In the name of God.

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Central Bank Digital Currency (CBDC) – Part 1

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This article is only for providing some basic knowledge, definitions, and understanding at the public level, and there won't be any technical terms.

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Central Bank Digital Currency (CBDC) – Part 1

National Digital Money or Central Bank Digital Currency (CBDC)

Introduction

In recent decades, the emergence of digital technologies, particularly those related to blockchain and cryptography, has engendered fundamental transformations in the financial and monetary systems of the world. Digital currencies and cryptocurrencies such as Bitcoin and Ethereum have succeeded in playing a significant role in establishing decentralized financial systems. However, concerns regarding severe price volatility, legal risks, and the absence of institutional support have prompted governments and central banks to seek a solution that, while benefiting from the advantages of digital technologies, preserves the security, stability, and control of national currency.

Central Bank Digital Currency (CBDC) has gained increasing importance in global financial systems as a new form of official national money. This type of digital money, which is issued and managed by the central bank, can engender fundamental transformations in the manner of implementing monetary policies, financial inclusion, transaction cost reduction, and financial security. This article, through a review of the history, fundamental concepts, related technologies, implementation models, advantages and disadvantages, international examples, legal frameworks, and economic and social impacts, presents a comprehensive picture of the current status and future prospects of CBDC. Furthermore, considering the specific economic and political conditions of Iran, appropriate solutions and policies for the development of CBDC in the country have been examined.

Within this framework, the Central Bank Digital Currency (CBDC) has been introduced as an official digital money under the direct supervision of the central bank, which can serve as a substitute for or complement to cash. CBDC seeks to facilitate daily payments, reduce money transfer costs, enhance financial transparency, and advance monetary policies.

Various countries and central banks, with differing approaches and models, have commenced pilot projects and detailed studies to evaluate the economic, social, and legal effects of CBDC. This article seeks to provide a comprehensive and precise examination of the current status and future prospects of CBDC at the global level, as well as the specific conditions of Iran.

Definitions and Fundamental Concepts of Digital Money

Digital money refers to any type of electronic currency employed to facilitate financial exchanges. This type of money may encompass banks' electronic money, digital wallets, and decentralized digital currencies.

Cryptocurrency

Cryptocurrencies are digital currencies created using cryptographic technology and are typically decentralized and without governmental backing. Notable examples are Bitcoin and Ethereum, which operate on the basis of blockchain.

Blockchain

Blockchain is a distributed and decentralized ledger that records digital transactions in a secure and transparent manner. This technology constitutes the foundation of many cryptocurrencies and provides characteristics such as immutability, transparency, and transaction traceability.

Central Bank Digital Currency (CBDC)

CBDC refers to digital money issued by the central bank and regarded as an official obligation of the government. Unlike decentralized cryptocurrencies, CBDC is under the direct supervision and control of the central bank and can be offered in two forms: retail (for the general public) or wholesale (for financial institutions).

Key Technologies in the Implementation of CBDC

a) Blockchain Infrastructure and Distributed Ledger:

One of the foundational technologies in the development of CBDC is Distributed Ledger Technology (DLT) or blockchain, which enables the secure and transparent recording of transactions without the need for intermediaries. Central banks can utilize private or permissioned blockchains, to which only authorized entities have access, as opposed to public blockchains, which are accessible to all.

b) Cybersecurity and Cryptography:

To safeguard digital assets, the utilization of advanced cryptographic technologies and systems resistant to cyberattacks is essential. Public and private key cryptography, multi-factor authentication, and intrusion detection systems are among the important technologies in this regard.

c) Scalability and Transaction Speed:

One of the principal challenges of CBDC is the ability to process transactions rapidly and in a scalable manner, which must be compatible with the high volume of daily transactions. Technologies such as Layer 2 networks and optimized consensus algorithms can be of assistance in this domain.

d) Privacy Preservation:

The design of CBDC must be such that a balance between transaction transparency and user privacy preservation is maintained. Models such as the use of Confidential Transactions and privacy-preserving technologies such as zk-SNARKs can prove beneficial.

e) Transformation in Monetary Systems:

Monetary systems have undergone extensive changes throughout history, from commodity money to paper money, and are now moving toward digital money. Innovative technologies such as the internet, cryptographic technologies, and blockchain have laid the groundwork for the emergence of new forms of money.

General Definition of CBDC and Its Necessity

CBDC is an official digital money issued by the central bank of a country and is regarded as a legal obligation of the government. Given the increasing use of digital financial services and the declining use of cash, the necessity of creating a digital form of national money is felt more than ever.

Principal Objectives of CBDC

a) Facilitation of rapid, secure, and inexpensive digital payments

b) Enhancement of financial inclusion by providing access to banking services for segments of the population lacking bank accounts

c) Advancement of the central bank's control and oversight over money flow and prevention of money laundering and tax evasion

d) Strengthening the independence and monetary policy-making authority of the central bank

Challenges Ahead

Despite the numerous advantages, the development of CBDC faces challenges such as user privacy preservation, cybersecurity, impact on commercial banks, and legal frameworks, which must be carefully addressed.

History and Global Background

Central banks, since the mid-2010s, have been pursuing digital solutions for official money. The Bank for International Settlements (BIS) has played an important role in supporting and guiding research.

Leading Examples

China: The DCEP project, which is the most advanced example of CBDC, backed by the yuan, encompasses extensive digital transactions.

Sweden: The e-krona project, aimed at countering the decline in cash usage and facilitating digital payments.

Europe: The digital euro is under development, with the objective of preserving the euro's role in the digital world.

Canada, Japan, South Korea: Studies and pilot experiments are underway.

Status of CBDC in Iran

Although an official CBDC project has not yet commenced in Iran, preliminary studies and academic and policy discussions have taken shape in this domain.

Cryptocurrencies and Their Differences from CBDC

Cryptocurrencies are typically decentralized and without governmental backing, whereas CBDC is issued and managed by the central bank.

Implementation Models and Architectures of CBDC

a) Retail Model

Digital currency for use by the general public, with characteristics such as ease of access, privacy preservation, and daily payment capability.

b) Wholesale Model

Digital currency designated for use in transactions between banks and financial institutions to enhance the speed and security of large-scale transactions.

Implementation Architectures

a) Direct Model: The central bank interacts directly with users.

b) Two-Tier or Indirect Model: Commercial banks assume the role of intermediaries.

c) Hybrid Model: A combination of direct and indirect models.

Key Technologies and Technical Challenges

a) Security and Cryptography: The importance of security against cyberattacks, utilization of advanced cryptographic algorithms.

b) Scalability and Speed: Technical solutions for managing high transaction volumes and ensuring rapid response.

c) Privacy Preservation: Balance between transaction transparency and protection of users' personal data.

d) Technology Infrastructure and Software Development: The need for robust, sustainable, and flexible systems.

Economic and Social Advantages and Opportunities

a) Financial Inclusion: Possibility of providing financial services to underserved segments and those lacking bank accounts.

b) Cost Reduction: Reduction of costs associated with printing, maintaining, and transporting cash.

c) Improvement of Monetary Policy: More precise control of liquidity and enhanced effectiveness of monetary policies.

d) Transparency and Anti-Corruption: Capability of precise transaction tracking and prevention of illegal activities.

Challenges and Risks

a) Security Risks: Cyberattacks, fraud, and system infiltration hazards exist.

b) Effects on Commercial Banks: Reduction of the role of commercial banks and the possibility of engendering financial crises.

c) Legal and Privacy Issues: The necessity of enacting laws to protect users and safeguard data is mandatory.

d) Public Acceptance: The need for education and cultural development for widespread use of CBDC is imperative.

e) Case Studies of Selected Countries: Details of projects in China, Sweden, the European Union, the United States, and Iran, with analysis of differences, achievements, and challenges, are feasible.

f) In-Depth Economic and Legal Analysis: Examination of CBDC's impact on monetary policies, financial stability, legislation, and the legal systems of countries is obligatory.

g) Social and Cultural Impacts in Iran: Investigation of Iran's specific challenges and opportunities, impact on people's financial behavior, public trust, and economic development is worth examining.

h) Policy and Strategic Recommendations: Comprehensive recommendations for formulating legal frameworks, developing infrastructure, advancing education, and fostering international cooperation are essential.

Conclusion

Central Bank Digital Currency (CBDC), as a prominent innovation in the domain of money and financial systems, plays an important role in the transformation of global monetary structures. This digital money, issued by countries' central banks, can be presented as a secure, rapid, and efficient substitute for physical cash and prove effective in facilitating payments, improving monetary policies, and enhancing financial inclusion. The present article, through a comprehensive examination of foundational concepts, related technologies, various implementation models, advantages and challenges, global examples, legal frameworks, and economic and social impacts, has provided a precise and comprehensive picture of CBDC. Furthermore, with a focus on the economic and political conditions of the Islamic Republic of Iran, it proposes practical solutions for the implementation of this innovative technology.

End of Article Number Sixteen.