

THE IMPACT OF DIGITAL CURRENCY ON THE TRANSFORMATION OF MONETARY POLICY

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Abstract. The purpose of the paper is to study the specifics of the organization of issue and circulation of digital money by central banks, to summarize existing global experience and assess the potential impact of digital currencies on the conditions of monetary policy, the functioning of the mechanism of money transmission and ensuring financial stability through the implementation of sound decisions of central banks in the digitalization of finance. *Methodology.* The study is based on an analysis of the scientific literature and points of view of foreign and domestic experts in the field of digital technology. It is also based on the experience of the European Central Bank, the People's Bank of China, the Bank of England, the Bank of Israel and the National Bank of Ukraine on the implementation of pilot projects for the issue and use of digital currencies, quantitative and qualitative assessment of the impact of new forms of money on monetary policy, the functioning of the transmission mechanism, state finance, efficiency of payment systems and payment transactions. In processing the material of the article used a set of general scientific and special methods of research, such as dialectical, historicallogical, system-functional and analytical approaches, generalization, scientific abstraction and others. The *results* of the study showed that the proposed digital currencies of central banks should be considered as a new high-tech dematerialized form of national fiat money. Having summarized the impact of the issue and circulation of digital money by central banks on the main parameters of economic policy, it can be argued that their use will lead to significant changes in the structure and functions of commercial and central banks, as well as existing national and transnational payment systems. The issuance and circulation of digital currency can significantly affect the nature of central banks' monetary policy, the conditions under which the monetary transmission mechanism functions, and the implementation of fiscal policy. *Practical implications.* The study revealed the main advantages and disadvantages of using centralized and decentralized models of issue and circulation of digital money by central banks, identified the directions of institutional changes in the development of the banking system and the implementation of monetary policy in a digitalized economy, which will provide a high level of control over all monetary transactions of market players. *Value/originality.* Using the experience of pilot projects on the issue and circulation of digital currencies of central banks will help to improve the effectiveness of monetary policy, to activate the mechanism of monetary transmission, to ensure the stable functioning of the financial system and reduce the level of shadow economy and corruption.

Key words: digital currency, banking system, central bank, monetary policy, digital transformation.

JEL Classification: E44, E49, G28

1. Introduction

The dynamic development of information and communication technologies based on the digitalization of the economy has contributed to a significant reduction in cash circulation and the development and use of digital technologies in money circulation

and finance. This has led to the emergence of a digital analogue of money – cryptocurrencies, which are issued not only by anonymous issuers, but also by large transnational companies. In a market environment, such virtual currencies are often seen as private money that can compete with officially recognized currencies

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(Cunha, Melo, Sebastião, 2021). A situation has arisen where a country's currency can be several currencies simultaneously, the emission and regulation of which are based on different principles, legal status and forms of emission organization. This complicates the work of state regulators of financial market and does not allow the central bank to effectively fulfill its main functions, namely to ensure the stability of monetary market and financial system as a whole (Nelson, 2018; Balvers, McDonald, 2021).

As a result, central banks have been forced to take appropriate measures to protect national currencies from unreasonable competition from cryptocurrencies, which, among other things, destabilizes the functioning of national monetary systems, the money market and public finances. Therefore, in the last few years in the activities of central banks in many countries around the world, issues related to the development, issuance and organization of circulation of their own digital money – Central Bank Digital Currency (CBDC) became particularly important.

The emergence of digital currencies of central banks has put on the agenda a number of new issues associated with the need to organize an appropriate system of regulation of money circulation, to assess the impact of the new form of money on the conditions of monetary and macroprudential policy, the functioning of money transmission mechanisms, as well as on this basis to ensure the stability of the entire financial system of the country (Mishchenko, Naumenkova, Mishchenko, 2021).

2. Mechanisms of functioning of the new form of money

In the academic literature, the central bank's digital money refers to its obligations denominated in local currency, which are digital and can perform the usual functions of money (ECB, 2020). The peculiarity of central bank digital currency is that it is a new high-tech dematerialized form of fiat money that exists today, the digital equivalent of national currencies.

The main features that distinguish a central bank's digital currency from other forms of money are:

- 1) the ability to instantly create and distribute to users – market participants (at minimal cost);
- 2) availability;
- 3) safety of storage and use;
- 4) high speed of transactions;
- 5) low transaction costs;
- 6) the absence of intermediaries in the process of operations;
- 7) confidentiality;
- 8) a high degree of control by the central bank over the status of accounts and all operations of users.

The analysis of central bank proposals shows that today we are witnessing the initial stage of the transition

to digital money. This is a kind of electronic money issued by a central bank. In this context, it should be seen as a new form of money within the existing monetary system. Therefore, today's proposals for the implementation of CBDC can be seen as an attempt to adapt the existing national monetary and financial systems to the requirements of the digital economy. In this approach, CBDC should be recognized as a new form of national money in addition to its cash and noncash forms. For example, the People's Bank of China characterizes CBDCs as electronic payments with digital money and, in terms of monetary statistics, includes them in the monetary aggregate M0, that is, cash (Juks, 2018; Davoodalhosseini, Rivadeneyra, Zhu, 2020).

A study of central bank proposals for the use of central bank digital currencies shows that they differ from conventional electronic money in that they are officially recognized currencies and are issued on the basis of blockchain technology. However, it should be noted that CBDCs are not cryptocurrencies in the conventional sense, as there is no "consensus" principle in their issuance by the central bank. The volume of digital currency issued by the central bank does not affect the dynamics of monetary aggregates M1, M2 or M3. Only a part of cash (monetary aggregate M0) is replaced by electronic money, which is in circulation in parallel with cash. Despite assumptions of some scientists, creation of a security for digital money in the form of reserves of the central bank (or in other form) is not obligatory because the central bank is directly involved in this process, proceeding from the general principle of trust in fiat money, laid in the basis of development of modern monetary systems.

According to central banks, the main goal of using digital currency of the central bank is the full transition of the population from cash to non-cash forms of payment, ensuring high speed, reliability, convenience and transparency of transactions, reducing transaction costs and increasing accessibility (Fernández-Villaverde, Sanches, Schilling, Uhlig, 2020). However, the main result of the use of digital money, will be the possibility of full control of all transactions of digital currency users of the central bank, which will help to reduce the shadow economy and corruption. Under such conditions, it is possible to considerably simplify the process of fulfillment of functions and increase the efficiency of state financial monitoring.

An analysis of existing experience and suggestions from scholars and practitioners regarding the implementation of CBDC shows that the use of digital money by central banks has many benefits for both the public and the government (Jiang, Qiu, Zhou, 2021). It should be noted that the question of fundamentally changing the functioning of national monetary systems is not on the agenda today. Digital currency, as well as central banks' electronic money, will function within

the framework of existing monetary systems built on fiat money.

To regulate the circulation of digital currency, the ECB, the Bank of England, the Bank of Russia and other central banks propose to use three models: centralized, decentralized and hybrid. In the centralized model, digital money is issued on the central bank's digital platform by opening a separate personal account (electronic digital wallet in CBDC) for each user to carry out digital money transactions. Such an electronic wallet is accessed by the central bank's hardware and software by moving a digital code between users' digital wallets. However, it should be noted that the use of such a model greatly increases the responsibility and burden on the central bank, while weakening the role of commercial banks (Balvers, McDonald, 2021).

The use of the decentralized model implies a division of responsibility between the central bank and the commercial banks. According to this model, the central bank first opens electronic digital wallets in the central bank's digital currency for intermediary banks, which then open corresponding digital accounts for individual users. CBDC user funds are held in accounts at an intermediary bank, which performs all transactions with them. The hybrid model can be viewed as a transitional model that can combine the requirements of both centralized and decentralized models.

Most scholars and practitioners, including ECB experts, prefer to use the decentralized model of CBDC issuance and circulation with commercial banks and other financial institutions as financial intermediaries, as they consider it simpler and more efficient. However, regardless of the chosen model, the overall control and responsibility for the issuance and circulation of digital money remains with the central bank.

3. World experience in regulating the circulation of digital currency

Currently, central banks in many countries, including the ECB, England, Israel, Canada, India, Japan, Russia, Singapore, Switzerland and Sweden, are actively exploring the creation and use of national CBDCs. In October 2020, the People's Bank of China launched a project to use the digital yuan through a mobile application to store and exchange it. The digital version of the RMB is based on blockchain technology. In the digital yuan experiment, the People's Bank of China uses a hybrid model for its circulation, but all digital money transactions are controlled by the central bank: it first exchanges cash from commercial banks for the digital yuan, and then the latter exchanges it from citizens for cash at a 1:1 ratio. There are four levels of digital wallet with different balances and payment limits.

In addition to improving domestic payments, the People's Bank of China plans to use the digital yuan to

make cross-border payments more effective, turn the national currency into an international currency and dedollarize China's foreign trade payments.

During the project year (October 2020 – October 2021), about 140 million digital yuan wallets were registered and \$10 billion worth of transactions were conducted. In October 2021, the Bank of Israel issued a digital shekel. The Central Bank of the Russian Federation will begin testing the digital ruble in early 2022, based on 12 banks, with further expansion of the project participants and the list of transactions using digital money. The U.S. Federal Reserve is also exploring the possibility of issuing a digital U.S. dollar (Jiang, Qiu, Zhou, 2021).

In 2018, the National Bank of Ukraine implemented a pilot project to issue electronic hryvnia. The testing was conducted among employees of the NBU on the basis of the PROSTIR payment system. About 5,000 e-hryvnias were issued. In 2021, a project was implemented to pay salaries in electronic hryvnias to employees of the Ministry of Digital Transformation of Ukraine.

In October 2020, the ECB published the Digital Euro Report, an important document for organizing the development and use of digital money (ECB, 2020). The main prerequisites for the issuance and use of the digital euro, the ECB considers a significant reduction in the demand for cash, an increase in the demand for electronic payments and the spread of the use of cryptocurrencies.

The published report sets out the principles and conditions for the implementation of the project, as well as the general requirements for the use of the digital euro. The basic principles of the issue and circulation of the digital euro were formulated by the ECB as follows (ECB, 2020):

1. Convertibility at par.
2. Responsibility of the Eurosystem for the issue and use of the digital euro, the issue and circulation of which is controlled by the Eurosystem.
3. The availability of the digital euro on equal terms in all eurozone countries, based on ECB control of payment service providers.
4. Market neutrality that supports the competitive use of private solutions in the payments market.
5. High degree of user confidence in the new form of money.

The main conditions for the issuance and circulation of the digital euro, the ECB includes the following:

1. Increasing the efficiency of digital technologies. To meet the needs of market participants for ease of use, speed of transactions and efficiency, the development and use of the digital euro must be based on the application of modern information technology.
2. Performing the functions of cash. The use of the digital euro should help reduce the amount of cash in circulation, enable offline payments, be free for basic

use, be accessible to vulnerable groups, and protect user privacy.

3. Competitive advantages. The digital euro should have the same or even better functionality compared to payment solutions that use foreign currencies.

4. Impact on monetary policy. The use of the digital euro as a tool to enhance the efficiency of the transmission mechanism should provide that users of digital euros can be charged interest at a rate determined by the central bank.

5. Backup system. To increase the overall resilience of the payment system, the digital euro must be widely available and circulated using stable communication channels that are separate from other payment services and can withstand extreme events.

6. International use. The digital euro should be available and convenient for use not only by residents but also by non-residents of eurozone countries, provided that their transactions are consistent with the objectives of the Eurosystem.

7. Cost savings. The introduction of the digital euro should help reduce the cost of payment transactions and improve the economic efficiency of market participants who use it.

8. Environmental friendliness. The issuance and circulation of the digital euro must be based on technological solutions that will help minimize the environmental impact and improve the existing payment ecosystem (ECB, 2020).

The report, in particular, establishes clear requirements for the use of the digital euro:

1. The ability to control the number of digital euros in circulation. The digital euro should be an attractive means of payment, but it should be avoided as a form of investment because of the risk of transferring funds in the form of private money into digital euros.

2. Cooperation between market participants. In the process of issuing and circulating the digital euro, it is necessary to use best practices in IT project management to ensure equal access to its use in all eurozone countries.

3. Compliance with the Eurosystem's regulatory framework and standards for digital euro payments.

4. Security and efficiency in achieving the goals of the Eurosystem. The digital euro must be developed and implemented in a safe and efficient way. The transaction costs of the projected issue of the digital euro must be commensurate with the expected benefits from its use.

5. Easy access for users in all euro area countries. Thanks to standardized interfaces, the digital euro should be simple and easy to use, compatible with private payment solutions and accessible to citizens who are not currently part of the financial system (for example, those who do not have a formal bank account).

6. Use by non-residents of euro area Member States. To prevent excessively volatile capital flows or high exchange rate volatility, the mechanisms for issuing and circulating the digital euro should provide for

special conditions for its use by non-residents of euro area member states, such as setting limits on certain transactions, limiting transaction amounts, introducing certain remuneration policies for holding digital euro-denominated assets, etc.

7. Cyber resilience. Digital services provided in the digital euro must be resilient to cyber threats and maintain an adequate level of protection of the financial ecosystem from cyber-attacks (ECB, 2020).

In July 2021, the ECB launched a two-year pilot project to test the issuance of the digital euro. To fully meet users' needs, the ECB will study various aspects of the creation, issuance and circulation of the digital euro, as well as the functionality of its design. In addition, the impact of its use on monetary policy and financial stability will be assessed. After the project is completed and the legislation of all EU countries is amended, which will take another three years, the digital euro will be finally put into circulation (ECB, 2021).

The world's leading financial companies have expressed interest in cooperating with the ECB on the use of the digital euro. This is due, in particular, to the fact that the Eurosystem has repeatedly expressed concern about the dominance of private payment companies, such as Visa and MasterCard, in the European payment market, the lack of control over their activities, as well as their access to a significant amount of information about the transactions of EU residents, which could threaten the financial stability and monetary sovereignty of the euro area.

The widespread use of the digital euro and digital money by other central banks could significantly narrow the scope of international payment companies. To avoid this situation, MasterCard has already developed a digital money testing platform to assess the compatibility of its payment ecosystem with block-chain-based CBDC. Visa is doing similar work. The implementation of such cooperation is important, because in the digitalization of economies, central banks' digital currencies should become an integral part of the new international monetary and financial system.

4. Directions of influence of the use of digital currencies on monetary policy

The practical use of digital currency by central banks, like any other form of money, has the potential to affect monetary and macroprudential policy conditions, the functioning of the transmission mechanism, financial stability, support for anti-inflationary measures, and public finances (Mishchenko, Naumenkova, Mishchenko, Ivanov, Lysenko, 2019).

According to the authors, since digital currency in the proposed format is a form of central bank electronic money, this impact will not be significant. This is due to the fact that under the current monetary systems inflation processes are determined not by the form of

money, but by other factors, and the tools and methods of monetary and macroprudential policies remain unchanged. The same can be said about anti-inflationary policy.

The impact of the central bank's use of digital money on curbing inflation will be determined by the nature of monetary and fiscal policy, their level of consistency, the balance of payments and the state budget.

At the same time, it can be expected that in the future the use of digital money by the central bank will increase the stability of national currencies and the level of financial stability in the country as a whole by ensuring the transparency of all transactions and reliable storage of money compared with keeping it in accounts at commercial banks. This is due to the fact that under certain conditions regulating the circulation of digital money guarantor monetary security will act not commercial banks, which may be insolvent, and the central bank as the guarantor of the monetary system.

The most significant use of digital currency by central banks could affect the maintenance of a balanced government budget and sound fiscal policy, as the shadow economy and financial corruption could be greatly reduced and tax evasion would become virtually impossible.

The study of the conditions for the issuance and circulation of digital money shows that it can become a new tool for controlling all payment transactions and user transactions in the fight against money laundering, tax evasion and other illegal activities. This is because each central bank digital currency digital unit has its own unique code that allows tracking its sequential movement since release to use during a transaction anytime and anywhere. In addition, an additional factor in maintaining financial stability in the country could be a significant increase in the level of confidence of the population and market participants in the new digital form of the national currency due to the transparency and accessibility of its use.

Ultimately, the use of the central bank's national digital currency as the sole means of payment in the country could lead to a significant reduction in the role of traditional banks as financial intermediaries. In fact, we are already seeing the beginning of this process. The rapid development of digital payment instruments and technologies has led to the fact that today, in addition to banks, payment transactions are increasingly carried out by non-bank organizations, which account for more than 25% of the payments market. Payments on central banks' digital payment platforms will lead to the loss of these functions by existing payment institutions, as central banks will be able to perform them more efficiently.

Using central bank digital money, commercial banks will be able to raise funds from businesses and households more efficiently, because each market participant will have a single digital wallet. The issue

of lending using central bank digital money is more complicated due to the need to formalize collateral and provide guarantees of loan repayment. However, the experience of existing digital banks, in particular the Ukrainian Monobank, proves that this problem can be solved over time.

The study also concludes that depending on the chosen model of digital money issue by central banks and due to the possibility of transferring some of the funds of market participants from conventional bank accounts into digital money, especially if interest is accrued on them, the use of digital currency by a central bank may lead to a reduction in the liquidity of the banking system. If such situations arise, the central bank, as part of its monetary policy implementation, should provide for the possibility of changing the forms and methods of using the mechanism of refinancing and support of commercial banks.

5. Findings

In economic terms, CBDCs are central bank liabilities denominated in local currency, which are represented in digital form and can fully perform all the functions of money. They represent a new high-tech dematerialized form of fiat money and are issued in addition to their cash and non-cash forms. The difference between central bank digital currency and electronic money is that they are officially recognized currencies, not cryptocurrencies, although they are issued based on blockchain technology. The volume of central bank digital currency issuance does not affect the dynamics of monetary aggregates.

Digital currency projects of central banks are the first stage of the transformation of existing monetary systems, which is characterized by their adaptation to the requirements of the digital economy. The main goal of using central bank digital currency is the transition to a cashless form of payment that ensures high speed, reliability, convenience and transparency of payments, which will reduce the size of the shadow economy. To ensure effective regulation of the central bank's digital currency circulation, the most promising is the use of a decentralized model of their issuance.

Today, central banks in many countries around the world are actively studying the issue and use of CBDC. The main reasons for a central bank to issue digital currency are to reduce the need for the use of cash and the need for transparency of payments. The principles, terms of issue and requirements for the use of the digital euro, developed by the European Central Bank, can be successfully used by central banks in other countries.

6. Conclusions

The study determined that the use of central bank digital currency (CBDC) will contribute to a significant

transformation of monetary, fiscal and macroprudential policy mechanisms, as well as intensify the channels of monetary transmission mechanism. It is proved that the impact of CBDC on the containment of inflation will be determined mainly by the nature of monetary and fiscal policy, the balance of payments and the state budget.

It is justified that by ensuring the transparency of transactions and the reliability of the storage of CBDC money, a much higher level of stability of the national currency can be ensured, as the central bank will be the guarantor of monetary security. In the long term, the use of a central bank's digital currency as the sole means of payment may lead to a significant reduction in

the role of traditional banks as financial intermediaries. Payments and settlements on central bank payment platforms could cause existing payment institutions to lose these functions.

To improve the efficiency of central bank digital currency issuance and circulation mechanisms, it is necessary to develop appropriate regulatory support, strengthen data confidentiality requirements, coordinate the activities of central banks in international payments and settlements, and reliably protect the new payment system from risks and cyberthreats. Issues related to the unevenness of the digitalization of banking and financial systems around the world also require further study.

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