ORIGINAL PAPER

DOI: 10.26794/2587-5671-2020-24-4-18-30
UDC 336.74(045)
JEL E42, E58, G21

Digital Money at the Present Stage: Key Risks and Development Direction

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ABSTRACT

The article explores modern trends in the development of digital money. The purpose of the article is to identify and analyze the risks of digital money, and to study scientific approaches and tools for managing these risks. The authors use general scientific and special research methods, including comparative legal analysis and a systematization method, as well as methods of economic theory: positive analysis and scientific abstraction. The research highlights the strategic challenges and guidelines in the development of digital money in the Russian Federation and shows the difference and common features of digital and electronic money. Based on a comparative analysis of private and national digital money, we conclude that the digital money of Central Banks is more flexible and more reliable for consumers than private cryptocurrencies. We systematize the risks of digital money circulation at the micro, mezzo and macro levels, as well as identify the essential tools for managing them. The authors note that exogenous risk management tools are more typical for private cryptocurrencies, and endogenous tools will apply to digital money of central banks, in particular, the development of an appropriate configuration of Central Bank digital currency. The study may be useful for digital money users, as well as government agencies implementing policies and regulations on the issue and circulation of digital money in Russia.

Keywords: digital money; cryptocurrency; central banks; risks; banking system; payment systems

For citation: **Larina O.I., Akimov O.M. Digital money at the present stage: Key risks and development direction. *Finance: Theory and Practice.* 2020;24(4):18-30. (In Russ.). DOI: 10.26794/2587-5671-2020-24-4-18-30**

INTORDUCTION

Money is a traditional item of any economic system. On the one hand, money performs economic functions, on the other hand, it is a social and legal category, subject of state power and regulation; on the third hand, money is an element of agreement and habits of economic entities that always strive to find a more profitable and convenient form of it.

The formation of digital money institution, which is also often called digital currencies, virtual money and cryptocurrencies, is a new evolving trend impacting the payment and monetary system transformation. In this context, digital money is viewed "as a combination of two elements: an asset and an exchange mechanism which allows payment and settlement through the use of distributed ledger technology" [1, p. 2].

The cryptocurrency market is rapidly growing. There are more than two thousand types of issued private digital currencies. So, the most popular of them are: Bitcoin (market capitalization is about 172 billion U.S. dollars), Ethereum (market capitalization is about 22 billion U.S. dollars), XRP (market capitalization is about 9 billion U.S. dollars), Bitcoin cash (market capitalization is about 4.3 billion US dollars), Litecoin (market capitalization is more than 2.8 billion US dollars)[1].

In some countries, there is a precedent for Central Banks to issue cryptocurrencies (for example, in Venezuela), and a number of other countries research the issue of national digital money, for example, E-Crona in Sweden [2] or Fedcoin in the USA [3]. Thus, national digital currencies issued by central banks appear along with decentralized private digital currencies [4].

Although digital money has been the main focus of scientific research in recent years [5–7], it is still understudied. In particular, there is no unified system to estimate risks of digital money circulation at various levels of economic processes. Also, scientific approaches and tools to manage these risks have not been developed, which creates obstacles for government agencies when regulating the circulation of digital money. This article studies the digital money development trends and associated risks.

PRIVATE DIGITAL MONEY (CRYPTOCURRENCIES): TYPES AND RISKS

Despite the ongoing technological and institutional transformation, the Russian ruble is an official monetary unit in Russia which is enshrined in law. At the same time, cash and non-cash (including electronic) forms of payment act as payment instruments, which are established by the legislation and rules of the Bank of Russia. From the point of view of payment instruments technology, electronic payment forms may ensure further development of the payment forms implemented by using digital technologies.

The peculiar feature of modern payment systems is that electronic money is used for settlement and payment, which, in fact, is an obligation that creates the illusion of a possible private issuance of such money.

F.A. Hayek described such use and feature [8, p. 177], and advanced the idea of private money circulation, not central banks' money. At the same time, it should be noted that legal and fiat value of assets ensure their status as means of payment and support their money function. The possibility of converting the state's digital money into real money makes it so attractive for investors.

This historical and social institution is currently undergoing a significant transformation. Most of the time mankind existed in a system of full money (commodity and metal). However, in recent years, monetary systems have significantly changed due to technological development which entails new risks in this process. Although the issuance of money is monopolized by central banks and government, there is a rising trend for private digital money (cryptocurrencies) formation and pay-

[1] Website CoinMarketCap. URL: https://coinmarketcap.com (accessed on 16.05.2020).

ment systems decentralization [9]. At the same time, we believe that such non-fiat digital currencies are not money in the full essence of this institution since the essence primarily depends on the functions performed. Currently available cryptocurrencies do not perform all the functions of traditional money and only serve as an interim payment alternative. However, in future, the fiat cryptocurrencies issued by central banks may lead to the development of new types of monetary systems with digital money widely used.

Currently, there are several thousand different digital currencies, which distinguish from each other by their characteristics, such as the issuance limit. As known, Bitcoin is the most popular cryptocurrency and it has an issuance limit. At the same time, Novacoin and PPCoin, for instance, have no issuance limit [10].

An important characteristic of cryptocurrencies may be privacy and anonymity, or conversely their absence. Both options are possible. Anonymity, however, is associated with money laundering risks. Also, cryptocurrencies can be created on the basis of complete (Bitcoin) or conditional (Namecoin, for example) independence. In this context, independent cryptocurrencies are entirely decentralized, while Namecoin is a controlled currency, where users get approved by ICANN, the US company-creator.

Another characteristic of cryptocurrencies that their creators can emphasize to distinguish from the general mass is security (the presence of any real asset-backed value) or insecurity. At the same time, it is more likely an advertising trick, since it is not possible to establish the real value. The most of cryptocurrencies are unsecured. It should also be noted that, by their purpose, cryptocurrencies are being used mainly as a payment instrument, however, they can also be used as platforms to finance projects and businesses.

It is important to point out that with the development and application of technology in society, specific risks increase. For instance, Internet fraud, viruses and malicious software, or even a simple breakdown of the equipment or its malfunction can lead to financial losses. Risks associated with the loss of information (cryptocurrency theft, cybersquatting) are considered as significant. So, "access to personal data is hardly controlled. In the future, hacking tools for devices that store confidential information will significantly improve so that they can become practically an "absolute weapon" [11, p. 64].

Thus, it is necessary to focus on identification and assessment of risks[2], that accompany the development and use of digital currencies in decentralized payment systems. Moreover, these risks will be different for consumers, the financial / banking system and for the state (*Table 1*). The table presented by the authors highlights the circulation risks of cryptocurrencies. Due to the short development and establishment period, official data have not yet been accumulated, and *Table 1* shows some examples of the implementation of risks.

According to the authors, *Table 1* presents the risks inherent of the circulation of private digital money, and possible forms of their manifestation, while it is noted that the risks are directed not only to a wide range of consumers and financial organizations, but may also undermine the systemic stability of the state economy. Therefore, the formation of new regulatory methods is required, which should consider and mitigate emerging risks. The problems of risks are addressed by Russian and foreign experts [13, 14]. At the same time, in order to successfully respond to the challenges of globalization, it is important to "to develop competition and move from the "economy of distrust" by abandoning strict legislative restrictions while tightening

[2] The term "risk" has many interpretations (including the Russian and international risk management standards), however, we use the concept that is given in the Federal Law "On Technical Regulation" dated December 27, 2002 No. 184-FZ, where it is stated that "risk is a probability of harm to be caused to people's life or health, natural persons' or legal entities' property, state or municipal property, the environment, the life or health of animals and plants taking account of the gravity of this harm".

Table 1

Private digital money circulation risks

Type of risk	Subjects at risk and scope of risk	Examples of risk
Liquidity risk	Customers: since systems are private they are not regulated by the state, as banking institutions. Once the transaction is confirmed, it is not possible to reverse it	In case of a transfer mistake, the user completely loses his money, as well as the possibility of keeping the funds invested in cryptocurrencies, since such investments are not insured and are not guaranteed. Example — Mt. Gox exchange, February 2014 "it closed without any explanation, which led to the loss of funds of its customers" *
	Financial/banking system: irreversibility/ irrevocability of the transaction	It is impossible to withdraw a transaction or challenge it
AML/CFT Risks	Financial/banking system: anonymity/ privacy — provides a possibility for money laundering and fraud	Customers of financial institutions may conduct illegal currency transactions, exposing credit organizations to reputational risks
	State: systems are autonomous and not regulated. Possibility to be used by criminals or persons belonging to terrorist groups	Criminals use cryptocurrencies to receive ransoms or payments for deliveries
Compliance risks	Financial/banking systems: the possibility of losses and penalties for illegal operations and doubtful transactions	The possibility of customer fraud exposes credit institutions to the regulatory sanctions. The complexity of identification procedures in financial institutions is growing
Legal risk	Customers: lack of legal status limits the scope	Illegal and illegitimate circulation makes it difficult to use in payments
	Financial system/banking system: limited use within a single payment system	The necessity to convert funds in different systems
	State: illegal and illegitimate status	At present, there is no legal framework for the use of digital currencies in civil circulation in Russia
Market risks	Consumers; financial/banking systems: volatility, investment risks	It is difficult to predict the movement of the digital currencies value since it depends on various factors: advertising, political and financial news, technical trends, and also, like any currency, it depends on supply and demand
Operational risks	Consumers, financial/banking systems; state: this risk is significant enough because there is a strong technical dependence for all the participants. It requires constant technological updating, as well as system improvement and integrity costs	All digital currencies are based on distributed ledger technology, which has many advantages, but at the same time is not perfect, and it must be considered. System crash: "for example, in August 2020 a major vulnerability in the bitcoin protocol was spotted, which let users create an indefinite number of bitcoins"*

Table 1 (continued)

Type of risk	Subjects at risk and scope of risk	Examples of risk
Systematic risks	Financial/banking system; state: high market risk may lead to a risk of liquidity loss of a systemically significant participant, which will lead to the need for government intervention	Digital currencies are a speculative asset and may become a crisis trigger because they lack real value.
Loss of state sovereignty risk	State: cross-border, volatility and anonymity triggers tax evasion, money laundering, terrorism financing and, as a result, state sovereignty problem	Private digital currencies are a non-state-controlled asset and can be used against public interests and undermine the sovereignty of the state
Deflation risk	State: limited issue may not correspond to the economic development of the state	According to Nobel Prize laureate P. Krugman**, cryptocurrency, Bitcoin, in particular, is not a generally accepted means of payment but is an element of a decentralized payment system. According to him, there is a threat of deflation, because, the number of bitcoins is limited by the amount of infinitely decreasing geometric progression, and the number of goods and services that can be paid with bitcoins will grow

Source: compiled by the authors.

Notes: examples indicated by * are taken from the source [12]; ** Website ttrcoin. URL: https://ttrcoin.com/pol-krugman-bitkoin-perecherkivaet-300-let-ekonomicheskogo-progressa.4344 (accessed on 16.05.2020).

control" [15, p. 20]. This idea may find support in the development of the financial sector digitalization since the use of cryptocurrencies by economic entities should be regulated by the state.

RISK MANAGEMENT OF DIGITAL PRIVATE MONEY CIRCULATION

In our opinion, there is a need for the state regulation of cryptocurrencies' circulation in Russia. However, the laws on digital assets and cryptocurrencies in Russia have not yet been applied, since the Russian regulators do not view cryptocurrencies as ecosystems in the same way. Thus, there is no official concept of digital money in Russia. It should be noted that the term "cryptocurrency" is not legislatively fixed in Russia, and there is a project to introduce the term "digital financial asset" into public circulation.

At the same time, cryptocurrencies exist and this fact cannot be denied. State legal regulator seems to be one of the most essential tools to mitigate the risks identified by the authors in the *Table. 1*, it also shows the "maturity" of the economic and legal system of the state.

We will analyze the legal infrastructure surrounding cryptocurrencies in different coun-

tries[3]. In 2014 only about 40 countries used some elements of regulation of operations with digital assets, and 5 years later 130 jurisdictions have their regulatory acts on this issue. This growth supports the authors' opinion about the need for legal regulation.

An analysis of how various countries apply a legal framework to the cryptocurrency market helps to develop optimal regulatory policies and practices. One of the facts is the variety of definitions used, which at the same time describe the same objects. For example, some of the terms used by countries to reference cryptocurrency are: in Thailand, Argentina, Australia they use the term "digital currency"; in China, Canada, Taiwan the term "virtual commodity" is used; the term "cyber currency" is used in Lebanon and Italy, and in Germany — "crypto-token"; while in Switzerland they use a "payment token"; Mexico — "virtual asset"; "electronic currency" is used in Colombia.

It should be noted that regulatory authorities in all countries understand the possible risks of using digital currencies. Regulators in various countries educate citizenry about opportunities that cryptocurrencies create for money laundering and terrorism financing. In addition, the Group for the Development of Financial Measures against Money Laundering (FATF) developed recommendations that summarize the current practice of the circulation of digital financial assets[4]. Some countries (for example, Australia and Canada) have already extended their laws on money laundering and counterterrorism, and warned about possible risks. These jurisdictions consider cryptocurrency markets as facilities that require control and have identified due diligence requirements for banks and other financial institutions that operate in designated markets. Regulatory institutions in some countries such as Belgium, South Africa and the United Kingdom issued notes for the public about the pitfalls of investment in the cryptocurrency markets, and have also found the size of the cryptocurrency market as too small to cause serious concern and to justify regulation and/or a ban at this stage.

Some countries regulate cryptocurrency as a mechanism to raise funds (ICO[5]). Of the jurisdictions that address ICOs, some (China and Pakistan) ban them altogether, while most tend to focus on regulating them. Most jurisdictions do not recognize cryptocurrencies as legal tender; however, they see a potential in the blockchain technology. Developing a cryptocurrency-friendly regulatory regime, these countries use cryptocurrencies as a means to attract investment in technology companies (Spain, Belarus and Luxemburg). Some countries approach this differently and develop their own system of cryptocurrencies (the Marshall Islands, Venezuela and Lithuania). One of the many questions that arise from allowing investments in and the use of cryptocurrencies is the issue of taxation. Since gains made from mining or selling cryptocurrencies are categorized as income or capital gains they are subject to tax. However, there is also no unity of tax regulators in this matter.

Thus, the presence of different jurisdictions and points of view gives rise to the problem of creating complete and consistent rules to regulate the circulation of digital financial assets, which would consider the requirements of national laws and business customs.

Based on the study and brief analysis of the possible areas and types of cryptocurrency regulation, we note that financial investments may create significant risks for investors (market, state, legal). At the same time, we believe that citizens have the right to manage their own legally earned funds independently, without any restrictions.

[3] Regulation of cryptocurrency around the world. The Law Library of Congress, Global Legal Research Center. 2018. URL: https://www.loc.gov/law/help/cryptocurrency/world-survey.php (accessed on 16.05.2020).

[4] FATF (2019). Guidance for a Risk-Based Approach to Virtual assets and Virtual Asset Service Providers. URL: https://www.fatf-gafi.org/publications/fatfrecommendations/documents/guidance-rba-virtual-assets.html (accessed on 05.06.2020).

[5] ICO (Initial coin offering) uses cryptocurrency as a mechanism to raise funds.

In our opinion, at the initial stage of developing regulatory standards in Russia, it is reasonable to build digital currency regulation based on the organizational principles of the existing currency regulation in Russia (the norms of the Federal Law "On Currency Regulation and Currency Control"[6]). According to these principles, operations with foreign currencies are limited, although economic entities are entitled to buy and sell foreign currency without restrictions and have any number of accounts in foreign currency opened with Russian banks. At the same time, payments in foreign currency are banned, except cases stipulated by this law. There is a threshold amount of funds over which identification of persons performing a particular transaction with foreign currency is required. Also, according to the by-laws, the regulator determined the requirement for credit institutions to comply with measures to manage currency risks — established standards for compliance with open currency positions [16].

To manage identified risks in Russia within the legislative framework, it seems essential to focus on the regulation and licensing of crypto-exchanges and other financial intermediaries in order to prevent possible criminal activities, as well as minimize operational and information risks.

The option of the issue of digital money by central banks seems more effective, more predictable with less negative effects for consumers, in the context of money digitalization. However, even this way of developing money digitalization requires appropriate legal and methodological tools.

CENTRAL BANK DIGITAL CURRENCY AND ITS IMPACT ON MONEY DIGITALIZATION

Digital currencies can be private and national (owned by the central bank). In the latter case, the central bank or another state institution with monetary functions issue them. IMF economists define central bank digital currency as "a new form of money, issued digitally by the central bank and intended to serve as legal tender. It would differ, however, from other forms of money typically issued by central banks: cash and reserve balances. Central bank digital currency designed for retail payments would be widely available" [17, p. 7].

The concept of direct access to central bank accounts from a wide range of individuals (deposited currency accounts) was introduced by Nobel laureate D. Tobin in the mid-80s. last century [18, 19]. Although the concept of D. Tobin was recognized in the academic environment, it did not find its practical application at that time. In recent years, the development of new financial technologies in the payment industry led to the launch of successful projects in the field of private digital money (Bitcoin, etc.). The authorities of several countries desired to completely abandon the use of cash, and the concept of giving access to households and firms to accounts opened directly in central banks has become relevant in the practical field.

Today there are no successful examples of issuing digital money among central banks of developed countries. However, there are pilot projects to create them and the closest to the release of digital currency is China, Sweden and South Korea.

Developing countries are more proactive in issuing national digital money. Venezuela attempted to issue a national digital currency in 2018 but failed. Also, Senegal, Uruguay and Tunisia announced the release of their own digital money. In Russia, the Central Bank is currently exploring the possibilities of digital currency launch[7].

According to the survey conducted by the Bank for International Settlements 63 central banks (of which 41 are located in emerging

[6] Federal Law of December 10, 2003 No. 173-FZ (as amended on August 2, 2019) "On Currency Regulation and Currency Control". URL: http://www.consultant.ru/document/cons_doc_LAW_45458/ (accessed on 16.05.2020).

[7] Central Bank is researching digital currency. URL: https://www.rbc.ru/rbcfreenews/5d04ccb69a7947da3eacd621 (accessed on 18.05.2020).

Table 2

Forms of Central Bank digital currencies

Who can use central bank money/ Used payment and cash flow technologies	A wide range of users (households and companies)	Banks and other financial intermediaries
Based on traditional technologies of interbank settlements on correspondent accounts	Funds on special accounts of individuals and legal entities opened with the central bank	Funds on correspondent accounts of commercial banks opened with the central bank (central bank reserves)*
Based on distributed ledger technology	Central bank digital tokens for individuals and legal entities	Central bank digital tokens (financial intermediaries only)

Source: compiled by the authors based on materials of Bank for International Settlements.

Note: * The concept of Central Bank digital currencies is not well-defined. Some researchers do not include central banks' traditional reserves (commercial banks' corresponding accounts) in Central Bank digital currency definition. See, for example, [17, p. 7].

market economies) mentioned the following motivations for issuing central bank digital currency: 1) payment efficiency (domestic); (2) financial inclusion; (3) payments safety; (4) others; (5) financial stability; (6) monetary policy implementation; (7) financial efficiency (cross-border)[8].

Payment safety and financial stability are priorities for central banks of advanced economies, whereas payment efficiency and financial inclusion are for central banks of emerging market economies. At the same time, the use of central bank digital currency for monetary policy implementation is not a priority neither for central banks of advanced economies nor for central banks of emerging market economies.

We distinguish between token- or account-based forms of central bank digital currency. Each of these forms is available for financial intermediaries (wholesale purpose) or individuals or legal entities (general purpose) (*Table 2*).

Token-based central bank digital money depends on a person receiving a token to verify that the token is genuine in order to prevent digital counterfeiting. To a certain extent, central bank digital tokens are similar to private cryptocurrencies and serve as an alternative to cash, as they can be transferred directly between users without a central counterparty, which ensures the confidentiality of transactions.

It is essential to identify the account holder of money in the form of entries in special accounts opened with the central bank, due to the possible unauthorized transfer or withdrawal of money from the account without the permission of its owner. This form of central bank money is similar to the money stored in accounts in commercial banks.

[8] BIS (2019). Proceeding with caution — a survey on central bank digital currency. BIS papers. No. 101. URL: https://www.bis.org/publ/bppdf/bispap101.pdf (accessed on 18.05.2020).

RISKS OF CENTRAL BANK DIGITAL CURRENCY CIRCULATION

Although the Central Bank acts as the issuer of digital currency, this form of money also incurs certain risks for users/consumers, the financial/banking system and the state. However, the nature of risks and their potential impact will differ significantly from the risks of private cryptocurrencies (*Table 3*).

The key risks for **users** will be: cyber risks — the threat of loss of funds due to hacking of the system; operational risks — failures in the system, leading to the loss of user data. The rest of the money of the central bank is safe for users. There are no market fluctuations and credit risks, since the probability of bankruptcy of the central bank, and hence its failure to fulfill its obligations, is very low. In this case, central bank digital currency is safer for users than private digital money.

The potential impact of central bank digital money on the **financial system** is estimated by economists as significant, despite objective difficulties in the current risk assessment process [20, p. 22]. Although, the digital currencies of central banks are intended to replace cash in the future, they can compete with deposits of individuals and legal entities in commercial banks. If households and companies had a possibility to open accounts directly with the central bank, it would lead to financial instability and an outflow of funds from commercial banks to central bank accounts (or tokens). The outflow of funds will negatively impact the liquidity of commercial banks and prevent them from performing the functions of financial intermediaries.

The second significant negative impact the central bank digital money entails is the potential decrease in the profitability of commercial banks due to the loss of customers, as some of them will prefer to use services of the central bank rather than private credit organizations. Consecutively, banks will lose some of the commission income.

In addition, banks will have to bear additional interest expenses on deposits to keep customers, as customers may prefer safe central bank accounts to current accounts and accounts with commercial banks. As a result, the central bank digital money entails more significant risks for the banking system than private digital money.

There are also certain risks for the **state and the financial regulator** due to the issuance of digital money: reputational and strategic[9]. Introducing new elements into the central bank's operation is always risk-bearing. Expanding the areas of responsibility regarding the increase of the customer base will require the organizational restructuring of the work of the regulator, and possible failure of the system may lead to reputation costs for both the regulator and the state[10].

A number of economists, along with new opportunities central bank digital money may offer, note potentially negative effects on the monetary policy of central banks [21]. During periods of financial instability, the outflow of funds from banks into reliable central banks (de-funding) may lead to the liquidity of commercial banks and prevent them from fulfilling the functions of financial intermediaries. This could have profound implications for monetary policy.

Also, it is important to develop requirements for anti-money laundering system if the central bank issues money in the form of digital tokens. Obviously, the token-based digital money of central banks provides a certain level of anonymity and privacy of users, which

[9] Strategic risk — "the risk of failure to achieve the objectives of the activity, improper performance of the functions of the Bank of Russia due to errors (deficiencies) in the adoption of decisions that determine the strategy and activities of the Bank of Russia or their untimely adoption, due to non-accounting (insufficient accounting) or untimely response to external factors threatening the price and financial stability of the Russian Federation". URL: https://cbr.ru/content/document/file/36486/policy.pdf (accessed on 18.05.2020).

[10] Legal issues/legal status of the currency. In many countries, including Russia, the work of central banks is limited by law. Central banks do not work with a wide range of customers, except in exceptional cases.

Table 3

Risks of Central bank digital currencies circulation for a wide range of users

For consumers/users	For financial/banking system	For state/regulator
Cyber risks — loss of money due to theft and unauthorized interference by third parties	Risk of liquidity loss by credit institutions	Reputational and strategic risks of the central bank
Operational risks	Loss of fee and commission income for credit institutions	Possible efficiency loss of the monetary policy of the central bank
Other risks	Interest expenses increase for credit organizations	The potential use of money to launder proceeds of crime (for anonymous forms of payments)

Source: compiled by the authors.

will come into conflict with the recent global trend of combating money laundering and terrorist financing.

To sum up at this stage, central banks have the necessary technological resources to issue their own digital money for a wider public. Meanwhile, potential significant risks for the financial system and the regulator itself[11], keep central banks from moving forward, although some central banks are testing their own digital currency.

Next, we consider how central banks can reduce the negative impact of their digital currency on the banking system.

DEALING WITH NEGATIVE IMPACT OF THE CENTRAL BANK DIGITAL CURRENCY ON THE BANKING SYSTEM

The development of the legislative framework for private digital money circulation is the key risk management approach. The state either completely ban private digital money circulation or introduce a policy that protects consumers from excessive risks [23].

However, different risk management approaches should be applied to central bank digital currency. This is because central bank digital money is safe for users who have a reliable alternative to commercial banks deposits. At the same time, risks arise at higher levels (mezzo and macro levels). Therefore, the legislative framework will take a second place here, and endogenous mechanisms of configuration (characteristics) of the digital currency will enter the scene. Central banks can mitigate the risks to the banking sector by varying the configuration of the digital currency.

Economists of the Bank for International Settlements identify 5 design features of central bank digital currency:

- availability;
- anonymity;
- transfer mechanism;
- interest-bearing;

[11] An ill-conceived approach to issuing central bank digital currencies may also have a negative impact on the real sector of the economy, although much depends on the method of issuance of digital currencies. See more [22, p. 95].

- limits or caps[12].

These design features of central bank digital currency ensure a flexible approach to the development of its own digital currency, limiting, if necessary, the risks of its impact on the financial sector of the economy.

We consider three basic tools for reducing the risks of central bank digital currency circulation on the financial system.

1. Negative interest rates. Amid instability, economic agents may prefer reliable central bank digital money, refusing commercial banks' deposits. In order to prevent the de-funding of commercial banks, the digital currency issuer can lower the interest rate to zero, or, if necessary, take interest rates into the negative zone. Thus, individuals and legal entities will bear certain costs and will prefer to keep their funds in commercial banks' accounts.

2. Limits on the maximum amount of digital money on the user's balance. If negative rates do not help, the central bank can set a limit on a user's balance. The lower the limit, the less the potential impact on the financial system. After all, the owner of the funds will be able to place only a small part of his savings in the central bank.

3. Limited access for users. Given the significant risks of issuing central bank digital money for a wide range of users, it is reasonable to consider the possibility to limit access exclusively by commercial banks and other financial intermediaries. The Bank of Canada's CAD-coin is an example of a digital (crypto) currency, which was introduced for the domestic interbank payments' settlement[13]. It is based on the distributed ledger technology. The largest Swiss bank UBS introduced a similar project of a token-based international payment system for banks and fintech companies based on private digital money — Utility Settlement Coin[14]. This new form of central bank digital currency for financial institutions do not carry risks of digital money for a wide range of users, as access to digital money will be limited exclusively by financial intermediaries and does not violate the traditional principles of their work.

CONCLUSIONS

1. The article highlights two current trends of money development — the rapid growth of private digital money (cryptocurrencies) and gradually evolving digital currency of central banks. Payment efficiency and financial inclusion are the key motivations to issue central bank digital currency for developed countries.

2. At the same time, each of the new forms of money has its specific features and unique risks for consumers, the banking system and the state. Thus, private digital currencies incur risks for consumers and the state. In case of central bank digital money circulation for a wide range of users, the risks of financial intermediaries are more significant, since they compete with commercial banks' deposits. Consecutively, this may lead to de-funding of commercial banks amid financial instability.

3. The authors classified types of risks of private and central bank digital currency circulation and provided economic and legal tools to mitigate those risks. It is essential to use tools that will reduce the influence of central bank digital currency on the banking system.

4. The authors concluded that the Bank of Russia may launch a digital currency project for credit institutions, similar to the Bank of Canada to start with. This approach lacks significant risks for Russian banks and at the same time may be a foundation to start a national digital currency project for a wide range of users in future.

[12] BIS. Central bank digital currencies. 2018. URL: https://www.bis.org/cpmi/publ/d174.pdf (accessed on 18.05.2020).

[13] Project Jasper. A Canadian experiment with distributed ledger technology for domestic interbank payments settlement. White paper prepared by Payments Canada, R 3 and Bank of Canada. 2017. URL: https://www.payments.ca/sites/default/files/29-Sep-17/jasper_report_eng.pdf (accessed on 18.05.2020).

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The article was submitted on 06.06.2020; revised on 16.06.2020 and accepted for publication on 22.06.2020.
The authors read and approved the final version of the manuscript.