Central Bank Digital Currency - Way Forward

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Abstract

In the recent times, Central Bank Digital Currency or CBDC has emerged as a highly sought after topic in the financial sector. Governments, Banks, Institutions are researching the feasibility and potential of introducing a new form of money. This form of currency has a plethora of benefits and hence, countries across the world are actively trying to map its potential. The present paper initially explains the concept of currency and the need posed for implementing a digital currency. Due to the benefits stated in the matter, different countries are at different levels of maturity in implementing CBDCs. The paper then deliberates on options for implementing such an alternative in India and based on pros and cons posed in the Indian context, the kind of category of CBDC which may be better suited. The key attributes and system design required for implementation is accordingly selected and explained further. It finally closes by stating the preparations which are required for a successful user buy-in and the challenges or threats which may be faced in successfully adopting this new form of currency.

I. Introduction

Central Bank Digital Currency or CBDC is an electronic form of money that can be used for making digital transactions and to store value[1]. It offers three focal elements -

i. Digital Currency/ Electronic format

ii. It is issued by the Central Bank

iii. It is universally accessible

If a country issues a CBDC, its government shall consider it to be legal tender, just like paper currency; both CBDC and cash would be legally considered as a form of payment and act as a claim on the central bank or the government. In a digital society, the usage of physical coins or notes may be gratuitous, and all money can be exchanged in a digital format. If a country wants to become a cashless society, a digital currency with a central bank backing is a strong alternative.

The pressure on governments to adopt CBDC is heavy, as the market for private electronic money is increasing. One of the triggers for the need of this alternative has been the rising usage of Bitcoin and other similar offerings. Since the privatized electronic money providers aim to maximize their own profits instead of the general public at large, issuing a CBDC would give governments legitimacy over private electronic money.

Barring currency notes, all other types of modern financial systems such as bonds, securities, etc. have been replaced by their digital versions. The usage of the physical cash is also on a decline in recent years. Post COVID-19, this trend seems to be further strengthening. For such reasons and other specific policy related aspects, CBDC is a strong contender for carrying the benefits of virtual currencies while avoiding the plausible negative socio-economic consequences.

II. Currency

A currency is a medium of exchange for goods and services. In other terms, it is money in any form,

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[1]Investopedia. 2022. The History of Money: From Barter to Banknotes. [online] Available at: <https://www.investopedia.com/articles/07/roots_of_money.asp>

when in use or in circulation it is used as a medium of exchange. It is a system of money for common use[2].

Money allows people to trade goods and services, by communicating the value or the price, and it provides the individual to store their wealth for a longer term. It is valuable because everyone knows that it will be accepted as a form of payment. Money is inherently an intangible concept, while currency is the tangible manifestation of the intangible concept of money.

Initially, bartering was a way of trading goods and services, for example, trading mangoes for shoes. However, these exchanges took time since the party should be in demand for what the counter-party has to offer. This is known as coincidence of wants. Also the standardization of value was an aspect missing from this methodology, like the number of mangoes required in exchange of shoes and so on. Due to this slow and inefficient method, a type of currency involving easily traded items such as animal skins, salt, weapons, etc. developed over the centuries. The barter got standardized.

Around 770 B.C., the Chinese moved to miniature replicas of the same objects. These became sort of first coins. In 600 B.C., the first coins came into being where the denominations were stamped. This system matured over the years to metal currencies. Gold and silver coins had the features of the barter in terms of an intrinsic value and the features of money which is the standardized representation of value. Further, the paper money came along. Eventually, the bills of exchange became a common part of the world economy. A bill of exchange is a written order that a party will pay a specified amount of money on demand to the counterparty. A bill of exchange can be used to settle international trades, which was one of the early uses.

[3]Money may be treated as either commodities (with intrinsic value) or as debt instruments. In case there is no intrinsic value, it should represent the title of commodities that carry that value. Paper currency is such a representative money hence, it is used as a debt instrument. The owner of the currency knows the underlying liability and who owes him. There is always an issuer of such representative money.

Money is issued by a sovereign backing. It is a legal tender. Private money, although existed previously, however, it was not sustainable owing to two main reasons:-

i. Being a debt instrument, it is completely dependent on the credit of the issuer. Since private currency can have multiple issuers, the currency becomes unstable. Public currency is backed by a sovereign guarantee hence, it has a better credit standing, making it stable.

ii. Paper currency has seignorage – the difference between the intrinsic value and the representative value. This seignorage should be used for public spending and public good.

Hence, currency is a form of money that is a legal tender, a liability of the sovereign issuer and an asset to the holding public.

III. Central Bank Digital Currency

A central bank digital currency (CBDC) is a legal tender issued by the central bank in a digital or electronic format. It is backed by the full faith and credit of the issuing government and the nation's monetary authority. It is a different format of issuance, and still appears as a liability on the central bank's balance sheet. They are supposed to be exchangeable at par with cash.

Need of CBDC

[4]The implementation of monetary policy and Government functions shall be simplified through CBDCs. [5]Wholesale settlements between banks, cross border remittances, capital and security market transactions shall be positively affected through the usage. A direct connection can also be created

[2]2022. [online] Available at: <https://mint.intuit.com/blog/investing-2/the-history-of-money/>
[3]Rbi.org.in. 2022. Reserve Bank of India - Speeches. [online] Available at: <https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=1111>
[4]Investopedia. 2022. Central Bank Digital Currency (CBDC). [online] Available at: <https://www.investopedia.com/terms/c/central-bank-digital-currency-cbdc.asp>
[5]2022. [online] Available at: <https://www.pwc.in/industries/financial-services/fintech/dp/central-bank-digital-currency-in-the-indian-context.html

between the central bank and the consumers through retail CBDCs. Functions such as benefit distribution, collection of taxes can be done seamlessly for Governmental policies.

The disbursement of money through third party poses a risk. Liquidity issues, bank runs, and other such triggers can potentially upset the monetary systems. A CBDC eliminates these risks. The only risk lies with the central banks, which is sustainably much lower.

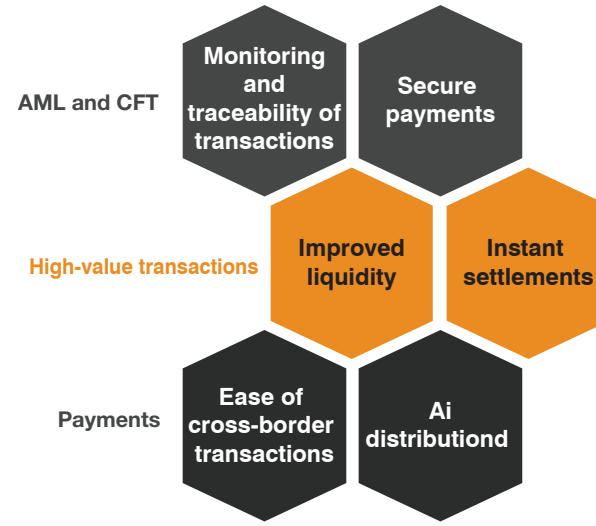
Since payments using a CBDC are final, the settlement risk is reduced in the financial system. The need for interbank settlement disappears. It's a real time and a cost effective globalization of payment systems. An importer can pay an exporter using digital dollars, without the need of an intermediary. There would be no 'Herstatt Risk' as the time difference won't matter in the currency settlement.

Privacy and security features can be integrated with this type of a currency. Since the currency is essentially a type of data trail, the tracking of illicit activity becomes easier and more robust. Public ledger make it easy for a central bank to track money in its jurisdiction, thereby preventing illegal activity and transactions by using CBDCs. Additionally, security and privacy features can be integrated at the account level, thereby ensuring transactions as genuine.

It will also improve monetary policy transmission as interest bearing CBDCs can transmit policy rates directly to the households.

Since CBDCs can be used as a direct connection between the consumers and the central banks, the large unbanked population can be provided access to the financial system, without developing costly banking infrastructure. It will also lead to lower cost of cash distribution and management in general.

Benefits of CBDC



Source - PwC report on Central Bank Digital Currency in the Indian context

Implementation across the World

Central banks are exploring the CBDCs because of the following primary reasons[6] -

i. It supports digitization of economies.

ii. It streamlines the current payment systems.

iii. It enhances policy making.

iv. It improves financial inclusion.

[7]In countries like Sweden, the paper currency is on a decline, hence CBDC is being looked as a viable alternative. To make issuance more effective due to significant use of physical cash, countries like Denmark, Germany and Japan are exploring these electronic forms.

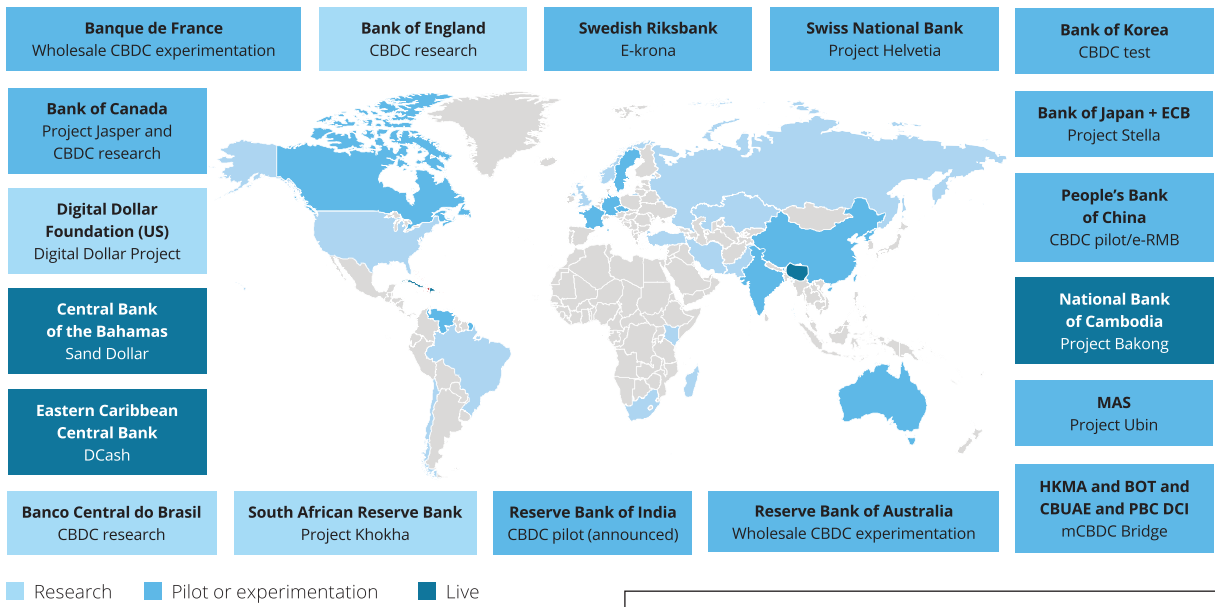
More than 60 central banks are exploring the viability of CBDCs at varying levels of maturity. 14% are moving forward to development and pilot arrangements. Bahamas Sand Dollar, Bakong Cambodia, and Eastern Caribbean DCash are already live. The Sand Dollar has already facilitated convenient monetary transactions across its vast archipelago.

[6]Deloitte United States. 2022. What are Central Bank Digital Currencies?. [online] Available at: <https://www2.deloitte.com/us/en/pages/financial-services/articles/cbdc-central-bank-digital-currency.html>

[7]Rbi.org.in. 2022. Reserve Bank of India - Speeches. [online] Available at: <https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=1111>

Sweden's Riksbank has been exploring the issuance of a digital currency in its economy since 2017; People's Bank of China has deployed a special task force to research and implement digital Yuan; Bank of England has been a pioneer in initiating CBDC; Bank of Canada, Central banks of Uruguay, Singapore, Thailand, etc. are all exploring the same.

As per the Deloitte report on financial services and Central Bank Digital Currency, the following countries are experimenting with the idea.



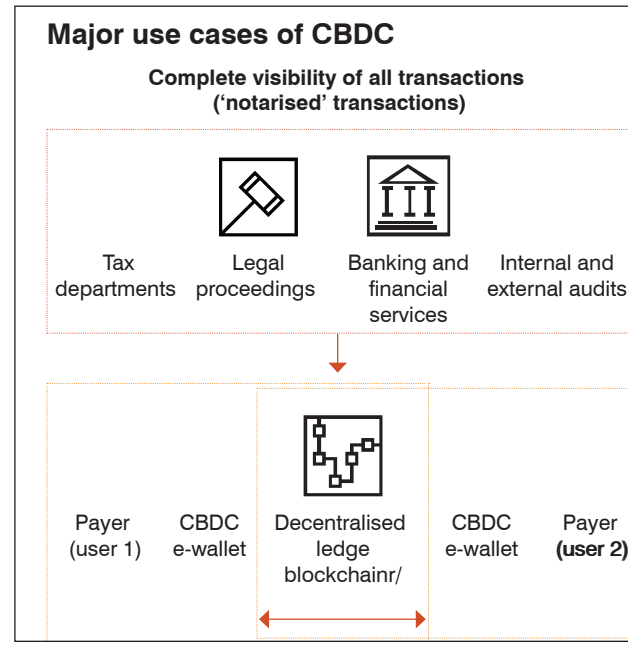
As of April 2021.

Alternatively, in a survey conducted by the Bank for International Settlements (BIS) in 2021, it was revealed that 86% of central banks around the globe were actively researching the potential for CBDCs, 60% were experimenting with the technology and 14% were deploying pilot projects[8].

IV. CBDC in India

The multiple facets of CBDC have a strong potential to be utilized across India. Some of the use cases are as appended below.

[9]One of the possible use case is for targeted payments in the country, such as social benefits and direct benefit transfer. The programmable aspect can lead the central bank to pay only the intended beneficiaries. For example, pre-programmed CBDC could be issued for LPG subsidies as direct benefit



Source - PwC report on Central Bank Digital Currency in the Indian context

[8]Bis.org. 2022. BIS Innovation Hub work on central bank digital currency (CBDC). [online] Available at: <https://www.bis.org/about/bisih/topics/cbdc.htm>

[9]2022. [online] Available at: <https://www.pwc.in/industries/financial-services/fintech/dp/central-bank-digital-currency-in-the-indian-context.html>

transfer. It could be accepted at only authorized LPG agencies and would be declined for use at other points of payment. Similarly, subsidies for fertilizers, employee expenses including food and telecom, industrial supply chains, taxation, etc. can be directly targeted to the beneficiary. It will ensure correct usage of the money transferred.

For faster cross-border remittances via international collaborations among the major economies, the necessary infrastructure can be created for interoperability of these digital currencies, ensuring a quick real time transfer of money.

Retail payments could be made through CBDC - Consumer to Consumer exchange (transfer between their wallets), Consumer to Business (paying for products and services) and Business to Business (Corporate account transfers). Instant settlement and lower risk of clearing of payments are strong use cases for this alternative mode of payment. Additionally, the ownership record of the transfer can be used as a proof to authenticate the settlement.

Instant lending to Micro, Small and Medium Enterprises can be done through this by accurately drawing the borrower risk profile, to meet the finance requirements of the sector. This transparency and quick disbursement of funds in requirement, can lead to better sustainability and growth of the sector.

Using Near-Field Communication (NFC) technology, the offline transfer through wallets can be enabled, creating a potentially large opportunity to enable areas with limited connectivity to transfer payments across digital wallets, without the need of internet.

India currently has a high currency to GDP ratio. The large cash usage can be replaced by CBDC, thus leading to drop in cost of printing, transporting, storing and distributing currency.

The advent of private virtual currencies has also been seen in the recent times in India. If recognition is gained by such currencies wherein international currencies can be interoperated, national currencies with limited convertibility can be threatened. The operability of these currencies in US Dollars for example can be limitedly threatened as the private virtual currencies are operating in US Dollars, however for India, the value of Rupee can be negatively volatized. As per the BIS Annual Report, "Central banks have a duty to safeguard people's trust in our money. Central banks must complement their domestic efforts with close cooperation to guide the exploration of central bank digital currencies to identify reliable principles and encourage innovation."

Hence, not only because of the desirable benefits of the digital currency, but also in order to safeguard the general public at large from the volatility of private virtual currencies, CBDC becomes a strong use case in the Indian context.

V. Implementation - Design Considerations

A CBDC can be divided into 2 major categories based on usage[10]

i. Wholesale CBDC

ii. Retail CBDC

Wholesale CBDC is generally used for trade between central bank and banks within the country. This makes the entire financial system faster, safer and economical. It will allow the central bank to interface faster with its intermediaries and help in improving the real time gross settlement systems. It can also facilitate cross border transactions between Wholesale CBDCs of other countries, which can be done by creating a 'bridge' or a network with an operator node run jointly by the central banks of the participating countries. It helps in making the cross-border settlements across the participating central banks much faster and safer.

Retail CBDC acts as a digital format of the fiat currency meant for the general public and used for day-to-day financial transactions. It is usually based on Distributed Ledger Technology (DLT) which can be managed by the government/ central bank to trace transactions while maintaining anonymity. It also helps reduce the involvement of private parties, thus preventing any illicit activity, like money laundering or fraud.

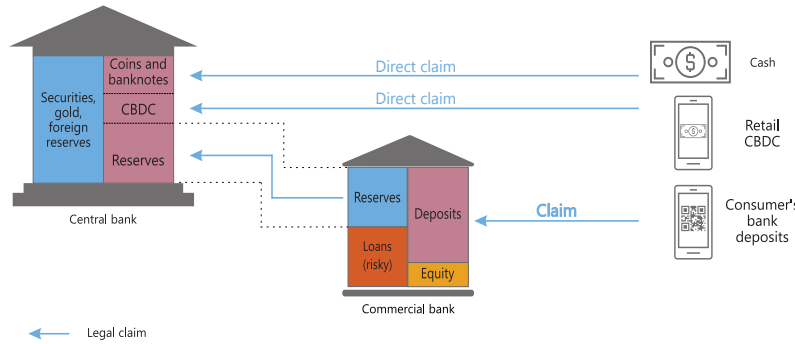
Retail CBDC can be issued directly to the public by the central bank. This form of issuance is called direct issuance. Alternatively, retail CBDC can be issued to intermediaries (which can be banks) who then issue it to the public like paper currency. This indirect method of distribution is called indirect issuance or intermediated issuance, and it forwards the risk

[10]2022. [online] Available at: <https://www.pwc.in/industries/financial-services/fintech/dp/central-bank-digital-currency-in-the-indian-context.html>

[11]Bis.org. 2022. [online] Available at: <https://www.bis.org/publ/work976.pdf>

towards regulated third parties/intermediaries. A third issuance method, called hybrid issuance, has retail CBDC issued to intermediaries, however the central bank periodically updates its own ledger with retail balance records.

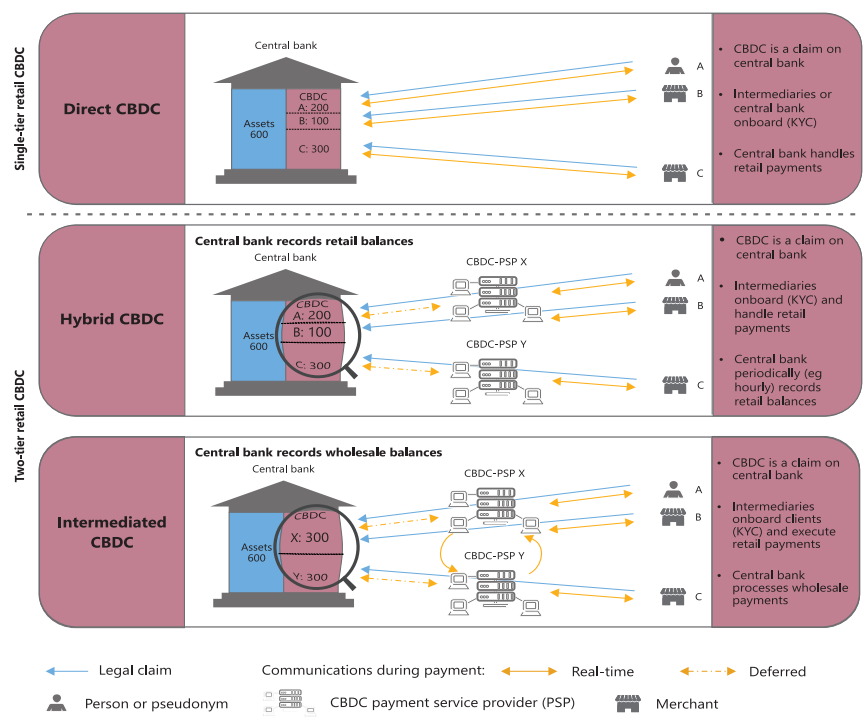
The monetary system with a retail CBDC Direct claim Graph 1



Source - Auer and Bohme (2021)

In a direct issuance model, CBDC has a direct claim on the central bank, which also handles payments in real time and keeps a record of all holdings. In a hybrid issuance architecture, CBDC has a direct claim on the central bank, however the real time payments are handled by intermediaries or banks. Periodically the ledger is also updated of all retail holdings with the central bank. An indirect or an intermediated issuance architecture is closely regulated and supervised to communicate with the Central bank to add up or sum up the retail accounts.

Retail CBDC architectures and central bank-private sector cooperation Graph 4



Source - BIS working paper No. 976 – Central Bank Digital Currencies; Motives, Economic implications and the research frontier

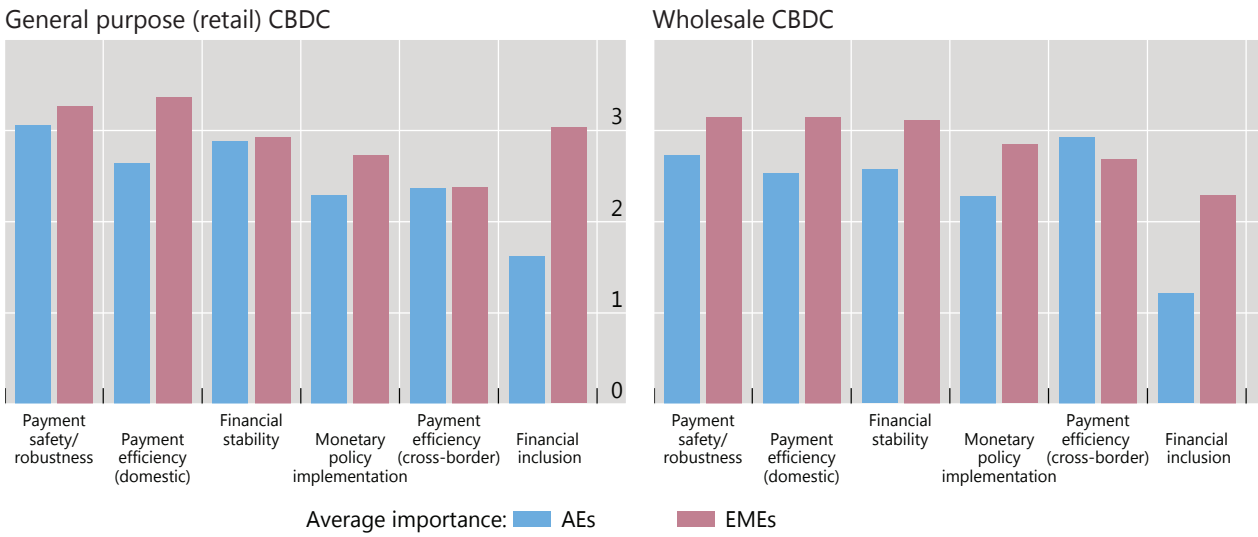
Design Considerations for India

[12]Based on a survey conducted by central banks of the BIS Committee on Payments and Market Infrastructures (CPMI), Boar and Wehrli (2021) show that in advanced economies CBDCs are being researched for robustness and safety or for domestic payment efficiency. It is seen as an opportunity to make the digital payments safer, to reduce costs and for smooth functioning of retail and wholesale payments. However, in emerging market economies such as India, financial inclusion is an important motivation. It is seen as an enhancement to provide access to the unbanked population.

Based on the said survey, CBDC retail projects are more advanced where the informal economy is larger - consistent with the notion that the data trail of transactions can formalize the informal activities. Wholesale CBDC projects are found to be more advanced with markets with greater financial inclusion, which may have a higher demand for more efficiency in payment services. The other factors are appended in the following graph, wherein the comparative importance in selecting a category of CBDC has been stated.

Average importance

Graph 5



1 = not so important; 2 = somewhat important; 3 = important; and 4 = very important.

Source - CPMI survey of central banks; Boar et all (2020)

For India, apart from the strong use case for utilizing Retail CBDC in alignment with the requirement of financial inclusion of the unbanked population, as mentioned above, other factors which nudge higher to implement Retail CBDC are:-

i. The intermediary risk is eliminated since the central government backed digital currency is directly transferred to the consumers. The risk that the banking institution will become illiquid or that the depositor funds may sink is not faced[13].

ii. Wholesale CBDC is better suited for advanced economies where the payment systems are efficient, most of the population is a part of those payment systems. To improve their efficiency, wholesale CBDC is a strong alternative.

iii. Tracing of depositor transactions with data trails will lead to formalization of illegal transactions.

iv. The central bank can collaborate with mobile technology providers to reach out to the population directly, where even the banks do not have the required infrastructure. Bank accounts are not required in such a case.

There are certain limitations to choosing Retail CBDCs over Wholesale CBDCs, which are,

i. Banks will have a concern that their role as an intermediary will be impacted.

[12]Bis.org. 2022. [online] Available at: <https://www.bis.org/publ/work976.pdf>

[13]Investopedia. 2022. Central Bank Digital Currency (CBDC). [online] Available at: <https://www.investopedia.com/terms/c/central-bank-digital-currency-cbdc.asp>

Various countries have decided between retail and wholesale projects based on their use cases as appended below.

	Country	Key motivations (s)
Wholesale CBDC	**Saudi Arabia & The United Arab Emirates** Saudi Central Bank & Central Bank of the UAE	Explore the technical viability of dual-issued CBDC/ Improve efficiency for cross border payments
	Singapore Monetary Authority of Singapore	Explore the capabilities of DLT and concepts of CBDC for different use cases and future commercial solutions
	Australia Reserve Bank of Australia	Explore the capabilities of DLT for interbank settlement
Wholesale + Retail	**South Africa** South African Reserve Bank	Explore the capabilities of DLT and implications of CBDC
	Canada Bank of Canada	Explore the capabilities of DLT/ Low cash usage/ Rise of alternative payment service providers/ Preserve domestic payments safety
Retail CBDC	**Eurozone** European Central Bank	Low cash usage/ Reduce overall costs and ecological footprint/ Innovation/ Adoption of other payment methods
	Sweden Riksbank	Explore the capabilities of DLT/ Low cash usage/ Rise of alternative payment service providers/ Preserve domestic payments safety
	Bahamas Central Bank of the Bahamas	High cash usage/ High financial exclusion and intermediation/ High smartphone penetration/ Encourage usage of local currency
	China People's Bank of China	Decreased cash usage/ Rise of alternative payment service providers/ Rise of digital currencies/ High financial exclusion/ Reaching international reserve status for China's Yuan
	Jamaica Bank of Jamaica	Drive financial inclusion for the unbanked/ Create opportunities for the launch of complementary innovative products and systems on CBDC/ Enhance payment efficiency/ Reduce costs of cash

Source – The way forward for retail central bank digital currency in Thailand, Bank of Thailand

ii. Wholesale CBDC system is easier to implement within the existing infrastructure.

iii. Integration with other platforms such as securities and forex platforms is easier.

Despite certain drawbacks, Retail CBDCs have some clear strong cases for implementation. The intermediation of banks by choosing a two-tiered retail CBDC may ensure the implementation within the existing infrastructure.

VI. Implementation - Retail CBDC in India

Key Attributes for Implementation

1. [14]**Interest rates** can be initially set at zero to replicate cash. At later stages, either a positive or a negative interest rate can be imposed, depending on the use case.
2. To encourage usage for mainly transactional purposes and not to have an impact on banking intermediation and hence bank runs, the **holding and transaction limits** can be decided.
3. To ensure that the adoption is maximum, the **end users** should not bear any **costs** of implementation. The cost bearing of other system participants can be explored.
4. Other payment system providers and intermediaries should be allowed to add any **innovative** features to the CBDC, as this may lead to value addition and encourage buy-in from a diverse country like India. However, adequate system regulations and standards are to be defined in order to ensure privacy, security and other related aspects.
5. User **identities** to be **verifiable** up to a certain extent to ensure that the major concerns of illegal activities, tax evasion, terror financing, etc. can be attended to. Additionally, the data trails shall help in building up credit profiles and better customized financial services. This would also help in better monetary policy decisions since the granular data will enhance decision making. However, a balance of maintaining sufficient privacy and anonymity will have to be explored.

System Architecture

To design the **issuance** aspect of system architecture, an account based CBDC can be considered for implementation, since in account based, similar to bank accounts, the records of the balances, transactions and users will be available for verification. This will ensure that the illicit activities are deterred. The token based issuance, similar to bank notes shall help in maintaining privacy and anonymity, however the user authentication shall be impacted. Hence, a hybrid wherein the intermediaries or the system participants have a limited access to the data, however authentication is ensured, is to be explored.

For **distributing** the currency, a two-tiered retail CBDC may be a better suited alternative rather than the direct issuance owing to majorly 2 reasons –

i. The role of financial intermediaries shall be preserved, as it will allow more effective utilization of the existing resources and infrastructure. Banks and payments systems have a developed IT system along with customer onboarding capabilities.

ii. Mainstream adoption can be streamlined since the accessible public is more accustomed to using financial services through financial intermediaries.

For **settlement** deliberation, while Centralized Technology offers scalability and performance, decentralized technology (DLT) offers greater security. For the first tier transactions between the central bank and the intermediaries, the centralized technology can be explored for implementation, since that shall provide the necessary scalability, and for second tier transactions between end users and the intermediaries, DLT shall ensure adequate privacy.

Preparation Required for Successful Implementation

For adopting a retail CBDC at a national scale, there are 3 major requirements for a successful implementation[15]

i. User Accessibility

ii. Digital Infrastructure

iii. Legal/Regulatory Frameworks

[14]Bot.or.th. 2022. [online] Available at: <https://www.bot.or.th/Thai/digitalcurrency/documents/bot_retailcbdcpaper.pdf>

[15]Bot.or.th. 2022. [online] Available at: <https://www.bot.or.th/Thai/digitalcurrency/documents/bot_retailcbdcpaper.pdf>

User Accessibility

Retail CBDC should strive for maximum participation. Building knowledge capacity and accessibility to compatible devices are of high importance. The first aspect which needs to be targeted is the digital literacy. Since retail CBDC is a digital representation of cash which is mainly accessible through digital wallets and smart devices, steps should be undertaken to ensure that the end users are comfortable with using such devices.

In this regard, UNESCO's Digital Literacy Global Framework project[16] suggests measuring the following 5 key areas –

i. Information and data literacy
ii. Communication and collaboration
iii. Digital content creation
iv. Safety
v. Problem solving

Although the smartphone penetration in India has substantially increased over the years, however, susceptibility to online frauds occur through these channels. Hence, raising awareness about cybersecurity and digital literacy in general, is required.

Financial literacy will play another crucial role in successful adoption and ensuring user acceptability. A user friendly, highly accessible system should be designed for a better buy-in. Additionally, financial literacy programs, awareness, consumer protection, etc. are some of the aspects which also require deliberation. Education regarding the products and services should be provided by either the intermediaries, third parties or the issuer.

Accessibility to acquire compatible devices, internet coverage, reliable connections are pre-requisites for a successful roll-out. However, as gaps still exist in digital infrastructure, design of retail CBDC should be made in such a way that it works with a minimal featured, no frills, affordable, offline compatible smart device. Also the custody should not be dependent on the device, but rather the user.

Digital Infrastructure

For a successful retail CBDC implementation, a proper digital infrastructure will be required in place. Firstly, strong broadband and mobile coverage is essential in issuance, distribution and access which majorly would occur online. Secondly, processing a large volume of transactional data will require high powered infrastructure. It is also to be ensured that since it will involve sensitive personal data of the users, data security becomes a key concern. Hence domestic cloud infrastructure shall be required. Lastly, KYC is required for facilitating user onboarding to authenticate the users. Digital identity verification and management will be required.

[17]Legal and Regulatory Frameworks

An enabling legal framework will be required for introduction of CBDC since although the currency usage may be similar to banknotes, the legal provisions are currently made for paper currency. Modifications shall be required in RBI Act, 1934 in respect of denomination (Section 24), form of banknotes (Section 25), status of legal tender (Section 26(1)), etc. It will also require other legal amendments in acts such as The Coinage Act, 2011, FEMA, 1999, Information Technology Act, 2000 etc.

In addition to the points mentioned above, certain other considerations for a successful design are as appended below -

i. CBDC should not drastically interfere with the overall public policy objectives of currency, at least initially. The general public should be allowed to use it interchangeably.

ii. CBDC should co-exist or complement other existing forms of currency. It should be in harmony with the fiat currency.

iii. It should constantly innovate and evolve to better efficiency. This can be done with the support of third party service providers, banks and other intermediaries. Innovation should be further boosted.

Challenges and Risks

1. **Banking Disintermediation -** It could lead to deposit outflows and reduced bank lending, if it is made sufficiently attractive.

   Solution - CBDC to be designed for usage as a means of payment rather than a store of value. It can be done by putting cap on conversion into CBDC or paying lower interest on CBDCs as compared to bank deposits.

[16]Uis.unesco.org. 2022. [online] Available at: <http://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf>

[17]Rbi.org.in. 2022. Reserve Bank of India - Speeches. [online] Available at: <https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=1111>

2. **Bank Runs -** A perceived flight of money in case of an economic turmoil may lead to a systemic bank run. This may further lead to a transfer of bank funds at a very fast pace into digital form. The banks may have to keep higher amount of liquidity.

   Solution - Withdrawal or holding limits can be set to inhibit convertibility from bank deposits. Additionally, bank's capital and liquidity requirements can be adjusted.

3. **Public Trust -** General public should have trust in the CBDC and its technological back-end.

   Solution - Development of clear standards, regulations, guidelines, governance structures, etc. of the system should be done. Example - CBDC may be asset backed similar to issue of paper currency. Adequate awareness in public about the implementation, adoption should be ensured. The roles and responsibilities of the service providers, third party vendors and other stakeholders are to be fixed so that accountability is defined.

4. **Data Privacy and Security -** The transactional data could be tracked leading to serious concerns of security and data privacy. Appropriate guidelines and technology should be put in place to ensure governance.

   Solution - Token based design to limit exposure instead of account based authentication (to be explored further since this will be difficult to authenticate. A middle way to be devised). Establishing safeguards to protect the user information. Appropriate consent to be taken before collecting or processing data.

5. **Capital Flow Management –** Since it can be utilized as a borderless transaction, foreign exchange becomes a field which needs to be appropriated with required safeguards in order to ensure that the capital volatility is controlled. It could also lead to internationalization of rupee, leading to exchange rate de-stability.

   Solution - CBDC transaction limitations on foreign exchange to prevent speculations. Regulatory and supervisory compliance to be made for oversight.

6. **Public Adoption -** User buy-in will be a huge challenge and hence the best user experience, ease of usage, proper incentivization for adoption should be deliberated. It should be universally acceptable and interoperable with other payment systems. Digital and financial literacy will also play major roles in this aspect.

   Solution - To be designed for wide range of devices. Adequate knowledge building to be done to ensure adoption.

7. **Central Bank's Balance Sheet –** Remuneration of CBDC will impact the balance sheet of the central bank. The liability of the central bank will depend on the fact that interest is paid on the currency. If no interest is paid then it would function similar to cash, however, if positive interest rate is paid, the seignorage will be reduced proportionately.

   Solution - Strategic plans with appropriate use cases to be deliberated before finalizing the interest rates and hence its impact on the balance sheet may be studied.

VII. RBI's Approach on CBDC[18]

Central Banks across the world are exploring CBDCs and a few countries have already introduced pilots. A High Level Inter-Ministerial Committee was constituted by Ministry of Finance, Government of India in November 2017 to deliberate on the policy and legal framework for regulating crypto currencies. RBI has also been exploring the feasibility of CBDCs.

RBI is currently working towards a phased implementation strategy without major disruptions. Some aspects which are under examination relate to the scope (wholesale or retail), centralization or decentralization, validation mechanism (token or account), architecture, degree of anonymity, etc.

VIII. Conclusion

CBDC is one of the biggest innovations in the financial sector. With a wide range of benefits, it is the next milestone in the fast developing digital economy. Countries across the world are exploring its feasibility. Similarly, India also has a strong use case for implementing this virtual currency. For a country like India, the retail two tiered CBDC poses a strong argument for its implementation. However, successful

[18]Rbi.org.in. 2022. Reserve Bank of India - Speeches. [online] Available at: <https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=1111>

implementation of such a disruptive technology comes in with a wide variety of risks and challenges which needs conscious attention. For a mass buy-in as well, planned preparations should be put in place. It is also to be ensured that the data security and privacy is maintained of the users. However, with short term challenges and long term benefits, the implementation of CBDC seems to be a promising avenue.

IIBF releases the "Banking and Finance Yearbook"

IIBF releases the "Banking & Finance Yearbook" updated up to December, 2021. It is a comprehensive digest of all major developments, trends, expert views and regulatory changes across different verticals in Banking & Finance domain including the extracts of important speeches rendered by senior officials of RBI, select articles published in IIBF's journal Bank Quest for giving the reader a wholesome reading experience. The book is available on Amazon both as a paperback and as a Kindle edition. The book will also be available in the retail outlets of our publisher, M/s Taxmann Publications (Pvt.) Ltd.

BANK QUEST THEMES

The themes for "Bank Quest" are identified as:

1. July - September, 2022: Fintech challenges for Banking Industry
2. October - December, 2022: Growing importance of co-lending in Financial Intermediation
3. January - March, 2023: Increased footprints of Financial Planning and Wealth Management
4. April - June, 2023: Competence based Human Resources Management in Banks
5. July - September, 2023: Digital disruption - Challenges and Opportunities

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