may be designed to protect privacy rights of users, a CBDC cannot truly remain anonymous like cash.

VI. Conclusion

As argued earlier, it is premature at this stage to conclude whether India should issue a CBDC. Given the varying motivations for issuing CBDC, the uncertainty regarding its potential impact on the financial system and the existence of a fairly efficient payment systems market in India, the ultimate decision as to whether to issue CBDC will come down to weighing the costs and benefits of CBDC issuance against those of the alternatives. Nevertheless, it is equally important to state that the tokenisation of payment systems may have far reaching impact and central banks cannot remain bystanders. In this transformative journey of payments, many central banks are exploring to lead the way through their work on CBDC. While many countries have confirmed that they do not view CBDC issuance as a priority, they continue to research on CBDC, should the need arise in the future to issue a CBDC.

- Considering the novelty and complexity of issues that a CBDC issuance may pose, it is important that there is a well-thought regulatory roadmap for CBDC issuance in India, which should amongst other things include a consultative approach, with relevant stakeholders.
- Any such process should commence with a study to understand the potential use cases or identify the policy priorities that CBDC issuance can further in India. Opportunities that will perhaps enable RBI to further its policy objectives should encourage issuance. While other opportunities highlighted by secondary literature such as preventing financial crimes, or promoting fiscal stimulus may guide CBDC development, they are not likely to be the primary consideration.
- Despite the opportunities and use cases identified by the central bank, it is important that there are certain core principles that should guide CBDC research in India¹⁶⁷ - (a) CBDC should not substitute cash and access to cash should be provided to citizens as long as there is a demand for it. This is important for a jurisdiction like India which has a sizeable population that remains underbanked (b) CBDC should not be viewed as a substitute to private money in India - this is important for India since it has a fairly developed digital payments infrastructure which should not be majorly disrupted due to CBDC issuance (c) CBDC issuance should enable RBI to further its policy objectives and should not be designed in a manner that it puts a strain on the institutional capacity of RBI to effectively carry out its existing mandate (d) CBDC issuance must have demonstrated impact on increasing the efficiency of payments in India - its issuance should not be solely guided by the rise of privately issued currencies such as cryptocurrencies and stablecoins. While these core principles should guide the CBDC research, irrespective of design, functional features may vary depending on the final design of the CBDC
- Upon identification of the use cases of a CBDC in India, it is important to follow it up with practical experimentation especially, to test the functional design and technical feasibility of the CBDC. This should include pilots in a controlled environment with the involvement of the private sector as well as some prospective users.
- The ultimate decision to issue a CBDC should be guided by such research, pilots, dialogue with public private stakeholders to understand the potential opportunities and challenges associated with CBDC issuance and the possible and the design that can tap into such opportunities and address the risks. In any such deliberation, specific emphasis on legal consideration is also critical to avoid any legal or reputational risks to the RBI.

¹⁶⁷ 'Central bank digital currencies: foundational principles and core features' (2020) <<https://www.bis.org/publ/othp33.pdf>> accessed 20 March 2021.

Annexure A - Snapshot of CBDC Research in Surveyed Jurisdictions

Sr. No.	Jurisdiction	Stage of CBDC Development
1.	Australia	<p>Retail CBDC: Members of the Payment System Board of the Reserve Bank of Australia (RBA) consider that at present there is “not a strong public-policy case” for retail CBDC issuance in Australia given that the electronic payment system in Australia is working favourably and there is adequate access to cash. (2020)¹⁶⁸</p> <p>Wholesale CBDC: As a part of the ongoing research at RBA on wholesale CBDC, it has partnered with banks and a blockchain technology company to explore the potential use and implications of a wholesale CBDC using DLT. (2020)¹⁶⁹</p>
2.	Bahamas	<p>The Central Bank of Bahamas had issued a paper on its CBDC project called Project Sand Dollar in 2019.¹⁷⁰ In 2020, it announced¹⁷¹ the nationwide launch of the Sand Dollar, which is a digital version of the Bahamian Dollar.¹⁷²(2020)</p> <p>In 2021, the central bank has released a consultation paper on draft Central Bank (Electronic Bahamian Dollars) Regulations, 2021 for developing a legal framework for the central bank’s oversight of wallet providers. (2021)¹⁷³</p>
3.	Brazil	The Banco Central do Brasil has created a study group to evaluate the potential benefits and impact of issuing a digital Brazilian Real. ¹⁷⁴ (2020)
4.	Canada	The Bank of Canada has released a report on contingency planning for a CBDC. While the bank currently has “no plans to launch a CBDC”, it proposes to build the capacity to issue a “general purpose, cash-like CBDC” should the need arise. ¹⁷⁵ (2020)
5.	China	Reports indicate that the People’s Bank of China has conducted a pilot of a digital yuan in October 2020. ¹⁷⁶ No official announcement on the same.

¹⁶⁸ Reserve Bank of Australia, ‘Payments System Board Update: August 2020 Meeting’ (2020) <<https://www.rba.gov.au/media-releases/2020/mr-20-19.html>> accessed 19 March 2021.

¹⁶⁹ Reserve Bank of Australia, ‘Reserve Bank partners with Commonwealth Bank, National Australia Bank, Perpetual and ConsenSys Software on Wholesale Central Bank Digital Currency Research Project’ (2020) <<https://www.rba.gov.au/media-releases/2020/mr-20-27.html>> accessed 19 March 2021.

¹⁷⁰ Central Bank of the Bahamas, ‘Project Sand Dollar: A Bahamas Payments System Modernisation Initiative’ (2019) <<https://www.centralbankbahamas.com/index.php/viewPDF/documents/2019-12-25-02-18-11-Project-Sanddollar.pdf>> accessed 19 March 2021.

¹⁷¹ Sand Dollar, ‘Nationwide Launch’ (2020) <<https://www.sanddollar.bs/publicupdates/nationwide-launch>> accessed 19 March 2021.

¹⁷² Sand Dollar, ‘FAQs – Project Sand Dollar’, <<https://www.sanddollar.bs/faqs/what-is-project-sand-dollar>> accessed 19 March 2021.

¹⁷³ Central Bank of the Bahamas, ‘Consultation Paper: Proposed Legislation for the Regulation of the provision and use of Central Bank issued Electronic Bahamian Dollars’ (2021) <<https://www.centralbankbahamas.com/viewPDF/documents/2021-02-15-11-24-12-Central-Bank-Electronic-Bahamian-Dollars-Regulations-2021.pdf>> 19 March 2021.

¹⁷⁴ Banco Central Do Brasil, ‘BCB established study group on issuance of central bank digital currency’ (2020) <<https://www.bcb.gov.br/en/pressdetail/2349/nota>> accessed 19 March 2021.

¹⁷⁵ Bank of Canada, ‘Contingency Planning for a Central Bank Digital Currency’ (2020) <<https://www.bankofcanada.ca/2020/02/contingency-planning-central-bank-digital-currency/>> accessed 19 March 2021

¹⁷⁶ Simon Rabinovitch, ‘China prepares to launch the world’s first official e-currency’ (*The Economist*, 17 November 2020) <<https://www.economist.com/the-world-ahead/2020/11/17/china-prepares-to-launch-the-worlds-first-official-e-currency>> accessed 20 March 2021; Raphael Auer, Giulio Cornelli and Jon Frost, ‘Rise of the central bank digital currencies: drivers, approaches and technologies’ (*BIS Working Papers No 880*, August 2020) <<https://www.bis.org/publ/work880.pdf>> accessed 21 March 2021.

6.	Denmark	Last published stand of the central bank clarifies that Denmark is not looking to issue a CBDC because there is no evidence that it will result in better payment solutions. (2017) ¹⁷⁷
7.	Eastern Caribbean	The central bank had launched a pilot for a retail CBDC - a digital version of the Eastern Caribbean dollar sometime in 2019. ¹⁷⁸
8.	Ecuador	Launched in 2014, the central bank provided electronic money accounts to its citizens to make mobile money payments. ¹⁷⁹ It is reported that the project has been discontinued.(2015) ¹⁸⁰
9.	Estonia	The central bank has launched a research project with technology companies to investigate the suitability of a blockchain based core technology of e-government in Estonia for operating the money infrastructure for a CBDC. (2020) ¹⁸¹
10.	Eswatini	The central bank launched a “diagnostic study” to investigate the possible use cases of a CBDC in Eswatini. ¹⁸² The report of the first phase which focussed on potential benefits of CBDC has been released. (2020) ¹⁸³
11.	European Union	The European Central Bank has released a report on a digital euro which sets out its work on possible reasons to issue a CBDC, potential impact, design possibilities, etc. ¹⁸⁴ The report was opened for public consultation, which has ended. ¹⁸⁵
12.	France	The central bank has issued a call for application to experiment with the use of CBDC for interbank settlements and to identify use cases for integrating CBDC in “innovative procedures for the clearing and settlement of tokenised financial assets”. ¹⁸⁶

¹⁷⁷ Danmarks National Bank, ‘Central bank digital currency in Denmark?’ (2017)

<<https://www.nationalbanken.dk/en/publications/Documents/2017/12/Analysis%20-%20Central%20bank%20digital%20currency%20in%20Denmark.pdf>> accessed 19 March 2021; Lars Rohde, ‘Speech by Governor Lars Rohde at Aarhus Symposium’ (2017) <https://www.nationalbanken.dk/da/presse/Documents/2017/11/LRO_Aarhus%20Symposium.pdf> access 19 March 2021; Danmarks National Bank, ‘Central bank digital currency would not result in better payment solutions’ (2017) <https://www.nationalbanken.dk/en/publications/Documents/2017/12/News_Central%20bank%20digital%20currency%20would%20not%20result%20in%20better%20payment%20solutions.pdf> accessed 19 March 2021.

¹⁷⁸ Eastern Caribbean Central Bank, ‘DCash: Frequently Asked Questions’ (2021) <<https://www.eccb-centralbank.org/p/what-you-should-know-1->> accessed 19 March 2021; Eastern Caribbean Central Bank, ‘About the Project’ (2021) <<https://www.eccb-centralbank.org/p/about-the-project#:~:text=The%20Eastern%20Caribbean%20Central%20Bank,of%20the%20EC%20dollar%20%2D%2DCash>> accessed 19 March 2021.

¹⁷⁹ Banco Central Del Ecuador, ‘More than 1,000 Electronic Money Transactions During the First Two Days of Operations’ (2 March 2015) <<https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/769-produbanco-grupo-prom%C3%A9rica-suscribe-acuerdo-para-sumar-1197-puntos-de-servicio-financiero-al-sistema-de-dinero-electr%C3%B3nico>> accessed 19 March 2021. We have relied on the English translated version.

¹⁸⁰ Raphael Auer, Giulio Cornelli and Jon Frost, ‘Rise of the central bank digital currencies: drivers, approaches and technologies’ (BIS Working Papers No 880, August 2020) <<https://www.bis.org/publ/work880.pdf>> accessed 21 March 2021; John Kiff ; Jihad Alwazir ; Sonja Davidovic, ‘A Survey of Research on Retail Central Bank Digital Currency’ (26 June 2020) <<https://www.imf.org/en/Publications/WP/Issues/2020/06/26/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49517>> accessed 21 March 2021.

¹⁸¹ EestiPank, ‘EestiPank is launching a research project into central bank digital currency’ (2020) <<https://www.eestipank.ee/en/press/eesti-pank-launching-research-project-central-bank-digital-currency-02102020>> accessed 19 March 2021.

¹⁸² Central Bank of Eswatini, ‘Industry Consultation on CBDC Diagnostic Study’ (2020) <<https://www.centralbank.org.sz/fintech/cbdc/>> accessed 19 March 2021.

¹⁸³ Central Bank of Eswatini, ‘Eswatini CBDC Diagnostic Study’ (2020) <[https://www.centralbank.org.sz/fintech/cbdc/CBE-Cenfri%20CBDC%20Diagnostic_Phase1%20\(002\).pdf](https://www.centralbank.org.sz/fintech/cbdc/CBE-Cenfri%20CBDC%20Diagnostic_Phase1%20(002).pdf)> accessed 19 March 2021.

¹⁸⁴ European Central Bank, ‘Report on Digital Euro’ (2020) <https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf> accessed 19 March 2021

¹⁸⁵ European Central Bank, ‘ECB digital euro consultation ends with record level of public feedback’ (2021) <[https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210113~ec9929f446.en.html#:~:text=The%20European%20Central%20Bank%20\(ECB,the%20large%20number%20of%20responses.&text=The%20public%20consultation%20was%20launched,report%20on%20a%20digital%20euro](https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210113~ec9929f446.en.html#:~:text=The%20European%20Central%20Bank%20(ECB,the%20large%20number%20of%20responses.&text=The%20public%20consultation%20was%20launched,report%20on%20a%20digital%20euro)> accessed 19 March 2021.

¹⁸⁶ Banque de France, ‘Call for applications – central bank digital currency experimentations’ (2020) <<https://www.banque-france.fr/en/financial-stability/market-infrastructure-and-payment-systems/call-applications-central-bank-digital-currency-experimentations>> accessed 19 March 2021.

13.	Ghana	The Governor of the central bank had stated that the bank is exploring the possibility of a pilot project (in a sandbox environment) for a CBDC. ¹⁸⁷
14.	Hong Kong	As per government official, the Hong Kong Monetary Authority (HKMA) commenced research on a CBDC in 2017 under "Project LionRock". As per findings of the research, since Hong Kong already had an efficient retail payment infrastructure and services, CBDC was found to be have greater potential at the wholesale and cross-border payment level. (2020) ¹⁸⁸ The HKMA in collaboration with the Bank of Thailand (BoT) under Project Inthanon-LionRock developed a proof of concept for the understanding the use case of a CBDC in cross border payments. The findings of the study were released by way of a report. ¹⁸⁹ Central Bank of the United Arab Emirates and the Digital Currency Institute of the People's Bank of China will now join HKMA and BoT in the second phase of Project Inthanon-LionRock. The project proposes to further explore the capabilities of DLT, through developing a proof-of-concept prototype "to facilitate real-time cross-border foreign exchange payment-versus-payment transactions in a multi-jurisdictional context and on a 24/7 basis". (2021) ¹⁹⁰
15.	Iceland	An interim report focussing on advantages and disadvantages of CBDC (rafkróna) issuance has been released. The report seeks to initiate a discussion on a rafkróna in Iceland. (2018)
16.	Israel	A report of an internal team constituted by the Governor of the central bank in 2017 to study issues surrounding CBDC has been released. The report recommends that the central bank should not issue a CBDC in the near future. However, it adds that the central must continue to examine and monitor CBDC research to inform its decision to issue a CBDC, if required. ¹⁹¹
17.	Jamaica	The central bank has invited applications to develop and test potential CBDC solutions in its regulatory sandbox. (2020) ¹⁹²
18.	Japan	The central bank has published a preliminary report setting out its approach to CBDC. ¹⁹³ The bank will develop a test environment for the CBDC system and conduct experiments on the basic functions that are core to CBDC as a payment instrument. The experiments are likely to begin in spring of 2021. ¹⁹⁴
19.	Kuwait	The central bank's annual report for 2018 / 2019 refers to a central bank digital system that the bank is working on without disclosing the details of the same. ¹⁹⁵

¹⁸⁷ Dr Ernest Addison, 'Keynote Address - Dr Ernest Addison, Governor, Bank of Ghana' (2019) <https://www.bog.gov.gh/wp-content/uploads/2019/11/23rd-Annual-Banking-Conference_Speech_Governor_final.pdf> accessed 19 March 2021.

¹⁸⁸ Government of the Hong Kong Special Administrative Region, 'LCQ11: Development of central bank digital currency' (2020) <<https://www.info.gov.hk/gia/general/202010/21/P2020102000686.htm>> accessed 19 March 2021.

¹⁸⁹BoT and HKMA, 'Inthanon-LionRock: Leveraging Distributed Ledger Technology to Increase Efficiency in Cross-Border Payments' (2020) <https://www.hkma.gov.hk/media/eng/doc/key-functions/financial-infrastructure/Report_on_Project_Inthanon-LionRock.pdf> accessed 19 March 2021.

¹⁹⁰ HKMA, 'Joint statement on the Multiple Central Bank Digital Currency (m-CBDC) Bridge Project' (2021) <<https://www.hkma.gov.hk/eng/news-and-media/press-releases/2021/02/20210223-3/>> accessed 19 March 2021.

¹⁹¹Bank of Israel, 'Report of the team to examine the issue of Central Bank Digital Currencies' (2018) <<https://www.boi.org.il/en/NewsAndPublications/PressReleases/Documents/Digital%20currency.pdf>> accessed 19 March 2021

¹⁹² Bank of Jamaica, 'BoJ opens door to Central Bank Digital Currency' (2020) <http://www.boj.org.jm/uploads/news/boj_cbdc_press_release.pdf> accessed 19 March 2021; Bank of Jamaica, 'General Guidelines for Entities Responding to the Letter of Invitation to the Pilot for Central Bank Digital Currency' (2020) <http://www.boj.org.jm/uploads/tendersgeneral_guidelines_for_entities_responding_to_letter_of_invitation_to_pilot_for_cbdc.pdf> accessed 19 March 2021; Bank of Jamaica, 'Invitation: Technical Advisor for Central Bank Digital Currency Project' (2020) <http://www.boj.org.jm/uploads/tenders/independent_cbdc_technical_advisor_bank_of_jamaica.pdf> accessed 19 March 2021.

¹⁹³ Bank of Japan, 'The Bank of Japan's Approach to Central Bank Digital Currency' (2020) <https://www.boj.or.jp/en/announcements/release_2020/data/rel201009e1.pdf> accessed 19 March 2021.

Bank of Japan, 'Integrating Information and Financial Systems: Beyond As-a-Service' (2021) <https://www.boj.or.jp/en/announcements/press/koen_2021/ko210316a.htm/> accessed 19 March 2021.

¹⁹⁵ Central Bank of Kuwait, 'Annual Report for the Year 2018/2019', (2019) <https://www.cbk.gov.kw/en/images/annual-reports-2018-2019-143909_v20_tcm10-143909.pdf> accessed 19 March 2021.

20.	Lithuania	A report setting out an analysis of CBDC design choices and monetary and financial stability implications have been published. ¹⁹⁶ It broadly presents the CBDC concept and typology, surveys the existing literature and documents the initiatives undertaken by central banks around the world. (2019)
21.	Madagascar	A note setting out the broad contours of the CBDC project has been released. It will be conducted in two phases, with the first phase focusing on analysis, design and export operations; and the second phase will involve deployment and production. ¹⁹⁷
22.	Malaysia	The Deputy Governor of the central bank has confirmed in a speech that the central bank is exploring the merits and feasibility of issuing CBDC. (2020) ¹⁹⁸
23.	Mauritius	The central bank's annual report confirms that the central bank has commenced a project to implement a CBDC. ¹⁹⁹ The Bank of Mauritius Act has been amended to expressly empower the central bank to issue a digital currency. ²⁰⁰ (2020)
24.	Netherlands	The central bank has noted that it seeks to play a "leading role" in developing a CBDC. ²⁰¹ A research report setting out objectives, preconditions and design choices have also been published. ²⁰² (2020)
25.	New Zealand	Central bank official had clarified in a speech that while the central bank is researching on a retail CBDC, there are no imminent plans to issue the same. ²⁰³
26.	Norway	In 2018, a report was released which outlines the work undertaken by a working group of the central bank. The report presented an overview of factors that should guide the central bank's decision to issue a CBDC. ²⁰⁴ In 2019, the working group's report explored possible objectives of a CBDC and alternative designs for achieving these objectives. ²⁰⁵ In 2020, a status report on the CBDC project which is in the third phase was published. ²⁰⁶ If a decision to move forward is made by the working group, it is likely to release a framework for pilot testing.
27.	Philippines	The Payments Transformation Roadmap 2020-2023 confirms that the central bank has commenced its "in-depth study on the issuance of central bank digital currency (CBDC) and its effect on monetary policy and money supply." ²⁰⁷

¹⁹⁶ Bank of Lithuania, 'In an effort to boost debate on CBDC, the Bank of Lithuania publishes an in-depth analysis' (2019) <<https://www.lb.lt/en/news/in-an-effort-to-boost-debate-on-cbdc-the-bank-of-lithuania-publishes-an-in-depth-analysis>> accessed 19 March 2021.

¹⁹⁷ BankyFoiben'iMadagasikara, 'Le Projet e-Ariary enquelqueslignes' (2020) <<https://www.banky-foibe.mg/admin/wp-content/uploads/projet-eAriary-One-pager.pdf>> accessed 19 March 2021. We have relied on an English translation of this release.

¹⁹⁸ 'Opening Remarks by Deputy Governor Abdul Rasheed Ghaffour at the OSSP-BNM-SEACEN Forum on Central Bank Foreign Currency Operations' (2020) <<https://www.bnm.gov.my/-/opening-remarks-by-deputy-governor-abdul-rasheed-ghaffour-at-the-oss-p-bnm-seacen-forum-on-central-bank-foreign-currency-operations>> accessed 19 March 2021.

¹⁹⁹ Bank of Mauritius, 'Annual Report Year Ended June 2020' (2020) <https://www.bom.mu/AnnualReport/2020/BOM_June_2020.pdf> accessed 19 March 2021.

²⁰⁰ Bank of Mauritius Act (2004) <https://www.bom.mu/sites/default/files/bank_of_mauritius_amended_updated_august_2020.pdf> accessed 19 March 2021.

²⁰¹ DeNederlandscheBank, 'Digital currency issued by central banks can protect public interest in payment systems' (21 April 2020) <<https://www.dnb.nl/en/actueel/dnb/dnbulletin-2020/digital-currency-issued-by-central-banks-can-protect-public-interests-in-payment-systems/>> accessed 19 March 2021.

²⁰² DeNederlandscheBank, 'Central Bank Digital Currency: Objectives, preconditions and design choices' (2020) <<https://www.dnb.nl/media/espadbvb/central-bank-digital-currency.pdf>> accessed 19 March 2021.

²⁰³ Amber Wadsworth, 'Working together to be on the money' (2020) <<https://www.rbz.govt.nz/-/media/ReserveBank/Files/Publications/Speeches/2020/Speech2020-10-19.pdf?revision=507c6151-3867-4d7c-82ea-582c4d3bfe62>> accessed 19 March 2021.

Norges Bank, 'Central bank digital currencies' (2018) <<https://www.norges-bank.no/en/news-events/news-publications/Reports/Norges-Bank-Papers/2018/norges-bank-papers-12018/>> accessed 19 March 2021.

²⁰⁵ Norges Bank, 'Central Bank Digital Currencies: Second Report of Working Group' (2019) <<https://www.norges-bank.no/en/news-events/news-publications/Reports/Norges-Bank-Papers/2019/memo-219-cbdc/>> accessed 19 March 2021.

²⁰⁶ Norges Bank, 'Central Status report – Norges Bank's central bank digital currency project' (2020) <https://www.norges-bank.no/contentassets/8bb6f72b5cca45659fce4eb6aa93b7a1/norges-bank-memo-2_2020-eng.pdf?v=09/01/2020094145&ft=.pdf> accessed 19 March 2021.

²⁰⁷ Bangko Sentral ng Pilipinas, 'BSP Digital Payments Transformation Roadmap 2020-2023' (2020)

<https://www.bsp.gov.ph/Media_And_Research/Primers%20Faqs/Digital%20Payments%20Transformation%20Roadmap%20Report.pdf> accessed 19 March 2021

28.	Russia	A consultation paper on a 'digital ruble' outlining potential ways to implement CBDC issuance and the corresponding functional requirements of a CBDC has been released. (2020) ²⁰⁸
29.	Saudi Arabia	The central bank of Saudi Arabia and United Arab Emirates has launched a project to study distributed ledger-based infrastructure, the technical dimensions of the central bank digital currency (CBDC), ways of issuance and trading of the CBDCs, and interbank settlement. ²⁰⁹ A report setting out the findings of the project has been released. ²¹⁰
30.	Singapore	The Monetary Authority of Singapore and the central bank of Canada conducted "successful experiment on cross-border and cross-currency payments using central bank digital currencies". ²¹¹ This was a part of the broader multi-year collaborative Project Ubin to explore the use of blockchain and DLT for clearing and settlement of payments and securities. The project aims to help to better understand the technology with the eventual goal of developing central bank issued digital token.
31.	South Africa	As per official statements, the central bank is exploring the benefits and risks of a CBDC, especially its implications on financial stability, monetary policy transmission and potential disintermediation of banking due to CBDC issuance. ²¹²
32.	South Korea	Announcement of 22 month pilot project on CBDC.(2020) ²¹³ Report on legal issues associated with CBDC issuance conducted by an external research for the second phase of the CBDC pilot has also been released. (2021) ²¹⁴
33.	Spain	Strategic Plan 2024, released by the central bank confirms that one of the priorities for 2020 and 2021 will be to assess the introduction of a CBDC and its impact on the financial system and economy. ²¹⁵
34.	Sweden	Commenced its project to explore the possibility of CBDC (e-krona) issuance in 2017. ²¹⁶ Under the project, the central bank has already published two reports on its research. ²¹⁷ The central bank in collaboration with a consultancy firm is conducting a pilot aimed at developing a technical solution for e-krona. ²¹⁸
35.	Switzerland	The Federal Council has published a report analysing the pros and cons for a CBDC. It concluded that a general purpose CBDC would not bring any "additional benefits" for Switzerland. However, it observed that wholesale CBDC "would appear more promising" than a general purpose CBDC. (2019) ²¹⁹

²⁰⁸ Bank of Russia, 'A Digital Ruble' (2020) <https://www.cbr.ru/eng/analytics/d_ok/dig_ruble/> accessed 19 March 2020.

²⁰⁹ Saudi Central Bank, 'Frequently Asked Questions based on Project Aber' (2021) <<https://www.sama.gov.sa/en-us/pages/faq.aspx>> accessed 19 March 2020.

²¹⁰ Saudi Central Bank and Central Bank of the UAE, 'Project Aber: Saudi Central Bank and Central Bank of the U.A.E. Joint Digital Currency and Distributed Ledger Project' (2020) <<https://www.centralbank.ae/sites/default/files/2020-12/Aber%20Report%202020%20-%20EN.pdf>> accessed 19 March 2021.

²¹¹ Monetary Authority of Singapore, 'Project Ubin: Central Bank Digital Money using Distributed Ledger Technology' (2020) <<https://www.mas.gov.sg/schemes-and-initiatives/project-ubin>> accessed 19 March 2021.

²¹² South African Reserve Bank, 'National Assembly: Question for Written Reply' (2019) <<http://www.treasury.gov.za/publications/other/MinAnsw/2019/PQ%20657%20-%20Singh%20-%20NW1697E.pdf>> accessed 19 March 2021.

²¹³ Bank of Korea, 'The Bank of Korea, Central Bank Digital Currency (CBDC) Pilot Test' (April 2020) <<https://www.bok.or.kr/portal/bbs/P0000559/view.do?nttId=10057475&menuNo=200690>> accessed 20 March 2021. We have relied on an English translated version of this.

²¹⁴ Bank of Korea, 'Central Bank Digital Currency (CBDC)-related Legal Issues and Directions for Enactment/Amendment of Laws' (February 2021) <<https://www.bok.or.kr/portal/bbs/P0000559/view.do?nttId=10062857&menuNo=200690>> accessed 20 March 2021. We have relied on an English translated version of this.

²¹⁵ Banco de Espana, 'Strategic Plan 2024 Analysis and research priorities for the Banco de España: 2020-2024', <<https://www.bde.es/f/webbde/INF/MenuVertical/AnalisisEconomico/AnalisisEconomico/PRIORITIES.pdf>> accessed 20 March 2021.

²¹⁶ SverigesRiksbank, 'E-krona – a digital complement to cash' (2020) <<https://www.riksbank.se/en-gb/payments--cash/payments-in-sweden/payments-in-sweden-2020/3.-the-riksbank-is-adapting-to-a-changing-world/digital-money--the-riksbanks-e-krona-pilot/e-krona--a-digital-complement-to-cash/>> accessed 20 March 2021.

²¹⁷ SverigesRiksbank, 'E-krona' (2019) <<https://www.riksbank.se/en-gb/payments--cash/e-krona/>> accessed 20 March 2021.

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²¹⁹ Swiss Federal Council, 'Central bank digital currency: Federal Council report in response to the Postulate 18.3159, Wermuth, of 14.06.2018' (2019) <<https://www.news.admin.ch/news/message/attachments/59639.pdf>> accessed 20 March 2021.

		<i>In collaboration with the Bank for International Settlements' Innovation Hub Swiss Centre, the Swiss National Bank under Project Helvetia has explored the technical and legal feasibility of two proofs of concept involving transfer of digital assets through issuance of a wholesale CBDC on a "distributed asset platform" and linking the digital asset platform to an existing wholesale payment system. (2020)²²⁰</i>
36.	Thailand	<i>Please see description of the CBDC research in Hong Kong. BoT is also conducting collaborative experiments to develop a prototype for CBDC explore how CBDC can be used by the business sector to enhance efficiency and flexibility of payments. The CBDC system prototype utilizes DLT for integration with the procurement management, billing, and payments systems.²²¹</i>
37.	Trinidad & Tobago	<i>The central bank issued a statement that CBDC issuance is not a priority, though it will continue to monitor developments in this area. (2018)²²²</i>
38.	Tunisia	<i>The central bank issued a clarification stating that the bank is examining CBDC, but the same is at an early stage.²²³</i>
39.	United Arab Emirates	<i>Please see description of the CBDC research in Saudi Arabia.</i>
40.	Ukraine	<i>The central bank has published an "analytical report" setting out the findings of its pilot project for issuance of CBDC. (2019)²²⁴</i>
41.	United Kingdom	<i>A discussion paper setting out the opportunities, challenges and possible design of a CBDC for UK has been released. (2020)²²⁵</i>
42.	Uruguay	<i>A pilot for issuance of "digital banknotes of the Uruguayan peso" was announced in 2017.²²⁶</i>
43.	United States of America	<i>In speeches and statements, USA has acknowledged that it is assessing the opportunities and challenges of, as well as the use cases for, a CBDC, as a complement to cash and other payments options.²²⁷ The Federal Reserve Bank of Boston is collaborating with a research organisation to build and test a hypothetical digital currency oriented to central bank uses.²²⁸</i>

²²⁰ BIS, 'BIS, Swiss National Bank and SIX announce successful wholesale CBDC experiment' (2020) <<https://www.bis.org/press/p201203.htm>> accessed 20 March 2021

²²¹ BoT, 'Results of the Central Bank Digital Currency (CBDC) for Business Prototype Development Project' (2021) <<https://www.bot.or.th/English/PressandSpeeches/Press/2021/Pages/n1364.aspx>> accessed 20 March 2021.

²²² Central Bank of Trinidad and Tobago, 'Central Bank of Trinidad and Tobago Statement on Financial Technology and Virtual Currencies' <https://www.central-bank.org.tt/sites/default/files/latest-news/Central%20Bank%20of%20Trinidad%20and%20Tobago%20Statement%20on%20Financial%20Technology%20and%20Virtual%20Currencies_0.pdf> accessed 20 March 2021.

²²³ Central Bank of Tunisia, 'Clarification' (2019) <<https://www.bct.gov.tn/bct/siteprod/actualites.jsp?id=638&la=AN>> accessed 20 March 2021.

²²⁴ National Bank of Ukraine, 'Analytical Report on the E-hryvnia Pilot Project' (2019) <https://bank.gov.ua/admin_uploads/article/Analytical%20Report%20on%20E-hryvnia.pdf?v=4> accessed 20 March 2021.

²²⁵ Bank of England, 'Central Bank Digital Currency Opportunities, challenges and design' (2020) <<https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf?la=en&hash=DFAD18646A77C00772AF1C5B18E63E71F68E4593>> accessed 20 March 2021.

²²⁶ Banco Central del Uruguay, 'https://www.bcu.gub.uy/Comunicaciones/Paginas/Billete_Digital_Piloto.aspx' (3 November 2017) <https://www.bcu.gub.uy/Comunicaciones/Paginas/Billete_Digital_Piloto.aspx> accessed 20 March 2021. We have relied on an English translated version of this.

²²⁷ Governor Lael Brainard, 'An update on Digital Currencies' (13 August 2020) <<https://www.federalreserve.gov/newsevents/speech/brainard20200813a.htm>> accessed 20 March 2021

²²⁸ Federal Reserve Bank of Boston, 'The Federal Reserve Bank of Boston announces collaboration with MIT to research digital currency' (2020) <<https://www.bostonfed.org/news-and-events/press-releases/2020/the-federal-reserve-bank-of-boston-announces-collaboration-with-mit-to-research-digital-currency.aspx>> accessed 20 March 2021.

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