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A Theoretical Background of The Fintech and Central Bank Digital Currency-Current and Challenges

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Abstract

A CBDC has the potential to offer new opportunities for innovation, which may benefit banks, and non-bank/third-party providers of financial services, supporting a competitive and diverse financial system. This could facilitate new opportunities for innovation and increase the resilience of the system overall – subject to authorities ensuring appropriate regulation of all parties. At the same time there is also continuing change in payment methods and emergence of new forms of privately issued digital money, some of which pose risks themselves. The introduction of a CBDC could prompt some changes that affect the functioning of the financial system in ways similar to the introduction of new forms of private money such as stable coins. The extent and nature of these changes would depend on take-up, which remains highly uncertain and depends on design features and attractiveness relative to deposits. The choice of a remuneration approach, and competitiveness with bank deposits, would likely be a key factor determining take-up, but non-pecuniary factors ranging from privacy to payments access could be important as well. Potential benchmarks for take-up would include factors that are specific to each jurisdiction, such as the payment attitudes and volume of currency in circulation. A material shift from bank deposits to CBDC – which would be possible for example if the holdings of CBDCs by individual users were left unconstrained – could have a non-trivial, long-term impact on bank lending and intermediation, although these impacts may be limited for many plausible levels of CBDC take-up and if the system has time to adjust. Estimates from a simple, partial model suggest that a large shift from bank deposits to CBDC could plausibly lead to a fall in bank profitability in benign circumstances, assuming normalized monetary conditions. This could in turn affect lending conditions and/or the resilience of banks. It could imply more reliance by banks on wholesale market funding. Greater take-up levels would have a greater impact on the financial system. Moreover, the impact could be exacerbated if the response of the banking system strains the capacity of funding markets. This is more likely to occur if deposits were lost over a shorter time frame. The implications could also be larger for some types of bank business model than others.

The CBDC is a complex piece of software and a complex digital framework capable of generating both economy-wide benefits and shocks. The establishment and operation of a CBDC by any developing country will require considerable expertise and a deep understanding of the designs and issues this fundamentally new form of currency gives rise to in the local context. The development of a safe, efficient, and accessible CBDC is likely to require developing country regulators to redirect scarce resources away from pressing challenges, such as enforcing anti-money laundering and counterterrorism financing regulations, while maintaining correspondent relationships with overseas commercial banks.

Keywords: Fintech, Digital Currency, Central Bank Digital Currency digital currency architectures

ABBREVIATIONS AND ACRONYMS

FINTECH – FINANCIAL TECHNOLOGY

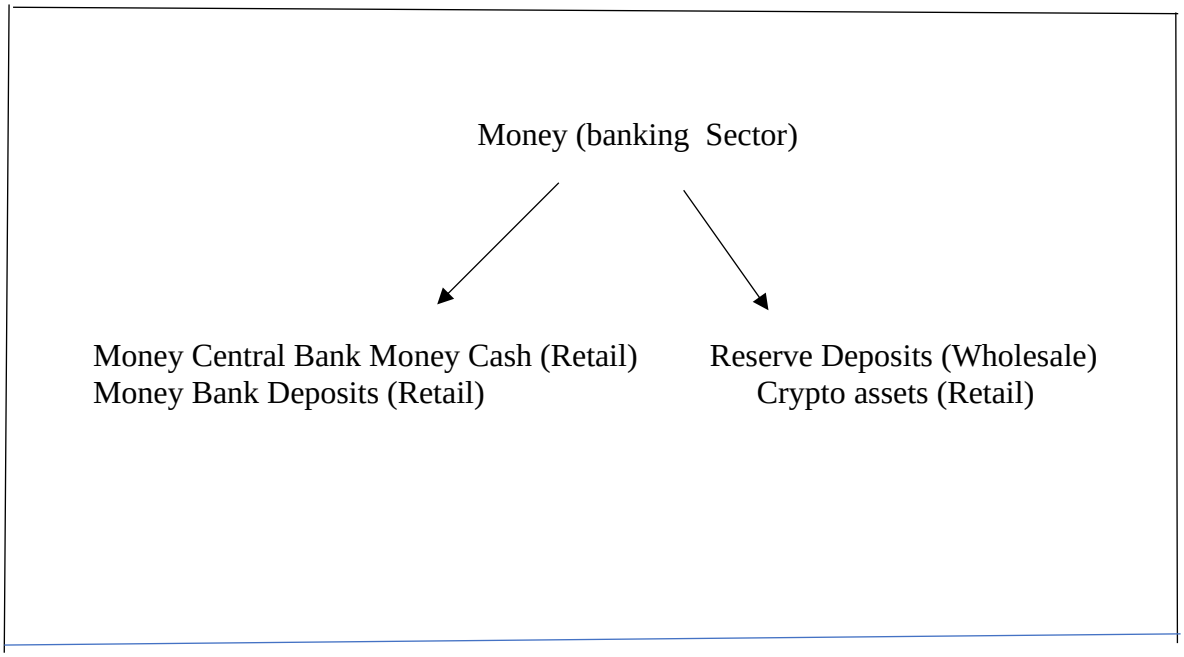
CBDC – CENTRAL BANK DIGITAL CURRENCY

INTRODUCTION

Recently in India reserve bank of India (RBI) central banks are increasingly considering a digital currency available to the general public on pilot mode. But what are the advantages of doing so in the light of generally well working private sector payment solutions? This paper discusses the range of proposed

central bank digital currency architectures, how they could complement existing payment options, and what they imply for the financial system and central bank of the future.

There have been created many IT projects which later answered for a sort of "accelerator" to modern financial technologies. Nowadays it is London that is known as the capital of FinTech because of the number of fintech innovations and its investment flow. There are four main factors determined to encourage the development of FinTech in India: intensive infrastructure, literate legal framework, verifiable tax system and investment support in the country. As has been noted above, FinTech was engendered in the USA and European countries. It came to domestic market only in 2008 when cellular operators took part in the development of mobile payments. Today Russian market of FinTech is still in arrears of foreign markets but it has an active growth. Nowadays, there are many new words that we hear every day; most of them become more and more popular. Enquiring, P2P, bitcoins, online banking, e-wallets and other specific terms have become so clear and ordinary that we start using them in our everyday life. For the first time they may seem to be unknown but if we get some more information about them, we will understand them at once.



Circulation Of Money

The potential for the introduction of a CBDC to affect financial stability risks arises primarily from a significant substitution away from private money, while central bank cash-to-CBDC substitution is generally regarded as having no implication for financial stability. Even as the financial system is evolving rapidly, private banks are in all jurisdictions still the dominant source of private money. The money creation process is intrinsically intertwined with bank credit provision, which in turn supports a banking system providing a wide range of intermediation and payment services. As a result, the analysis that follows focuses on the implications of CBDC substitution for bank deposits (and later other money instruments). Absent limits to individual holdings, a CBDC (like other forms of digital money) could lead to higher volatility in deposits and/or a significant, long-term reduction in customer deposits. This could, under certain circumstances, affect bank profitability, lending and the overall provision of financial services. Customer deposit funding is at the heart of the commercial banking business of maturity transformation and intermediation services. Away from issues of the zero-lower bound, any material loss in customer deposit funding would require banks to consider combinations of actions to try and maintain regulatory ratios and risk-adjusted profitability, eg: • Switching to alternative market-based funding sources which could be more expensive and, in some cases, less stable; • Reduction in assets/deleveraging; • Increased risk taking to mitigate near-term margin compression; • Increased lending rates; • Actions to offset any lost fees and commissions on

activities associated with customer deposits, eg ancillary payment services. These could include actions that improve competition for customer deposits or leverage a role as CBDC intermediary. • Cost efficiencies (eg lower cost of cash handling).

The payments landscape in India is at a point of inflection with growing acceptance infrastructure and consumer adoption of digital payments. Continued Government initiatives to drive e-payments, including fiscal incentives for consumers and merchants to switch from cash, efforts to bolster financial inclusion, and a focus on innovation are necessary to drive change.

"India should look to international examples for ways to increase the adoption of digital payments such as establishing an acceptance development initiative in Indonesia and Poland, mandating payment of salaries electronically in Uruguay, and wide scale digitisation of person–to–government payments such as transit in London and Singapore. Similar initiatives could be game changers for India.

THEORETICAL BACKGROUND

The idea of **"Central Bank Digital Currencies"** (CBDC) is not a recent development. Some attribute the origins of CBDCs to Nobel laureate **James Tobin2**, an American economist, who in 1980s suggested that that Federal Reserve Banks in the United States could make available to the public a widely accessible 'medium with the convenience of deposits and the safety of currency.' It is only in the last decade, however, that the concept of digital currency has been widely discussed by central banks, economists & governments.

Defined a currency as a liability issued by the central bank, we are now in a position to define a CBDC. A CBDC is the legal tender issued by a central bank in a digital form. It is the same as a fiat currency and is exchangeable one-to-one with the fiat currency. Only its form is different. It is also important to understand what a CBDC is not. CBDC is a digital or virtual currency but it is not comparable to the private virtual currencies that have mushroomed over the last decade. Private virtual currencies sit at substantial odds to the historical concept of money. They are not commodities or claims on commodities as they have no intrinsic value; some claims that they are akin to gold clearly seem opportunistic. Usually, certainly for the most popular ones now, they do not represent any person's debt or liabilities. There is no ISSUER. They are not money (certainly not CURRENCY) as the word has come to be understood historically.

The brief interprets financial inclusion broadly, as adopted in the **Bali Fintech Agenda**: Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs (transactions, payments, savings, credit, and insurance) and are delivered responsibly and sustainably (Bali FinTech Agenda 2018). A CBDC is "a digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank" (BIS 2020). While the definition appears straightforward, it has not been uniformly understood. As the variety of digital currencies keeps increasing, new designs sometimes envisage different forms of official currency integration into privately issued payment instruments. This complicates analysis of the risks and opportunities underlying CBDCs, in that it can be difficult to distinguish a CBDC from certain privately issued digital currencies. A CBDC (or certain new forms of privately issued digital money) could also change run dynamics in a stress, and the latent level of liquidity risk banks face. Authorities might need to consider adjusting prudential liquidity requirements or other measures such as the terms of their crisis lending facilities. The potential for more abrupt flows out of money market instruments may also demand further consideration of prudential regulation in that sector. And to the extent that CBDCs encourage new entrants and the growth of non-bank financial services, authorities would need to ensure appropriate regulation of these entities.

Key Design Choices The different **motivations** discussed in the previous section determine the design choices of CBDCs.

1. **Wholesale or retail**

Some CBDC designs envisage that the circulation of digital currency will be limited and end-users will only be financial institutions, so-called "wholesale" CBDCs. Other CBDC designs aim for broad, daily public use and are known as **"retail" or "general-purpose**".

2. **Token-based** or **account-based**

CBDCs The two types of general-purpose CBDCs differ mainly in verification. In token based CBDCs, the object of verification is the digital token that represents, token-based CBDCs could be more efficient in areas with limited connectivity, as end-users can exchange tokens stored in digital wallets. In token-based CBDCs, a central bank will typically honour the claims of users who can demonstrate knowledge of a certain value. Such value could be a secret key (a digital signature used in public-key cryptography), in which storage would be either custodial (managed by a trusted third-party entity or service), non-custodial (residing on a physical device owned by the end user), or some balance between the two options.

3. **DLT or non-DLT based Integration** of **distributed ledger technology**

(DLT) is a characteristic feature of many CBDC projects. However, DLT is not technically necessary: CBDC platforms could utilize conventional, centrally controlled databases. While both database structures can be used to store large amounts of data in different locations, the main difference lies in the process of updating stored records.

Thus outlines three important foundational **principles** for central banks to consider in issuing a CBDC:

I. It should not interfere with public policy objectives or prevent banks from performing their monetary stability mandate (a "do no harm" principle).
II. It should be used alongside and complement existing forms of money (the coexistence principle).
III. It should promote innovation and competition to increase the overall efficiency and accessibility of the payment system (the innovation and efficiency principle).

One potential design (analogous to cash) would be for the central bank to issue CBDC tokens that would circulate electronically among private individuals and firms and that might only rarely be redeposited back at the central bank. Like bitcoin, this approach would use some form of distributed ledger technology (DLT) for verifying the chain of ownership of each token and validating payment transactions, without requiring the direct involvement of the central bank or any other clearinghouse. In contrast to bitcoin and other virtual currencies, however, the central bank would determine the supply of CBDC tokens, which would be fixed in nominal terms and serve as legal tender. Moreover, the central bank could establish transparent procedures for incorporating appropriate updates to the DLT software—a challenge that has proven to be difficult in the case of virtual currencies. Under the alternative design (analogous to debit cards), individuals and firms would hold funds electronically in CBDC accounts at the central bank or in specially designated accounts at supervised depository institutions.20 Under this approach, the central bank would process each payment transaction by simply debiting the payer's CBDC account and crediting the payee's CBDC account. One crucial advantage of an account-based system is that CBDC payments could be practically instantaneous and costless. Of course, during the initial creation of each CBDC account, the identity of the account holder would need to be verified using procedures like those followed in obtaining a drivers' license or opening an account at a commercial bank. From that point onward, however, payment transactions could be conducted rapidly and securely (e.g., using two-step verification with a cellophane and digital pin), and the central bank would be able to monitor any unusual activity and implement additional anti-fraud safeguards as needed. the cost of verification for a token-based system would be inherently expensive. The entire chain of ownership of every token must be stored in an encrypted ledger (the blockchain), and a copy of that ledger must be stored on each node of the payment network. New payment transactions are collected into blocks that must be verified before being added permanently to the ledger. This verification process—referred to as mining—involves computational procedures that are highly complex and energy-intensive.

After adoption CBDC the currency to change the an alternative approach would be for the central bank to frame its policy strategy in terms of a **simple benchmark rule**. As emphasized by Taylor (1993, 1999), such a benchmark would not be followed in a purely mechanistic fashion but rather used to clarify the central bank's overarching strategy and explain its specific policy decisions. To provide a concrete example, we assume that CBDC is interest-bearing so that the stance of policy can be framed in terms of adjustments to the CBDC interest rate. Thus, our benchmark rule is analogous to the **Taylor Rule** but oriented towards stabilizing the price level rather than the inflation rate, and hence can be expressed as follows:

$$it = \tilde{\pi}t + rt* + \alpha(\tilde{p}t - p*) + \beta(pt - p*) + \delta(yt - yt*)$$

where it denotes the interest rate on CBDC, pt denotes the price level, $p*$denotes the target price level, $\tilde{p}t$ denotes a "core" measure of the price level (i.e., smoothed to remove transitory fluctuations in volatile components), $\tilde{\pi}t$ denotes the core inflation rate, $rt*$ denotes the equilibrium real interest rate, and $(yt - yt*)$ denotes the output gap (that is, the deviation of real GDP from its potential level). The interest rate should respond more strongly to the core measure than to fluctuations in the overall price index ($\alpha >> \beta > 0$) and should respond appropriately to movements in the output gap ($\delta > 0$). As in the Taylor Rule, this specification can be interpreted as a benchmark for adjusting the real interest rate in response to fluctuations in economic activity and prices. In particular, when the price level is at its target and output is at potential, then the ex post real interest rate $it - \tilde{\pi}t$ equals its equilibrium value $rt*$. That value could reflect historical average real rates, as in the Taylor Rule, or could be specified as the median estimate of professional forecasters, as in Levin (2014). The coefficient values in this benchmark rule (α, β, and δ) could be chosen to generate robust macroeconomic stabilization outcomes based on evaluations of a wide array of alternative macro econometric models.

Along with the cost of verification for a token-based system would be inherently expensive. The entire chain of ownership of every token must be stored in an encrypted ledger (the **blockchain**), and a copy of that ledger must be stored on each node of the payment network. New payment transactions are collected into blocks that must be verified before being added permanently to the ledger. This verification process—referred to as mining—involves computational procedures that are highly complex and energy-intensive.

As in current practice, the central bank could conduct monetary policy by adjusting short term nominal interest rates. However, its ability to push nominal interest rates below zero would be tightly constrained, because depositors could readily move their funds into CBDC earning zero interest. Consequently, in a protracted period of weak aggregate demand and deflation, the central bank would likely need to rely on other tools such as quantitate easing; alternatively, the government would need to engage in fiscal stimulus to boost aggregate demand and thereby push the price level back up to its target

OBJECTIVE

1. To explore Alternative tools Monetary policy to Direct monetary policy implementation which provides independence system.
2. To simplify financial system policies payments systems safety and efficiency.
3. To Regulation Financial stability/lender of last resort.
4. To Regulation Other objectives Reserve currency status.
5. To Reduce crime and tax evasion.
6. To Broaden financial inclusion. (needs elimination of cash)
7. To Regulation Provide or protect anonymity/privacy /security.

PROBLEMS

1. IT security
2. Required financial investment
3. Differences in operational processes
4. Differences in knowledge/skills
5. IT compatibility
6. Differences in business models

7. Differences in management and culture
8. Regulatory Uncertainty

- The need for technical supervision emerges as soon as the central bank is shielded from some retail transactions, which a fraudulent or technically compromised PSP could use to appropriate customer funds.
- Maximum supervision is required when the central bank has the conceivable minimum information set.
- Payment supervision must happen at a high frequency – perhaps even in real time.
- It must put aspects like data consistency, cyber security and privacy at centre stage

6. Figures and Tables

Changes in banking and services

Changes in banking		Traditional bank		Digital currency	
		Service provide		Service provide	
1	24/7 availability	Yes		Yes	
2	Anonymity vis-à-vis central bank	Yes		Yes	
3	Peer-to-peer transfer	Yes			No
4	Interest-bearing	Yes		Yes	
5	Limits or caps	Yes			No
6	Security and privacy		No	Yes	

7. CONFLICT OF INTEREST AND PROBLEMS

Financial inclusion is a challenge in the India because of banking sector to CBDC signals is reducing, as the market expectations on the role played by the fintech industry in developing the CBDC tended to be stable. Some symbolic events during the progress of CBDC also impacted the fintech sector, thereby leading to its positive responses. The government should encourage the fintech companies to take part in the progress of CBDC development and create more conditions such that it can realize the rational allocation of market resources by guiding the investors' attention and raising their expectations of the emerging fintech industry. As a result, it will further push digital economy development. Moreover, this study suggests that investors pay more attention to the fintech sector and adjust their strategies.

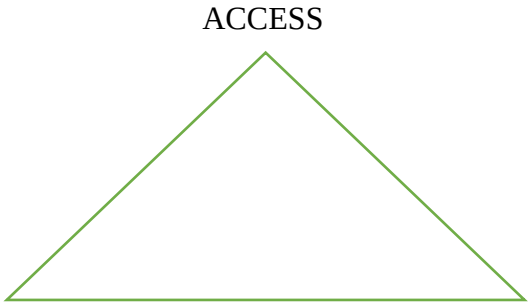
(i) **Privacy risk**:
The wide adoption of CBDC poses the entire ecosystem to enhanced privacy risk as the CBDC provides anonymity and privacy up to a certain extent. The design principles of the CBDC will determine the extent of privacy risk posed to the consumers as well as the potential ways to mitigate the risk.

(ii) **Security and technology risks**:
The technology design of the CBDC will be a determinant of the security risk posed to the users. Several issues regarding how security protocols are designed, as well as how they are technically implemented would prove critical for the safety and soundness of the products/ services. Given that a detailed technical understanding of the systems underlying issuance of CBDC will be beyond the understanding of an average consumer, appropriate technical and audit standards may be necessary to neutralize technical impediments which can indirectly cause consumer risk.

(iii) **Accountability Risk**:
The identification of who is accountable to consumers in case of loss is crucial and a core issue in respect of the consumer protections associated risk.

Other associate problems -

(i) geographic remoteness,
(ii) limited digital infrastructure
(iii) insufficient financial literacy
(iv) A small number of banks also tend to dominate its financial system.
(v) undermining competition.



8. CONCLUSION

Similar to the majority of financial innovations, which aim to reduce the frictions in the financial system, cryptocurrencies have emerged to address the existing market frictions stemming from the lack of a global uncensorable peer-to-peer (P2P) digital store of value and payment mechanism. One of the major challenges to the emergence of such a mechanism has been the double-spending problem. Prior to bitcoin, addressing this problem was delegated to trusted third parties in charge of centralized ledgers.4 Bitcoin solved the double-spending problem in a highly secure, decentralized, consensus-based6 and censorship-resistant manner. By doing so, Bitcoin has also created an incentive-compatible ecosystem for the security and maintenance of the Bitcoin network leading to the creation of a decentralized medium of exchange. The digital nature, a high level of security based on a Proof-of-Work (PoW)algorithm, properties such as no double-spend, forge-proof, tamper resistance, censorship resistance, pseudonymity (and anonymity), cheaper transaction costs, and decentralized, distributed trust feature of bitcoin all contribute to its uniqueness.

Although compliance processes can reduce risks, enhance trust and reduce transaction costs (e.g. a company with reliable financial records could borrow money at lower costs), compliance processes are often not directly adding value to the business. Therefore, from business point of view, we suggest that the future studies related to compliance should be related to how to improve the effective of compliance processes, how can use lower costs to complete related tasks or how to use technologies to conduct compliance works that could not be easily done by human in traditional ways. For example, there is already a FinTech case that EY, one of the four biggest audit firms in the world, has revealed plans to expand its use of drones to improve the audit process. In summary, robot, drone, mobile device, CSCW (Computer-supported cooperative work), Artificial Intelligence, Data, Advanced Algorithms, etc. are the emerging directions for future studies under this topic.

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