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Central Bank Digital Money (CBDC): Theoretical foundations and experiences

Zoha Riahi, Jaleh Zarei, Ilnaz Ebrahimi

Executive Summary:

In recent decades, the rapid development of technology, especially in the field of financial technologies, has created dramatic changes in the monetary system of countries around the world. One of these new technologies is Blockchain. Many central banks around the world are researching to answer the question of whether Blockchain technology and distributed ledger can solve long-standing challenges such as banking system efficiency, security, flexibility in payment systems, and financial inclusion. Research in this area began in 2014 with the Bank of England, and now more than 60 research centers in the world's central banks and several large-scale projects are being explored on how to use this new technology and the issuance of digital money based on this technology by the Central Bank as functional products. Introducing and highlighting key issues, fields of research and experiments, and results of central bank projects in the field of digital currencies of the Central Bank to enable the use of their achievements in the Central Bank of the Islamic Republic of Iran is one of the goals and priorities of this study.

Based on the analysis of central banks' cryptocurrencies, the effects of their potential power in payment systems, implementation, and money transfer systems and the structure and stability of financial systems have been proven. Thus, it is suggested that the Central Bank of the Islamic Republic of Iran, in solving the problems related to financing in the conditions of sanctions, and increasing the efficiency of the payment system and making the economic system transparent, etc., pay more attention to designing and creating its own digital money.

The scope of the report:

Advances in digital technology have paved the way for innovation in many sectors, including finance. The development of digital money is one of the examples of digital advances in the financial industry. As the name implies, digital currencies can generally be defined as the digital or electronic form of currency in any country. These currencies can take many forms, and today Cryptocurrencies are one of the most popular forms of digital monies; Bitcoin and other cryptocurrencies are slowly gaining acceptance around the world as a means of payment. However, unlike foreign currencies, bitcoins and altcoins are not issued by central banks or other government officials, and as a result, will be very difficult to monitor. In response to this economic phenomenon, central banks in some countries are exploring introducing a version of their digital currency called the **Central Bank Digital Currency (CBDC)**. Since the history of the central bank began with payment services, all innovations related to payment systems have always been an important part of the central bank's activities, and in this new era, the central bank's digital money as a method of payment is one such they are considered



innovations. Central Bank digital money is a broad digital form of Fiat money that can be held in various accounts with the central bank. The central bank's digital currency is essentially a proposed **Distributed Ledger Technology (DLT)** scheme that has attracted much attention in the central bank community because of its potential ability to solve long-term challenges such as **financial inclusion**, payment efficiency, payment system application, and cyber flexibility. According to the **Bank for International Settlements (BIS)**, in January 2019, at least 40 central banks worldwide are conducting research and feasibility studies on the central bank's digital currency.¹ The depth of research varies between central banks according to their motivation and interest.

Although the idea of issuing digital money has been debated by academia and central banks for several years, there is still no common consensus on its definition and design options. There are several possible reasons for this. First, the concept of digital money issued by the central bank is not very clear in itself. Some believe that central banks should issue central bank digital money in the form of central bank reserves that commercial banks can only access. Others believe that the central bank's digital currency should be separated from the central bank's reserves. Second, the issuance of central bank digital money depends heavily on the central banks' intentions in implementing such a plan, as well as on the economic conditions of each country. Third, issues related to the issuance of digital money by the central bank include not only central banks but also the entire society, including the judiciary, legislative and regulatory bodies; Thus, there are differing views on the best way to design and implement central bank digital money, and even on the important question, "Do central banks need central bank digital money?"

Central banks are looking for cryptocurrencies and similar projects for completely different reasons. Here it is better to use the term governments or governing institutions instead of central banks because it is not only central banks that are looking for these topics. The following are some examples of the world's central banks' reasons for using Blockchain projects or creating digital money:

1. Issues related to sanctions, relief from US sanctions, and financing under sanctions;

The Central Bank of Venezuela is one of the most prominent examples of the production of national cryptocurrencies to counter US sanctions and financing in those circumstances. Created cryptocurrencies, or petro, were one of the most common cryptocurrencies because they were created on one of the general Blockchain platforms. This coin was quite similar to the usual cryptocurrencies in infrastructure, **Initial Coin Offering (ICO)**, etc. The Venezuelan government has announced that you will receive a barrel of oil in exchange for buying coins. It is worth noting that this project failed.

2. Increase the efficiency of the payment system;

Another reason for the central bank of some countries is the issue of **Real-Time Gross Settlement (RTGS)** or interbank settlement. In this case, the goal was to perform SATNA and clearing room

¹ Central Banks and Distributed Ledger Technology: How are Central Banks. Exploring Blockchain Today? March 2019. World Economic Forum.



operations through a Blockchain system. Countries such as the United States (**Fitcoin**) and Canada (**Catcoin**) pursued this goal.

The creation of digital cash is another reason for countries' central banks to use the Blockchain system. Like Sweden, the goal of these countries is to eliminate cash from society to reduce its costs. The digital cash they are considering should have all the features of bitcoin, except that it is government-controlled and more efficient than the current system.

3. Economic development and cashing in an economic bloc

Some countries, like Russia, have the goal of economic development, and through this, they want to penetrate the economic blocs by creating a common coin and develop their country economically.

4. Transparency of the economic system

Some countries, such as China, aim to make the money search system more transparent so that scams can be prevented. The approach of the Central Bank of the Islamic Republic of Iran (Data Services Company as a service provider to the Central Bank) in the implementation of this project was mostly in the field of work done in Canada, China, and Sweden; And the goals of Venezuela and Russia were not considered at all. The Central Bank of Iran pursued several goals in carrying out this project:

- Money search system;
- Clarifying the money path and operationalizing the customer recognition process;
- Reducing or eliminating cash

The main goal of the third case was to create digital cash so that the central bank could activate a number of Fintechs and businesses and eliminate the challenges to their business without compromising the rules of the central bank.

Summary and Solutions:

Technology and digital innovations are transforming the economy and turning it into a digital economy. The high speed of these changes in recent years and their pervasiveness in different societies have made them key economic elements. Therefore, understanding the effect of technological advances on the economy is of great importance for adapting to new conditions.

Research and testing vary from country to country in terms of Blockchain and distributed ledger technology; However, central bank researchers have not yet concluded whether distributed ledger technology, given its significant risks and limitations, is worth the investment and the start-up of activities and processes through it. In rare cases, such as the Bank of France, programs based on this type of technology have been successfully implemented. In other cases, central banks have not yet concluded that Blockchain technology provides valuable economic opportunities. Central banks in countries with underdeveloped economies may benefit most from implementing this new technology because of inefficient existing financial processes and systems technology. They may also gain more financial inclusion by running digital money or other Blockchain-based applications. For central



banks worldwide, distributed ledger-based programs, such as digital currency issued by the central bank, can increase efficiency and reduce costs in overseas payments, both at the consumer, retail, and interbank and wholesale levels. In the coming years, we should expect to see many central banks around the world that will use Blockchain technology and distributed ledger to improve processes and economic well-being. Of course, given the systemic importance of central bank processes, banks must also consider all known and unknown risks to use Blockchain technology.

An important point for the Central Bank of the Islamic Republic of Iran in digital currency production is the amount and method of calculating the cost of these digital currencies. It is complicated to answer the question of whether the central bank can calculate the cost of producing cryptocurrencies; Because, first of all, we need to know what is the purpose of the central bank in issuing these currencies, or which plan and model of these currencies will apply to Iran. It is challenging to predict expenditures when the primary purpose of the central bank is not yet clear, and we do not have a definite explanation of them.

Institutions that benefit and suffer from the implementation of this plan should also be examined. Interestingly, the banks themselves, apart from the payment system providers, will not be harmed by implementing such a scheme or may even ultimately reduce some of their costs and gain concessions in this way. The central bank will not be harmed in the implementation of this plan, the people will not be harmed, and even the Fintechs will not be harmed because they will be able to gain privileges and facilities that they did not have before. The identification of the institutions affected by the implementation of this plan depends entirely on the goals and policies of the Central Bank for implementation of this plan. To compare the situation in Iran with other leading countries, no information is available on the institutions affected by the plan and the costs incurred by other countries in implementing the plan; Of course, the limited scope of this plan has made access to information more difficult. The Central Bank of the Islamic Republic of Iran may consider the following suggestions to initiate an investigation and how to carry it out; The comparison of digital money issued by the Central Bank with other payment systems in the country, such as PAYA and SATNA. For this comparative study, the headlines of doing the work include the following:

- Comparing the nature of costs, are the types of costs similar or different?
- Measuring costs, are costs higher or lower?
- Interviews with legislators, reviewing issues related to regulation and the amount of value creation resulting from the implementation of the plan;
- Interview with the technical site on issues related to **Load Balancing** and **Single Point of Sale (POS)** terminals;
- Business interviews to find a way to numbering

Given its goals, including increasing the efficiency of the payment system and the benefits that may be gained through the implementation of this new technology, It is recommended that the Central Bank of the Islamic Republic of Iran put further study and research in this field on its agenda. To do this, the central bank can, in the first instance, establish a working group under the supervision of the deputy for new technologies and with the participation of the Monetary and Banking Research



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Institute to measure the feasibility of using digital money issued by the central bank and opportunities and threats. Doing so should address the Iranian economy as a whole and the banking system in particular and assess its strengths and weaknesses. Also, with technical and economic expertise, estimate the cost of creating the civil, legal, and technical grounds for doing so.



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