Bank of Russia

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A DIGITAL RUBLE

Consultation paper

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This paper was prepared by the following divisions of the Bank of Russia: the Security Department, the Monetary Policy Department, the Information Security Department, the Information Technology Department, the Research and Forecasting Department, the Cash Circulation Department, the National Payment System Department, the Banking Supervision Support Department, the Public Relations Department, the Financial Market Strategy Department, the Financial Monitoring and Foreign Exchange Control Department, the Financial Stability Department, the Financial Technology Department, the Service for Consumer Protection and Financial Inclusion, and the Legal Department.

Please send your comments regarding the topics covered in the consultation paper and your suggestions through 31 December 2020 to the Digital Ruble Working Group at: cbdc@cbr.ru.

If you believe that there are any essential questions not included in the list provided in the consultation paper, please send them as well to the above email.

It is mandatory that reference be made to the Bank of Russia if you intend to use this consultation paper.

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INTRODUCTION

Money plays an essential role in the economic life of society. As the economy evolves and technologies advance, the forms of money also change. In recent years, both Russia and the world have been experiencing fundamental shifts in the area of money circulation. Today, alongside cash, Russians increasingly opt for non-cash funds to purchase goods and services and make other payments and money transfers. The use of bank cards and mobile devices in money transactions has already become commonplace. Moreover, economic agents increasingly demand improvements in the speed, convenience and safety of these transactions and a reduction in fees, which is only possible through the implementation of cutting-edge technologies. Concurrently, banks, businesses, and government authorities are actively expanding the implementation of digital financial technologies. This makes it critical to evaluate the rationale for Russia to introduce a central bank digital currency as an additional form of money capable of addressing the current demands of the financial system.

The Bank of Russia intends to enhance the money circulation so that it meets the changing needs of individuals and businesses and promotes the deployment of innovations in both the financial market and the economy in general. Therefore, the Bank of Russia is exploring the possibilities and prospects of the introduction of a digital ruble – the digital form of the Russian national currency.

No decision has been made yet to introduce a digital ruble, and it is premature to specify a definitive timeline for its launch. However, we believe that this topic requires an extensive and deep study already now, in terms of both economic and technological implications. The Bank of Russia will carry out this work closely communicating with the public, experts, and financial market participants. The publication of this consultation paper is just the first step in this direction and is intended to initiate a comprehensive and broad discussion of this subject. It is vital for us to be prepared for the timely launch of a digital ruble if such a launch becomes necessary for the Russian economy.

What is the concept of a digital ruble? What are its role and place in today's monetary system? How can it help individuals, businesses, and society in general? What aspects are to be taken into consideration in the course of its implementation?

A digital ruble will remain the Russian ruble which will be issued by the Bank of Russia in digital form in addition to the existing forms of money. Individuals will be able to transfer digital rubles to their electronic wallets and use them through their mobile and other devices both online and offline (that is without access to the Internet and mobile communication). A digital ruble will be an additional form of money and will be used alongside individuals' and businesses' cash rubles and funds in their commercial bank accounts. Depending on their needs, individuals and companies will be able to exchange their money from one form to another, i.e. from the digital form to cash or non-cash funds in their bank accounts, and back. This requires special-purpose technologies that would enable the offline usage of a digital ruble. A digital ruble will combine the advantages of both cash and non-cash money.

The unified monetary system embracing the three forms of the Russian ruble, specifically the cash, non-cash and digital forms, will fully meet the current needs of the economy and create new opportunities for a faster implementation of innovations in the financial and real sectors.

It is essential to design a digital ruble so as to make payments secure, protected, fast, convenient, and accessible for any individual anywhere across Russia. Cutting-edge technologies applied to develop a digital ruble will help reduce payment costs and increase financial inclusion, as well as create new opportunities to improve financial services and instruments meeting the needs of the new digital economy. The launch of a digital ruble will provide an additional opportunity

for individuals and companies to make convenient and fast digital payments and will boost the evolution of payment technologies. The Bank of Russia will factor in all these considerations when designing possible solutions for the digital ruble project, including its functionality and technologies used. Furthermore, the Bank of Russia will take into account potential effects of the introduction of a digital ruble in its price stability and financial stability policy and the strategy for information security in the financial sector.

The Bank of Russia will develop a digital ruble step-by-step. The Bank of Russia will explore the possibilities and prospects of the launch of a digital ruble and elaborate the concept of a digital ruble incorporating the feedback from public consultations, after which it will first pilot a digital ruble engaging a limited number of users and develop a digital ruble platform. Only after this, the Bank of Russia will consider whether the launch of a digital ruble is appropriate and map out subsequent steps of its introduction. The timeline of these stages will be determined later on, with due regard to the outcome of public consultations.

The introduction of a digital ruble will be a major event for the economy and society in general. Thus, the Bank of Russia considers it essential to discuss the key aspects, benefits, potential risks, milestones and time periods of the implementation of the digital ruble project with financial market participants, experts, and the general public. This consultation paper addresses this task. It highlights the key economic and technological aspects of the launch of a digital ruble and proposes topics for discussion.

The key topics to be discussed are outlined in the sections below and at the end of this consultation paper. The Bank of Russia will appreciate your feedback and welcomes your comments through 31 December 2020.

1. THE ROLE OF A DIGITAL RUBLE IN MONEY CIRCULATION

- *A digital ruble will represent a digital form of the national currency and will have all the necessary properties to perform the functions of money. It will be issued by the Bank of Russia. A digital ruble will be an additional form of money and will circulate along with cash and non-cash rubles. At the same time, the Russian payments area will remain seamless, and all forms of ruble will be easily convertible into one another.*
- *The introduction of a digital ruble will require creating additional payment infrastructure, which will foster the further development of the Russian payment system and increase its stability.*
- *When developing the digital ruble project, the Bank of Russia will thoroughly assess the specifics of various models and technologies from the point of view of their capability to provide all the necessary features of a digital ruble for households and businesses, as well as from the information security standpoint.*
- *The Bank of Russia will also assess the potential effects introducing a digital ruble will have on its price and financial stability policy.*
- *After the public consultations based on this report, the Bank of Russia will consider its next steps in the implementation of the digital ruble project.*

1.1. A DIGITAL RUBLE AS A FORM OF MONEY

Specific features of a digital ruble

In the Russian economy today, the money used by businesses and households exists in two forms: cash rubles issued by the Bank of Russia and non-cash rubles that are funds in accounts with the Bank of Russia and commercial banks. In turn, commercial banks have accounts with the Bank of Russia (correspondent accounts) used to make settlements between banks and between banks and the Bank of Russia.[1]

A digital ruble will be an additional form of the Russian national currency. It will be issued by the central bank (the Bank of Russia) in digital form. In other words, a digital ruble will be the Russian central bank digital currency (CBDC). While cash money is issued in the form of banknotes with unique identifiers and non-cash money exists as records in accounts with commercial banks, digital rubles will be represented as unique digital codes stored in special-purpose electronic wallets. In order to transfer digital rubles between users, the digital code will be transferred between their electronic wallets.

On the one hand, a digital ruble resembles banknotes as it has a unique numerical identifier (the same as a banknote has its series and number) and is issued by the central bank. For this reason, a central bank digital currency is often referred to as 'digital cash'. To continue this similarity with cash, there must be a way to use digital rubles offline (that is without access to the Internet and mobile communication). This requires the development of special infrastructure.

On the other hand, due to its digital form a digital ruble has properties of non-cash money that do not rely on a physical medium and make it possible to develop online payments. Therefore, if it is implemented, a digital ruble will have the combined properties and benefits of cash and non-cash money.

All economic agents, including individuals, businesses, financial market participants and the state, will be able to make payments using digital rubles. They will be stored in individual electronic wallets

[1] *The Federal Treasury and certain other economic agents also have accounts with the Bank of Russia due to the specific nature of their activity.*

opened directly within the Bank of Russia payment system. These wallets will be the liabilities of the Bank of Russia.

A digital ruble will be used along with cash and non-cash money and perform all the functions of money: it will act as a medium of exchange, a unit of account, and a store of value.

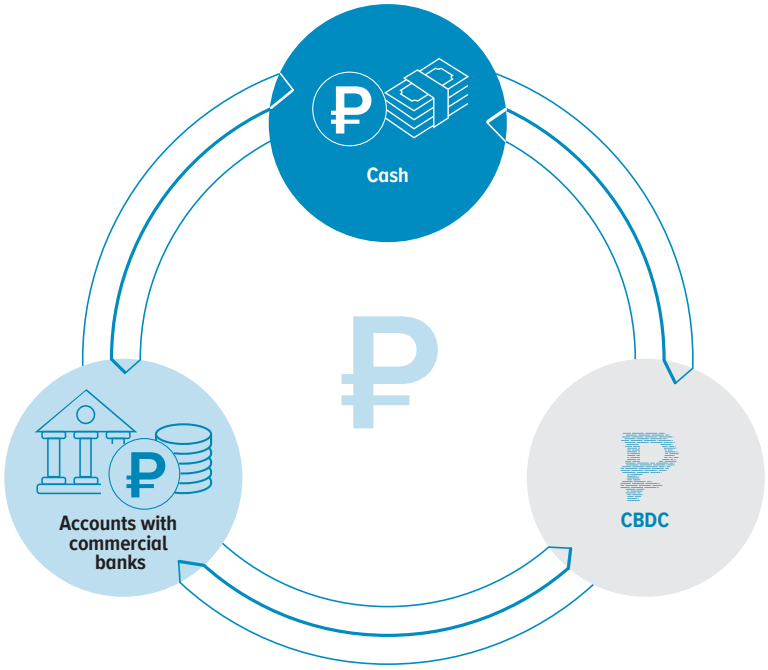
All the three forms of the Russian ruble will be totally equal: as one cash ruble equals one non-cash ruble, one digital ruble will always equal each one of them. Moreover, it will always be possible to convert rubles from one form to another.

Payment infrastructure for a digital ruble

Introducing a central bank digital currency requires creating an additional reliable and convenient infrastructure for online and offline payments made by households and businesses. In such scenarios when it is necessary to ensure straight-through processing of financial transactions with digital rubles in the domestic financial market as well as in cross-border operations, the CBDC platform can be integrated with other Russian or foreign platforms.

The payment infrastructure for a digital ruble will complement the existing payment infrastructure. The digital ruble platform will be integrated into the existing infrastructure and will be scalable.

FORMS OF MONEY AND THEIR INTERACTION* *Chart 1.1*



** For details on money creation in modern monetary systems and interaction of various forms of money refer to McLeay et al. 2014, Jakab and Kumhof 2015, Jordan 2018, Grishchenko 2017, Grishchenko 2019.*

DIGITAL RUBLE FEATURES *Table 1.1*

		Money		
		Digital	**Cash**	**Bank accounts**
Form		Digital code	Protected paper	A record in bank database
Personalisation (bearer/personalised)		Personalised or bearer	Bearer	Personalised
Issuer		Central bank	Central bank	Commercial bank
Availability for payments (system operating schedule, readiness of vendors for its acceptance		✓	✓	✓
Medium of exchange	**online**	✓	—	✓ Payments are not possible if there is no Internet or mobile network connection
	offline	✓	✓ Remote payments are not possible	—
Stable value		✓	✓	✓
Unit of account		✓	✓	✓
Store of value		No interest is accrued	No interest is accrued. Permanent loss is possible	Interest can be accrued

Therefore, the introduction of a digital ruble in addition to cash and non-cash funds in bank accounts will expand digital payment options available to households.

The payment infrastructure for a digital ruble must prompt further development of payment technologies in the private sector and provide for the implementation of further innovations as digital technologies evolve. The popularisation of digital payments will decrease transactional costs

for consumers, promote competition among credit institutions and their fight for clients through offering more convenient services for households and businesses. It will also serve as a stimulus for companies to develop and implement innovative products and technologies.

For cross-border payments, the digital ruble platform can be integrated with CBDC platforms of other countries and international organisations, which will speed up and reduce the cost of payments for consumers.

Box 1
The forms of money that currently exist

These days, the functions of money such as being a medium of exchange, a unit of account, and a store of value can be performed by cash and non-cash funds issued by a central bank as well as funds in accounts with commercial banks.

Cash (banknotes and coins) is bearer money on a protected medium issued by a central bank. It circulates through the exchange of the medium from one person to another. Its protection is its owner's responsibility, and forging it is prohibited by law.

Non-cash central bank money is funds in commercial banks' accounts with a central bank **(bank reserves[1])**.

An account with a commercial bank is a record in its owner's personal account with a commercial bank. The bank where such accounts are opened is responsible for their maintenance and operations with the records in such accounts.

Currently, only cash in circulation and funds in accounts with commercial banks are formally considered money in terms of statistics (they are included in monetary aggregates).[2] The reason is that they can be directly accessed by households, businesses and non-bank financial intermediaries whereas only banks can access bank reserves at a central bank. Cash in circulation and bank reserves are 'money issued by a central bank', or monetary base.[3] Funds in accounts with banks are simultaneously assets (of banks' clients) and liabilities (of banks themselves).

Only a central bank is entitled to issue cash and create bank reserves. Deposits for households, businesses and non-bank financial intermediaries can be created by commercial banks (they do it mainly as part of lending or purchasing assets).

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[1] *It is important to distinguish between bank reserve assets (today, these are banks' funds in accounts with a central bank), which are a form of money, and loan loss provisions (liabilities), which are a deduction from profit, a reflection of the risk of potential losses and are not money in any way. This consultation paper covers exclusively the former (bank reserve assets). In Russia, they include funds in banks' correspondent accounts with the Bank of Russia.*

[2] *'Broad money' in the terminology of the IMF Monetary and Financial Statistics Manual (IMF 2000, IMF 2008).*

[3] *'In the terminology of the IMF Monetary and Financial Statistics Manual (IMF 2000, IMF 2008).*

Box 2
Evolution of the role and forms of money

Over the course of history, three types of money have existed: **commodity money** (its value was determined by the physical properties of the medium of exchange), **credit money** (it was backed by the assets of the bank that created the credit), and **fiat money** (its value was set by the public authorities). In each case, it was trust – whether in the physical properties of the material or the issuer – that acted as a guarantor that the functions of the money would be performed.

The emergence of market relations prompted the need for money as a universal measure of value of other goods and services that could be used to pay for them, to repay debts, and to store wealth. In antiquity and in the Middle Ages, **commodity money** dominated. At that time, economies hardly grew (per capita). Therefore, in order to have an optimal monetary system, a state had to choose a relatively rare metal to be used as money and not to issue it excessively. In the Modern Era, as economic growth was accelerating, the following side effects of metal standards became apparent: a lack of the 'money metal', the impossibility for the central bank to perform its functions as lender of last resort, and increasing cyclical fluctuations.

Around the 17th century, the predecessors of contemporary banks started lending by issuing their own banknotes, **credit money**. When issuing a loan, banks gave such banknotes (often, bearer notes) to their clients. The access to private credit expanded the investment potential of economies. However, the lending banks gained political weight, which the governments of that time did not approve of.

Around that time, governments issued treasury notes that were legal tender across the country. These were the predecessors of **fiat money**. In the 19th and early 20th centuries, states tried to take control over the banks' emission. In the end, banks were prohibited from freely issuing banknotes but their money was officially recognised as legal tender, the same as treasury notes. From that moment on, differences between credit money and fiat money became negligible. In several countries (Sweden, England, Scotland, and others), there were banks that were granted a monopoly right to issue banknotes that could be used to pay taxes. These became the first central banks. The money they issued was, in fact, both credit and fiat.

In the 20th century, the system where money could be exchanged for gold was abolished. In other words, commodity (and commodity-backed) money ceased to exist. Since early 1970s, we have been living in a world of fiat money whose main source is bank credit. Today, all money is fiat in the sense that the state not only issues it itself but also maintains trust both in banks that create it and in monetary policy in general.

It should be noted that technical progress has also been one of the drivers behind the evolution of money forms. Primitive commodity money (grain, cattle, shells, skins, etc. depending on location) gave way to metal money when the technologies to process precious metals were invented. The discovery of paper and book printing prompted the popularisation of credit instruments and paper money. With the advance of computers, most money today exists in the form of electronic records.

With the development of the financial market, the role of money as a store of value has been declining in favour of other financial instruments which not only allow the nominal value to be maintained but also increased with interest. These instruments primarily include state-insured time deposits in credit institutions.

Box 3
Why are cryptocurrencies not money?

From time to time, the focus of researchers and the general public is drawn to such phenomena as cryptocurrencies and stablecoins. Both are not money because they can't fully perform all the functions of money, and there is no trusted guarantor to ensure the legitimacy and reliability of their issuance and use. In particular, these assets are not a medium of exchange as they can't be used as payment for goods and services everywhere; they can't be used as a unit of account and a store of value due to the volatility of their price in official currency units. Their price – the rate of exchange for money – is subject to significant fluctuations.[1] The use of these assets is fraught with high risks of tangible financial losses for households. They are also often used for money laundering, the financing of terrorism and the proliferation of weapons of mass destruction, therefore they are illegal in Russia.

Central bank digital currencies are based on digital technologies. However, in contrast to cryptocurrencies and stablecoins, a CBDC is an equivalent of the national currency and its stable operation in the interests of households and businesses is ensured by the state represented by the central bank and their trust in the existing national currency.

[1] *Although stablecoins have inherent mechanisms to decrease volatility, they are not always effective because it is necessary either to maintain reserves of collateral (which is fraught with significant costs) or to increase/decrease the issuance of stablecoins themselves (for these operations to take effect, this stablecoin should remain interesting for investors).*

1.2. THE BANK OF RUSSIA'S APPROACH TO DEVELOPING A DIGITAL RUBLE

When developing the digital ruble project, the Bank of Russia will take into account a number of aspects that are discussed in detail in this consultation paper.

Firstly, it is crucial to formulate the **user properties** that a digital ruble must possess to satisfy public demand with due regard to differences in the activity of various economic agents. At the same time, when offering customers the full range of potential applications of a digital ruble, it is important to ensure that user rights are protected. These issues are reviewed in detail in Section 2.

Secondly, when designing a digital ruble, it is necessary to take into account its impact on the financial system and the effectiveness of the Bank of Russia's policy aimed at **maintaining price and financial stability in the interest of society**. A digital ruble will be introduced gradually, with a pilot period, in order to give the financial system enough time to adapt. The digital ruble design process will definitely involve an analysis of potential effects on the conditions for the Bank of Russia implementing monetary and financial stability policies as well as an assessment of whether the currently available tools are sufficient to perform all the functions. This issue is reviewed in Section 3 of this consultation paper.

Thirdly, it is necessary to analyse the **models and mechanisms** that can be used to design a circulation system for a digital ruble. The selected model for a digital ruble will be an important factor in determining its functional capabilities. These issues are discussed in Section 4.

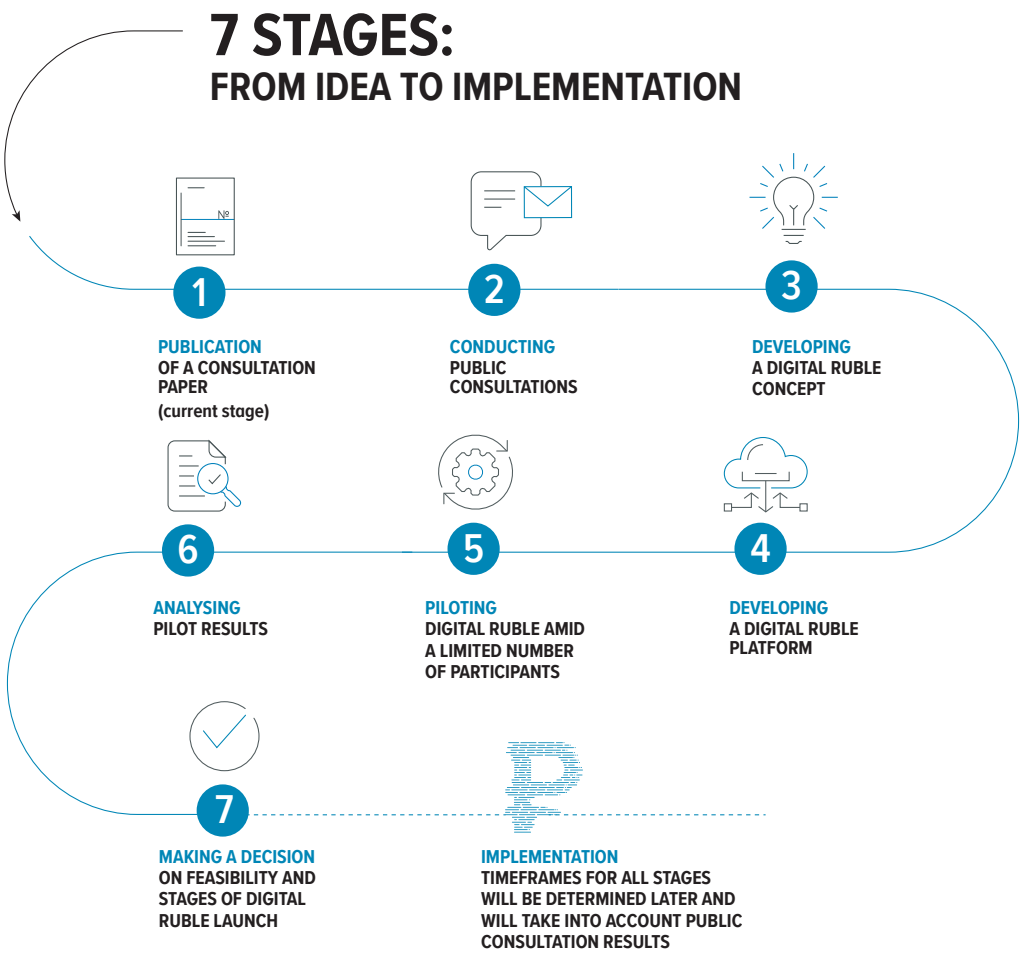
Fourthly, it is important to review all aspects related to **ensuring information security** of the digital ruble circulation system. This is covered in Section 5.

And finally, it is necessary to consider certain **legal and regulatory changes** that will create the legal basis required to release a digital ruble into circulation. These issues are covered in Section 6.

This consultation paper is aimed at establishing an agenda for an extensive discussion of opportunities and consequences of the introduction of a digital ruble with the general public and the expert community. The Bank of Russia will take into account the results of this discussion for its further development of the digital ruble project. This project will be implemented in the stages

specified in Chart 1.2. Along with the assessment of the prospects and capabilities of a digital ruble and its technological design, much attention will be paid to the pilot of the digital ruble platform. This pilot will be conducted with a small number of participants after holding public consultations, designing the digital ruble concept and developing the corresponding platform. The participants and the time frames for the pilot will be determined at the stage of designing the digital ruble platform.

Chart 1.2



Topics for discussion:

1. Is it necessary to introduce a digital ruble now and why?

2. Which factors can increase the need for a digital ruble in the next few years?

3. What other aspects should be considered when developing the digital ruble project in addition to those specified in subsection 1.2?

2. APPLICABILITY OF A DIGITAL RUBLE

- *A digital ruble combines the benefits of cash and non-cash money and will be able to be widely used by the general public, businesses and the state for payment purposes. A digital ruble will ensure the simplicity, high speed, low cost, high reliability and security of both online and offline payments. The introduction of a digital ruble will improve the accessibility of payment services and digital financial instruments.*
- *A digital ruble will boost the development of the new digital economy by creating the necessary conditions for financial and digital innovations in both the real and the financial sectors. This will enhance competition, increase productivity and improve the effectiveness of economic activity in general.*
- *When implementing a digital ruble as a new form of money and in the process of promoting its wide circulation, it is necessary to tackle the issues related to informing consumers and the specifics of organising the AML/CFT/CFPWMD framework.*[1]

2.1. PRE-REQUISITES, CONSUMER QUALITIES AND CONDITIONS OF USE OF A DIGITAL RUBLE

Over the last few years, Russians have increasingly used cashless payments and remote channels to access financial services.

According to the surveys of the adult population conducted as part of assessing financial inclusion in 2017-2019, the share of adults for whom remote access to their bank accounts to make payments had become a common practice rose from 32% to 55%. In 2020, the next part of the survey was postponed due to the coronavirus pandemic; however, it would be reasonable to assume that in the current situation the share of such transfers increased. In 2016-2020, the share of cashless payments for goods and services in the retail trade, catering and paid retail services increased even more significantly, from 39% to 70%.[2] Therefore, Russians are already actively using both remote service channels and cashless payments.

Moreover, Russia is one of the countries with the highest level of mobile penetration. All of the above is shaping the trend for further digitalisation of the financial market and retail trade. The use of new digital financial instruments, such as smart contracts,[3] in the financial market makes it pertinent to provide convenient payment services based on new solutions that can be implemented on the digital ruble platform.

A digital ruble is capable of becoming a wide-spread payment instrument and being used along with cash and funds in accounts with commercial banks. For that, it must have all the properties necessary to enable fast and convenient payments for businesses and individuals, that is it must combine the benefits of both cash and cashless payments via online banking, bank cards, and instant payment services.

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[1] *AML/CFT/CFPWMD – countering the legalisation (laundering) of criminally obtained incomes, financing terrorism and proliferation of weapons of mass destruction.*

[2] *39% in 2016; 70% in 2020 H1. The Bank of Russia calculations based on reporting and Rosstat data.*

[3] *A smart contract is a digital contract that provides for automatic execution, monitoring, and accounting of legally significant acts and events in IT systems.*

In particular, a digital ruble must possess the following qualities:

- **simplicity of use**, support for typical payment scenarios, such as transfers to another person by his or her mobile phone number;
- **high speed** of operations – digital ruble payments at points of sale (POS) must not take more time than those with payment cards or instant payment services;
- **reliability** – successful execution of all operations with a near-zero probability of malfunctioning;
- the costs to the payer when conducting operations with digital rubles must not exceed those when using payment cards and other retail payment instruments;
- it must be **universally accepted**, the same as cash;
- it must be **safe to keep funds in electronic wallets** – consumers must be ensured of a low risk of losing their funds due to hacking or fraud, the same as with payment cards where holders' rights are legally protected in Russia and many other countries;
- **convenience and simplicity of conversion** of digital rubles into cash and funds in bank accounts. At the same time, the same kind of conditions (restrictions) for the conversion of funds from bank accounts into digital rubles may be imposed as those that exist currently for cash (such as notifying the bank in advance before withdrawing a large amount in cash or limiting the amount that can be withdrawn without such a notification during a single day). It is also necessary to ensure the seamless transfer of digital rubles from online to offline electronic wallets and back. The attractiveness of using a digital ruble can be enhanced by payment system services for transfers where the payer sends digital rubles and the payee receives non-cash rubles to their account with a credit institution.

As a high-tech payment instrument, a digital ruble may also offer new possibilities, such as:

- **confidentiality of consumer information**. Information on digital ruble transactions will contain less data about the payment purpose and the payee than the existing payment systems, limiting the risks of misusing consumers' personal information, for example, by retail outlets to promote goods and services, and the risks of disclosing confidential information, for example, as a result of the POS being hacked. At the same time, transaction data will be available to the central bank and financial intermediaries responsible for AML/CFT/CFPWMD in the public interest;
- **seamless integration with digital platforms**. Free conversion of digital rubles into non-cash funds and back (accounting for the established limitations) makes it possible to arrange payments under transactions with digital financial assets and ensure their seamless integration with the system of cashless payments and transfers. This will facilitate the development and implementation of innovative products and technologies by enterprises in both the financial and the real sectors, and meet the demand for high-tech settlements in the circulation of digital rights and financial assets as well as in the implementation of smart contracts;
- **24/7 access on unified terms**. In contrast to payment cards and other cashless payment instruments offered by commercial organisations on their own terms, a digital ruble as a public good will be offered by the state (the central bank) on unified terms and will be available 24/7 across the country both in the app of the bank (financial intermediary) that provides the user with the access to an electronic wallet and in other apps connected to the digital ruble platform;
- **possibility of offline use**. A digital ruble needs to be available offline with users being able to perform basic transactions, such as transferring funds to another user or paying for goods at a retail store without access to the Internet. Special technologies need to be developed to enable the offline use of a digital ruble. For more detailed information about the offline mode refer to Box 4.

A digital ruble that possesses all the above-mentioned properties will satisfy the payment needs of households and businesses and provide new, digital technology-based opportunities for payments, thereby promoting the development of the modern digital economy.

Box 4
Offline use of a digital ruble

Offline mode provides an opportunity to make payments in a CBDC without access to the Internet, including in remote and hard-to-reach regions of the country.

Offline payments are similar to cash payments as they do not require the involvement of intermediaries and are final. In order to make such payments, the user needs to transfer a CBDC from his online wallet to a device such as a mobile phone or another device that supports offline CBDC payments.

If it is necessary to withdraw a CBDC from the device on which it is stored, the user must connect it to the Internet and transfer a CBDC to his online wallet.

For users to be able to transfer funds to each other in offline mode, they need to activate the possibility of making offline transfers and crediting a CBDC using wireless technologies on their devices.

The provision of offline payments in a CBDC may be an advantage for users in comparison with the existing payment systems as they do not require users to be connected to the Internet. It is also necessary to assess the demand for offline payments in the medium and long term, taking into account the Internet coverage across the entire territory of the country and its availability to every Russian citizen, as well as the high share of users of cashless payment technologies.

At the same time, offline settlements are considered as an additional option to the main online CBDC payment system.

The ability to perform offline payments will require serious research and development of technologies and solutions to enable such payments to be performed without access to the Internet, to ensure the ability to restore a CBDC if the device on which it is stored is lost, and to ensure a high level of information security when performing such payments. Moreover, it is necessary to consider AML/CFT issues related to offline CBDC transactions.

If the possibility of offline digital ruble payments for legal entities and transfers between users is implemented, specific measures should be considered to ensure the protection of digital rubles and users' interests. These measures might include:

- the introduction of a limit on the amount of a single transaction, as well as on the total amount of transactions within a specified period;
- the introduction of a limit on the number of transactions / operations that can be performed within a specified period;
- the introduction of a limit on the amount of funds to be transferred between an online wallet and an offline device;
- the introduction of a requirement to provide for the possibility of transferring a CBDC to a device that allows offline payments to only be made to users that have online wallets.

2.2. A DIGITAL RUBLE FOR HOUSEHOLDS

Digital ruble transactions for households might be similar to using electronic wallets or payment apps (pay services) and might be performed via a special app or the existing remote banking channels (online or mobile banks). Moreover, as it has been already mentioned, it must be possible to use a digital ruble offline, which will allow payments to be made irrespective of being connected to the Internet or a mobile network.

Households will be able to:

- promptly credit funds to their digital ruble accounts (with the funds from a bank account or a card, salary, pension, etc.);
- transfer digital rubles to other individuals;
- make payments in digital rubles to enterprises and the state, pay for transactions in financial instruments and digital financial assets, including with the use of smart contracts;
- easily convert digital rubles into cash and non-cash funds in bank accounts and back;
- use their wallets with digital rubles via various financial intermediaries without tying it to a single financial intermediary where it was opened (subject to adequate user identification).

Complementing the existing forms of money, a digital ruble will offer households new channels to receive financial services and increase financial inclusion through lifting financial and temporal limitations on payments. When used offline, a digital ruble may become a new convenient means of payment for both buyers and sellers in remote, scarcely populated and hard-to-reach territories, which will positively influence the overall level of financial inclusion.

Due to the fact that a digital ruble is a new phenomenon in the payment industry, it will take time for users to familiarise themselves with it. At the same time, using a digital ruble must be simple enough for the general public. Owing to the competition among financial intermediaries providing access to electronic wallets, it will be possible to create user-friendly wallet interfaces for consumers using modern technologies, such as voice recognition or biometric identification.

The interfaces for digital ruble devices and apps must support simple and user-friendly complaint procedures. It is necessary to establish a transparent complaint review procedure with fixed time frames to analyse complaints and send responses in a convenient form.

2.3. A DIGITAL RUBLE FOR BUSINESSES

For customers to be able to pay for goods, works and services using digital rubles, the same as with payment cards or instant payment services, enterprises need to offer them such an opportunity.

Customer operations in digital rubles might be processed using the existing bank and POS infrastructure. For instance, digital rubles might be used to make contactless payments which are supported by over 90% of POS terminals and nearly 50% of all ATMs in Russia. Transfers in digital rubles might also be made using QR codes or biometric identification which are currently used for payment cards, electronic money and instant payments.

Businesses will be able to use a digital ruble in addition to the existing system of cashless payments with the state, counterparties, financial institutions, and employees. At the same time, the introduction of a digital ruble will enable companies to automate control and settlements under contracts and financial market transactions with the help of smart contracts, which are special applications that contain settlement instructions in the form of digital code automatically executed in the digital system of financial operations. The digitalisation of agreements in the form of smart contracts allows for the objective and impartial execution of their terms and conditions, while the introduction of a digital ruble may contribute to establishing a secure environment for the functioning of smart contracts and settlements without the use of surrogates.

2.4. A DIGITAL RUBLE FOR GOVERNMENT PAYMENTS

In addition to the existing cashless payments, the state will be able to use a digital ruble to process settlements, accept payments, and make transfers to households and businesses. This will expand the possibilities for automating and increasing the efficiency of payments and settlements with the help of smart contracts which can be used for public procurement. Due to the fact that the Federal Treasury keeps its accounts with the Bank of Russia, it will not be bound by any restrictions to convert non-cash rubles into digital ones, therefore it will possible to use digital rubles to make salary, benefit and other social payments along with cash and non-cash money. This might be especially important when an individual does not have access to a bank account for some reason. At the same time, the Bank of Russia assumes that people must be able to select the preferable form of money to receive such payments themselves.

In addition, a digital ruble expands the possibilities for the government to control the targeted expenditure of funds, including those received by economic agents to execute government contracts. This mechanism will function as follows.

In simplified form, a digital ruble may be represented as traditional banknotes and coins that are issued and transferred electronically. Every banknote and coin will remain unique, and the digital ruble system will be able to trace their movements.

In order to control their intended use, digital ruble funds might be marked with a special tag indicating the permitted purposes of their expenditure. A digital ruble will make it possible for the government to automatically trace the movement of money extended under government contracts or as part of other budgetary payments and prohibit their unintended expenditure. For instance, it will not be possible to spend digital ruble funds extended by the state for social payments to buy office equipment. These restrictions may be managed either as part of the payment system or through smart contracts.

2.5. A DIGITAL RUBLE FOR CAPITAL MARKETS AND FINANCIAL INNOVATIONS

In capital markets, a digital ruble might be used to make payments for classic financial assets, e.g. securities. It may also facilitate the use of high-tech financial solutions based on the distributed ledger technology, among other things, and promote competition.

A digital ruble may positively influence brokerage services for individuals with regard to settling transactions with securities and derivatives. It will be possible to use a digital ruble to ensure on a new technological level the segregation of client funds and the transferring of client positions from one broker to another in case of various risk events.

The use of a digital ruble with smart contracts may positively influence such instruments as escrow, letters of credit, and collateral accounts. The use of smart contracts will also help reduce operational errors and the role of human error in the execution of transactions.

We can assume that the technological nature of a digital ruble might lay the foundation for new digital products as part of the innovative financial market infrastructure, such as financial platforms (marketplaces), investment (crowdfunding) platforms, and information systems used to issue digital financial assets.

In the future, as businesses and households continue to gain direct access to trading in financial instruments, it will be possible to consider the potential and feasibility of creating a platform to conduct DVP (delivery versus payment) transactions with digital financial assets in digital rubles.

The digital ruble technological platform may potentially become a centre for connecting financial intermediaries providing end users with access to electronic wallets that hold digital rubles and related additional services that the platform itself does not provide. The unified digital ruble technological platform, neutral with respect to the source of sending and receiving funds, may also allow financial intermediaries to concentrate their efforts on improving customer services, including the user interface of their software, as it will eliminate the need for a separate settlement infrastructure.

A digital ruble will promote competition in the financial market, strengthening the effects for which, among other things, the regulatory environment for financial marketplaces was created. Expanding the list of payment instruments available to consumers that allow them to move their funds between financial institutions as quickly and easily as possible will help reduce barriers to switching, increase competition for clients, and make it more dynamic and innovative. Thus, a digital ruble may become an important addition to the system of remote retail distribution of financial products provided by the financial marketplace. All these trends will strengthen incentives for banks to offer more attractive conditions for their customers, including maintaining current accounts, processing settlement and cash operations, improving the quality and speed of services provided, and reducing their cost.

It is also important that the infrastructure allows digital ruble transactions initiated by the payee or third parties with the consent of the owner, which will, inter alia, support the existing technology of automatic payments for utility and other regular services provided to households.

2.6. CERTAIN AML/CFT/CFPWMD ISSUES

The use of a digital ruble will increase settlement transparency and help reduce AML/CFT/CFPWMD risks as well as the costs of the financial industry in counteracting illegal actions. One of the advantages of the introduction of a digital ruble is the possibility of conducting analysis based on large amounts of data on economic entities and their payments.

The distribution of AML/CFT/CFPWMD control functions between the central bank and financial intermediaries in the context of the introduction of a digital ruble remains an open question. This will depend, among other things, on the nature of the access financial intermediaries have to data on digital ruble transactions.

At this point, it is more realistic to implement a model where financial institutions responsible for the execution of the national AML/CFT/CFPWMD legislation are endowed with relevant powers and their current functionality related to AML/CFT/CFPWMD is extended, inter alia, to digital ruble operations. As part of these measures, financial institutions will need to modernise their existing resources which are currently used to analyse customer activity.

2.7. PROTECTION OF DIGITAL RUBLE OWNERS

The use of a digital ruble implies the ability to use payment applications on mobile devices, use of ATMs and other automatic payment devices, and the ability to use digital ruble media offline. Therefore, if a digital ruble is introduced as a publicly available payment instrument, a targeted **training** programme should be carried out aimed at improving general digital and financial literacy and developing the skills required to perform digital ruble transactions. It would be advisable to include training in the use of digital payment instruments in the existing educational system. Special attention must be paid to certain categories of people with potentially low digital and financial literacy, as well as those who are not covered by the education system.

Mobile applications supporting digital ruble transactions should provide users with simple and clear **information** on the balance and operations in digital rubles. At the user's request, detailed information on transactions must be provided, for example, in the form of an account statement sent by email or other communication channel. It is also important to provide convenient and reliable mechanisms for remote receipt and control of documents confirming a digital ruble payment, which includes documents to be transferred and used by payees or authorised organisations, for example, as proof of payment of a fee or state duty. When developing interfaces and devices for digital ruble payments, it is necessary to take into account the needs of people with disabilities. In particular, it is important to provide for different channels of information exchange and ways to control account balances and to conduct transactions for people with sensory impairments (sight, hearing), to ensure that visually impaired and blind people use familiar adaptive access programmes, and to develop simplified interfaces and modes for people with mental disabilities. There is the potential of using a voice-user interface.

If a digital ruble is used to pay for goods, works or services, reliable **protection of consumer rights** must be ensured, including:

- specifying information on payment in digital rubles in documents confirming the purchase of / payment for goods, work or services;
- establishing a procedure (specifics) for returning money to consumers when they cancel transactions or return goods previously paid for using digital rubles;

- providing for the ability to easily apply to or file a complaint with the supervisory and monitoring authorities via a user-friendly and convenient interface, including one adapted for people with disabilities.

As with other forms of money, consumers must be provided with a simple and accessible **dispute resolution policy to handle situations**, such as:

- losing access to devices or payment applications to manage funds in digital rubles (how to restore access and confirm one's rights to their own funds);
- disagreement with operations (transactions) performed;
- disagreement among participants in digital ruble settlements.

The system of digital ruble settlements must provide for a multilevel **framework for protection against unauthorised (fraudulent) transactions**, including mechanisms for the automatic detection of such transactions for the purpose of their additional investigation, confirmation or suspension, as well as the possibility of setting limits on operations in digital rubles, including those set by consumers themselves. When implementing the offline digital ruble mode, special attention should be paid to confirming the paying capacity of digital rubles offered as payment in this mode.

In addition, the format of the system for processing individuals' inquiries on all issues related to the use of a digital ruble, including unauthorised transactions, must be considered.

Topics for discussion:

1. Which key properties from among those listed in Section 2 should a digital ruble as a form of money have in order to be useful to society? What other properties are important?

2. In your opinion, will the introduction of a digital ruble provide significant advantages over existing payment and settlement forms?

3. Do you consider it a prerequisite for the successful implementation of a digital ruble that all trade and service companies accept it?

4. How important is the ability to use a digital ruble in offline mode? What is the optimal limit on the amount of digital rubles to be used in offline mode? Should there be a limit on the maximum time for a digital ruble wallet to remain offline without synchronising it with the online digital ruble infrastructure?

5. Are offline payments in digital rubles necessary in the event that the entire country is covered by the Internet and every person has access to it?

6. Should it be possible to restore digital rubles stored on users' devices intended for offline payments if they are lost?

7. At the first stage of the launch of a digital ruble, would it be advisable to provide for offline payments?

8. Is it necessary to provide for offline payments in digital rubles between legal entities?

9. Which specific consumer protection measures do you consider necessary to implement if a digital ruble is introduced? What means of controlling digital ruble transactions should be entrusted to consumers?

10. What impact do you think the introduction of a digital ruble will have on competition in the financial market and on the business models of banks and other financial intermediaries?

11. Who do you think should perform the AML/CFT/CFPWMD functions with respect to the circulation of a digital ruble: the central bank or financial intermediaries?

3. THE IMPORTANCE OF A DIGITAL RUBLE FOR THE CENTRAL BANK'S POLICY TO MAINTAIN PRICE AND FINANCIAL STABILITY

- *Since the introduction of a digital ruble will have an impact on money circulation and the financial sector, the Bank of Russia will take this into account when pursuing its monetary and financial stability policies.*
- *The advent of a digital ruble will result in the redistribution of funds of households and businesses between cash, bank accounts, and electronic wallets in digital rubles. This will influence banks' needs with regard to transactions with the central bank, which will have to be taken into account when tuning the operational procedure of monetary policy and in order to ensure financial stability.*
- *Over time, the introduction of a digital ruble may help improve the monetary policy transmission mechanism, given that the spread of a digital ruble may increase financial accessibility and financial inclusion for a wider range of users.*
- *The introduction of a digital ruble also increases the stability and reliability of the money circulation system, which is important both for achieving monetary policy objectives and for ensuring financial stability.*

3.1. A DIGITAL RUBLE AND MONETARY POLICY

Through its monetary policy, the Bank of Russia maintains the purchasing power of the ruble in all its forms, i.e. ensures price stability, or stable low inflation. Monetary policy influences the economy and inflation through the financial sector. Given that the possible introduction of a digital ruble will primarily influence money circulation and the financial sphere of the economy, it is important to assess the potential effects of the introduction of a central bank digital currency on monetary policy conditions.

With the introduction of a digital ruble, households will distribute their money based on their needs between cash, accounts with commercial banks, and electronic wallets in digital rubles in the same way as they currently distribute it between cash and bank accounts.

Banks will act as intermediaries in transferring funds between cash and digital rubles, and these transactions will not affect the size of their balances. The redistribution of funds between banks' deposits and the central bank digital currency will have an impact on banks' balance sheets and their need to use the operations they conduct with the central bank (see Box 5) and may also exert upward pressure on the formation of bank deposit and loan rates. This must also be taken into account when implementing monetary policy.

Achieving the operational objective of monetary policy

The Bank of Russia will take into account the effects of the introduction of a central bank digital currency to ensure the achievement of the operational objective of monetary policy, which is maintaining money market rates close to the key rate. This is important for the effective implementation of monetary policy as a whole.

The introduction of a digital ruble will influence the operational procedure of the central bank's monetary policy, i.e. the terms and procedure for conducting transactions with banks for monetary policy purposes. The redistribution of funds between digital rubles and bank accounts will be an additional factor in the formation of banking sector liquidity similar to cash circulation.[1] The central bank will need to forecast and account for the expected dynamics of this factor when determining the volume of liquidity management operations with the banking sector. Banks, in turn, will have

[1] *Credit institutions will receive the CBDC for further distribution among their customers by paying funds from their correspondent accounts.*

to take into account the potential redistribution of funds between digital rubles and customer accounts in their internal liquidity management practices at the level of credit institutions.

The redistribution of funds from bank accounts to a CBDC at the initial stage of its implementation will have an impact on banking sector liquidity, and a significant change in the structural balance of liquidity may occur. The Bank of Russia will take these changes into account when determining the parameters of its monetary policy operational procedure so that they do not interfere with the achievement of the Bank of Russia's operational objective of maintaining overnight money market rates close to the Bank of Russia's key rate.

Monetary policy transmission mechanism

A distinction should be made between the possible impact of the introduction of a digital ruble on the monetary policy transmission mechanism at the initial stage of the introduction of a CBDC, i.e. at the stage when the financial sector is adapting to it, and later, after the financial system has adjusted to the appearance of an additional form of money.

At the introduction stage of a digital ruble, when economic agents have just started using it and there will be a redistribution of funds between bank accounts and electronic wallets, it will take time for banks to update their approaches to liquidity management and asset and liability management. Banks may seek to influence the process of redistribution of funds by changing rates on customer accounts, which, in turn, may affect the formation of loan rates and lending dynamics. This may lead to changes in consumption and savings even if the central bank's key rate remains unchanged. The Bank of Russia will assess and account for such potential effects in its monetary policy.

Over a longer term horizon, as the banking system adapts to the new reality, the effects of the short-term adjustment will be exhausted and the spread of a CBDC may strengthen the transmission of monetary policy solutions through the financial sector to the economy. This will be facilitated by increasing the accessibility and coverage of financial services for households and businesses through the use of a digital ruble by a wide range of users. In addition, the introduction of a digital ruble may also limit the risks of economic agents redistributing funds into the digital currencies of other central banks, thus contributing to the attractiveness of the national currency.

The Bank of Russia will need to assess the impact of the introduction of a digital ruble on the monetary policy transmission mechanism, which includes on rates and volumes of deposits and loans, when preparing macroeconomic forecasts, on the basis of which key rate decisions are made.

Box 5
On the impact of the redistribution of funds from cash and bank accounts into central bank digital currency

The redistribution of funds from cash into a CBDC (Table 1) will influence the structure of funds in the balance sheets of the central bank and the CBDC user, but the size of their assets and liabilities will remain unchanged. At the same time, the balance sheet of a commercial bank will not change, given that the bank may have an operational role in transferring funds from cash to digital rubles. The tables below give an example of an individual performing such a transaction in the amount of 100 rubles.[1]

If the user replenishes his or her electronic wallet in a CBDC with funds from his or her account with a commercial bank (Table 2), the bank's assets and liabilities will decrease. The bank's liabilities will decline due to a reduction in the balance on the user's bank deposit and the bank's assets – due to a corresponding one-time reduction in its correspondent account with the central bank. Therefore, the size of the commercial bank's balance sheet will decrease. As in the first example, the user will have a redistribution of funds within assets and the central bank – within liabilities.

If necessary, the bank may replace the 'retired' part of deposits with the central bank's funds using its liquidity provision operations (Table 3). In this case, the share of the central bank's funds received as part of

[1] *For simplicity, the example assumes that a commercial bank deposits cash rubles received from an individual with the central bank.*

refinancing transactions will increase (in this example, by 100 rubles). As a result, the size of the commercial bank's balance sheet will return to the previous level, but the share of central bank funds in its liabilities will increase. The central bank's balance will increase by the same amount (100 rubles).

Table 1

Household balance sheet

Assets	Liabilities
Deposits	Other
CBDC +100 rubles	
Cash -100 rubles	
Balance of operations **0 rubles**	Balance of operations **0 rubles**

Commercial bank balance sheet

Assets	Liabilities
Loans	Deposits
Correspondent accounts	CB loans
Other	Capital
Balance of operations **0 rubles**	Balance of operations **0 rubles**

Central bank balance sheet

Assets	Liabilities
CB operations	Correspondent accounts
Other	CBDC +100 rubles
	Cash -100 rubles
Balance of operations **0 rubles**	Balance of operations **0 rubles**

Table 2

Household balance sheet

Assets	Liabilities
Deposits -100 rubles	Other
CBDC +100 rubles	
Cash	
Balance of operations **0 rubles**	Balance of operations **0 rubles**

Commercial bank balance sheet

Assets	Liabilities
Loans	Deposits -100 rubles
Correspondent accounts -100 rubles	CB loans
Other	Capital
Balance of operations **-100 rubles**	Balance of operations **-100 rubles**

Central bank balance sheet

Assets	Liabilities
CB operations ...	Correspondent accounts -100 rubles
Other ...	CBDC +100 rubles
	Cash
Balance of operations **0 rubles**	Balance of operations **0 rubles**

Table 3

Household balance sheet

Assets	Liabilities
Deposits -100 rubles ...	Other ... ...
CBDC +100 rubles ...	...
Cash	
Balance of operations **0 rubles**	Balance of operations **0 rubles**

Commercial bank balance sheet

Assets	Liabilities
Loans	Deposits -100 rubles ...
Correspondent accounts -100 rubles +100 rubles	CB loans ... +100 rubles
Other	Capital
Balance of operations **0 rubles**	Balance of operations **0 rubles**

Central bank balance sheet

Assets	Liabilities
CB operations ... +100 rubles	Correspondent accounts -100 rubles +100 rubles
Other	CBDC +100 rubles ...
...	Cash
Balance of operations **+100 rubles**	Balance of operations **+100 rubles**

3.2. A DIGITAL RUBLE AND FINANCIAL STABILITY

The Bank of Russia ensures financial stability in all conditions of the functioning of the economy and financial system. Since a digital ruble has a direct impact on the financial sector, financial stability aspects must be taken into account in the process of its introduction.

As noted above, at the introduction stage, there will be a natural redistribution of funds between digital rubles, accounts with commercial banks, and cash. At the same time, it will be initially difficult for banks to predict the intensity and the amount of these flows between different forms of money, i.e. the behaviour of demand for a digital ruble, given that it has never been used by households and businesses before. Therefore, during the introduction of a digital ruble, banks may face increased volatility in customer account balances and changes in balance sheet structure. In order to mitigate the risks for the stability of financial institutions associated with this, the Bank of Russia will provide access to its refinancing operations in the required amount and at the required time. Thus, the provision of sufficient liquidity by the central bank to the banking sector will play an important role both for achieving monetary policy objectives and for maintaining financial stability.

The Bank of Russia may also take additional measures to ensure the smooth introduction of a digital ruble into circulation and the settlement system, for example, by establishing requirements for the gradual conversion of funds into digital rubles for households and businesses.

When a digital ruble is used, it is likely that certain restrictions will be imposed on the conversion of funds from bank accounts into digital rubles – similar to those that are applied currently with respect to cash (e.g. a restriction on the amount of cash withdrawal per day, a prior notification to the bank of the need to withdraw funds in excess of a certain amount). These restrictions are necessary to enable banks to fund flows between various forms of money in their operations, which is necessary for the stable functioning of the banking sector and its fulfilment of all liabilities to users of financial services.

When conditions change significantly, e.g. due to external economic factors that may have a negative impact on the Russian economy and financial sector, there are sometimes episodes of increased demand for cash as a precautionary measure, leading to a temporary but sharp outflow of funds from bank accounts and increasing their need for liquidity. Similarly, in such cases demand may increase for a digital ruble as a central bank liability. In these circumstances, in order to limit the risks for the strength of financial institutions and to ensure financial stability, the Bank of Russia may use macroprudential policy instruments, as well as emergency liquidity provision facilities, possibly with their additional adjustment.

Thus, the Bank of Russia is well placed to maintain financial stability both in the current conditions, when cash and funds in bank accounts are used in money circulation, and later, when they are supplemented by digital rubles.

At the same time, the introduction of a digital ruble may additionally contribute to financial stability by limiting the risks of the dollarisation of the economy in the circumstances where global trends in the digitalisation of the financial sector are rapidly developing and other central banks are developing their own digital currencies. In addition, the creation of an additional payment infrastructure for a digital ruble will contribute to the stability, reliability and uninterrupted operation of the country's payment system and settlements, which is also an important requirement for financial stability as a whole.

Topics for discussion:

1. Do you consider the introduction of a CBDC to be a significant factor that may affect monetary policy? How can this influence manifest itself and how should this be taken into account by the central bank?

2. Do you consider the introduction of a CBDC to be a significant factor that may influence financial stability policies, including macroprudential policies? How can this influence manifest itself and how should this be taken into account by the central bank?

3. How appropriate do you think it would be to introduce restrictions on the use of a digital ruble, including potential restrictions on the volume of CBDC transactions (e.g. similar to cash) and on the owned amount, in terms of macroeconomic policy objectives?

4. What could the strategies of banks and other financial intermediaries be at the initial stage of the introduction of a CBDC and further on down the road?

4. MODELS AND MECHANISMS FOR IMPLEMENTING A CENTRAL BANK DIGITAL CURRENCY

- *There are several possible models of CBDCs and technologies for their implementation. When deciding on the introduction of a digital ruble and choosing the implementation model, the main focus should be on providing fast, convenient and reliable payments in the new digital reality as well as the corresponding infrastructure for the development of the digital economy.*
- *The following models under consideration for the implementation of a CBDC are presented for illustrative purposes.*
- *In all models presented, the creation and operation of the CBDC platform and the issuance of a CBDC are performed by the central bank, while the opening of electronic wallets and making payments and settlements in a CBDC are performed on the CBDC platform. All models assume that only one wallet will be opened per one client.*
- *The presented CBDC implementation models vary based on the performance by banks/financial intermediaries of the following functions:*
    1. *Performing AML/CFT/CFPWMD functions with regard to CBDC operations;*
    2. *Opening wallets for customers;*
    3. *Carrying out payments using customers' wallets;*
    4. *Accessing customers' wallets from other banks/financial intermediaries.*
- *When studying various models, the Bank of Russia is focusing on retail models (B, C, D) for further consideration. They provide for the possibility of developing customer services that will better meet customer demands for convenient and quick service.*

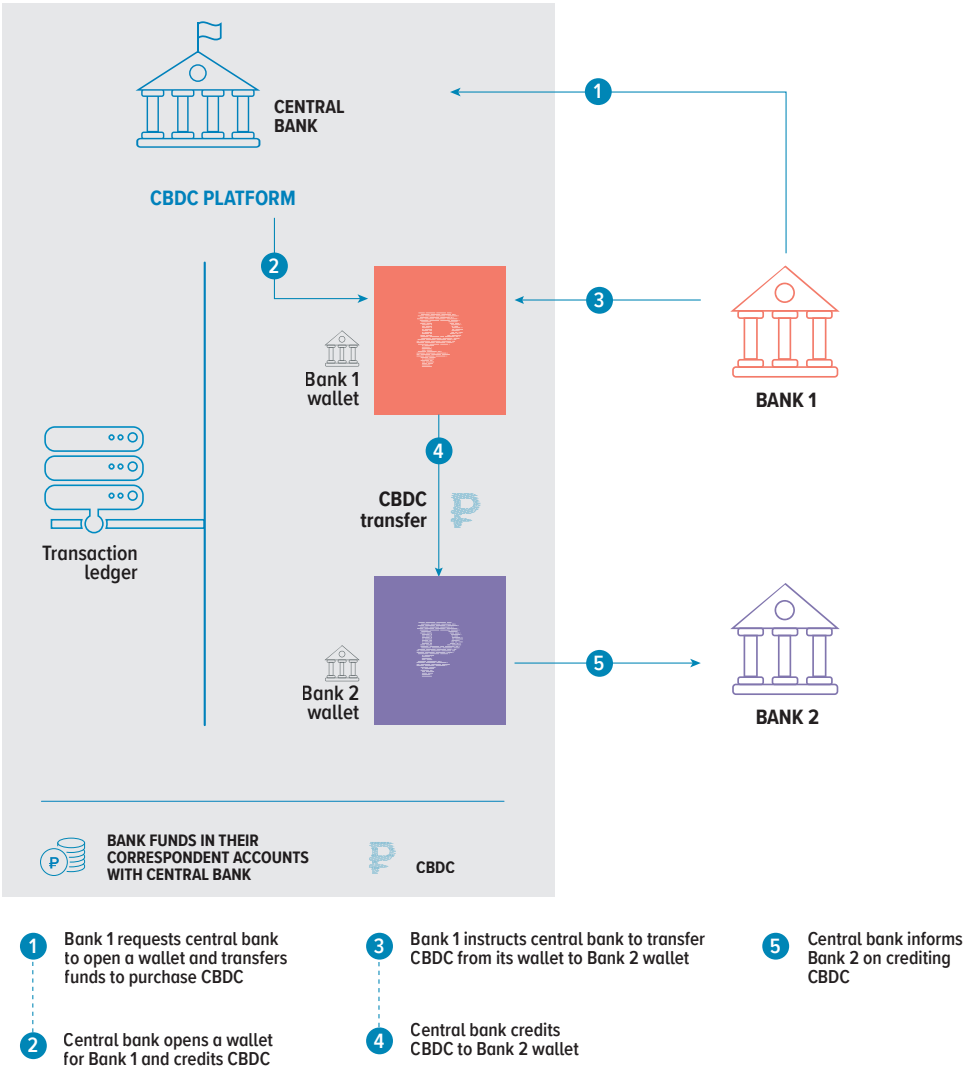
4.1. MODELS OF A CENTRAL BANK DIGITAL CURRENCY

Model A – a central bank opens wallets for banks for interbank settlements (Chart 4.1).

The central bank creates a CBDC, issues it, and opens wallets for banks for interbank settlements and transactions with securities on the CBDC platform. Individuals and legal entities do not have access to a CBDC.

The Bank of Russia does not intend to further develop this model, as it does not offer additional benefits to households and business compared to the existing payment systems.

Chart 4.1

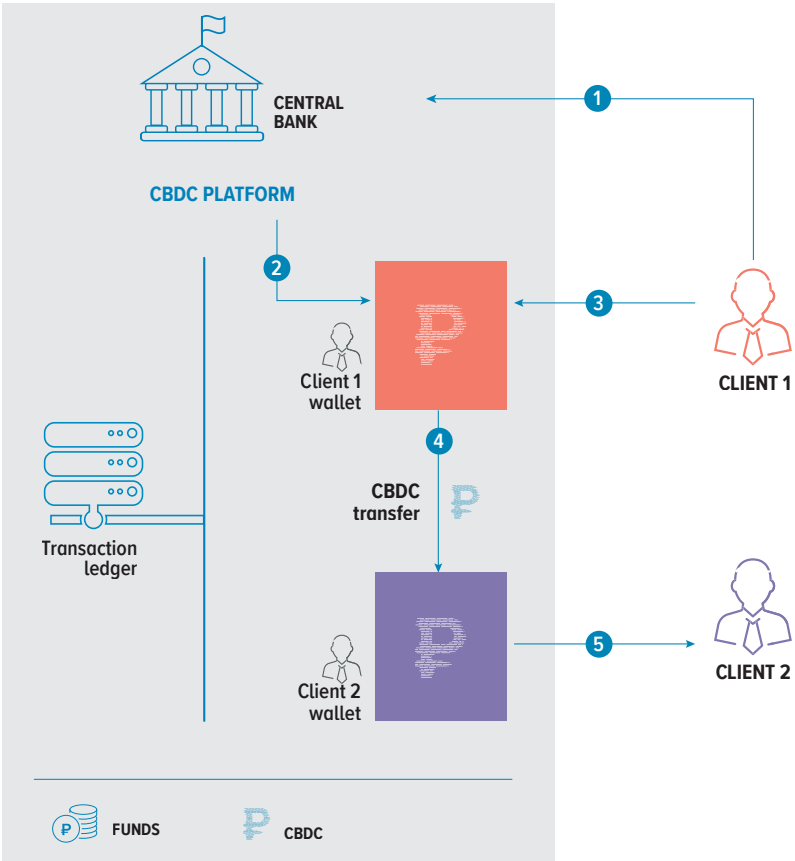


Model B – a central bank opens and maintains customer wallets on the CBDC platform and settles payments using them (Chart 4.2).

The central bank creates the CBDC platform, issues a CBDC, and provides direct access to it to individuals and legal entities, as well as performs AML/CFT/CFPWMD procedures, opens wallets for customers and conducts payments using them. The central bank may also open customer settlement accounts and provide settlement and cash services without opening an account in a CBDC.

Only one wallet in a CBDC is opened for each customer. Settlements using CBDC wallets are performed directly with customers without the involvement of banks / financial intermediaries.

Chart 4.2



1. Client 1 (an individual or a legal entity) requests central bank to open a wallet and transfers funds to purchase CBDC
2. Central bank opens a wallet for Client 1 and credits CBDC
3. Client 1 instructs central bank to transfer CBDC from its wallet to Client 2 wallet
4. Central bank credits CBDC to Client 2 wallet
5. Central bank informs Client 2 on crediting CBDC

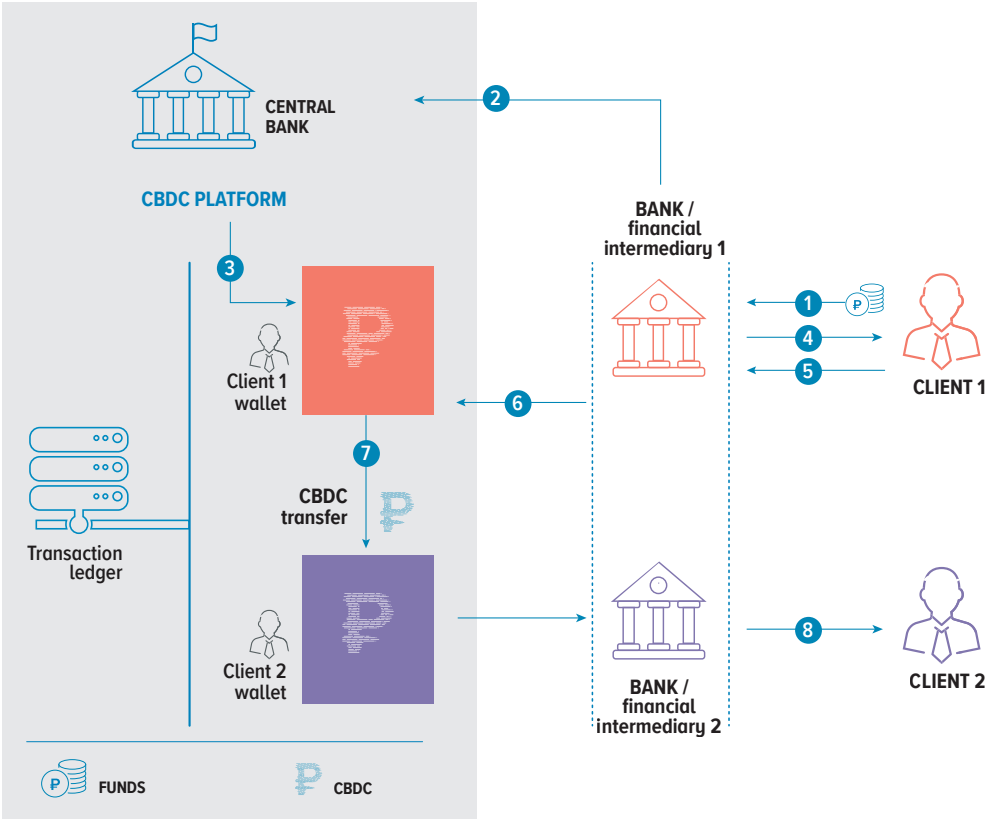
Model C – a central bank opens and maintains customer wallets on a CBDC platform. Banks / financial intermediaries[1] act as intermediaries and initiate the opening of customer wallets and payments using them (Chart 4.3).

A central bank creates the CBDC platform, issues a CBDC, and provides access to it for individuals and legal entities, including the opening of wallets for customers (individuals and legal entities) in a CBDC and settling payments using them.

Only one wallet in a CBDC is opened for each customer. The wallet can be opened and accessed by customers through any bank or another financial intermediary connected to the platform.

Banks/financial intermediaries in this model carry out AML/CFT/CFPWMD procedures in relation to clients, provide them with mobile applications for making payments using CBDC wallets and initiate requests to open wallets and make payments on the CBDC platform on behalf of clients.

Chart 4.3



1. Client 1 (an individual or a legal entity) requests bank / financial intermediary to open a wallet and instructs it to purchase CBDC
2. Bank / financial intermediary initiates opening Client 1 wallet on the CBDC platform and transfers funds to central bank
3. Central bank opens a wallet for Client 1, credits CBDC, and informs bank / financial intermediary
4. Bank / financial intermediary informs Client 1 on opening the wallet and crediting CBDC
5. Client 1 instructs bank / financial intermediary to transfer CBDC from its wallet to Client 2 wallet
6. Bank / financial intermediary initiates the CBDC transfer from Client 1 wallet to Client 2 wallet
7. Central bank debits CBDC from Client 1 wallet, credits CBDC to Client 2 wallet, and informs bank / financial intermediary
8. Bank / financial intermediary informs Client 2 on crediting CBDC

[1] *Organisations that, in accordance with legislation, may connect to the CBDC platform and conduct AML/CFT/CFPWMD procedures in respect of the platform's customers.*

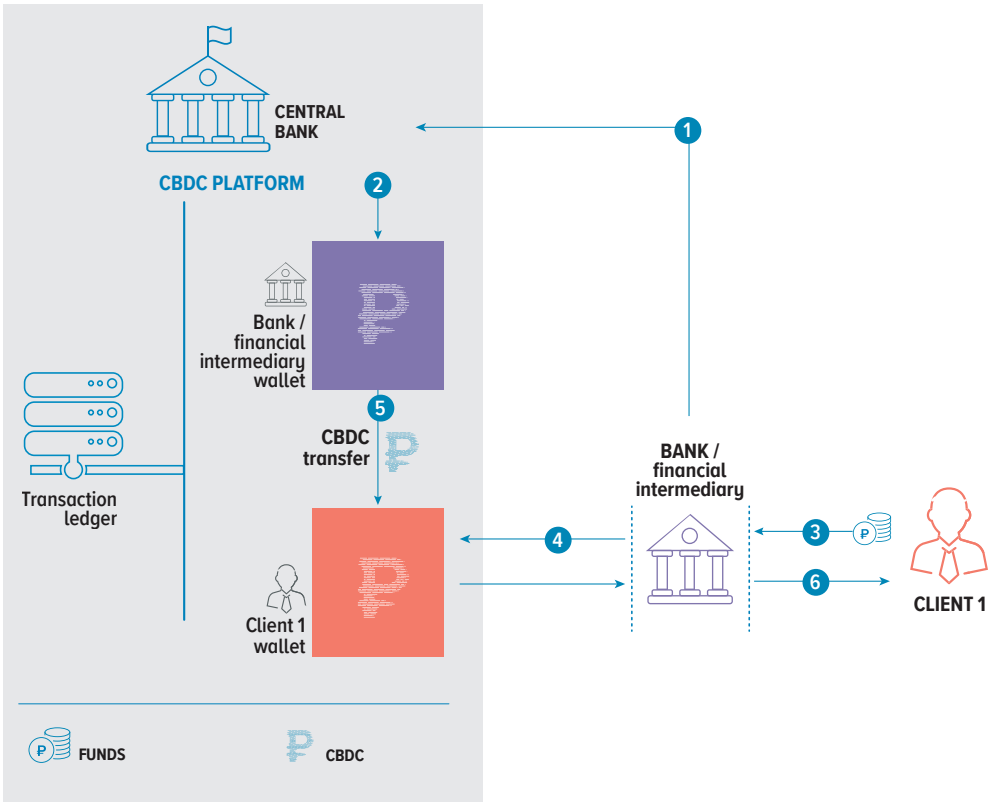
Model D – a central bank opens and maintains wallets in a CBDC for banks / financial intermediaries. Banks / financial Intermediaries open and maintain customer wallets on the CBDC platform and settle payments using them (Charts 4.4, 4.5).

A central bank creates the CBDC platform, issues a CBDC, and provides access to it for individuals and legal entities.

Only one wallet in a CBDC is opened for each customer. The client's access to the wallet for making payments can be provided through any bank or another financial intermediary connected to the platform.

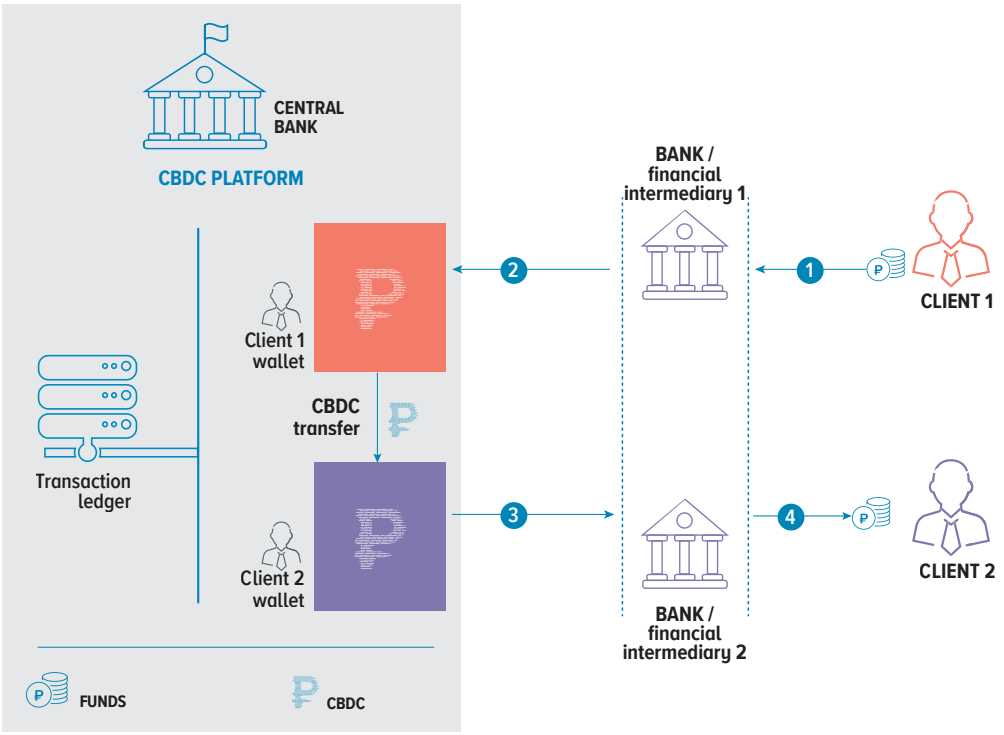
Banks / financial intermediaries perform AML/CFT/CFPWMD procedures, open wallets for customers on the CBDC platform, provide clients with mobile applications for making payments using CBDC wallets, and settle payments on behalf of clients on the CBDC platform.

CBDC PURCHASE AND OPENING A WALLET *Chart 4.4*



1. Bank / financial intermediary initiates opening CBDC wallet and purchasing CBDC
2. Central bank debits funds from bank / financial intermediary correspondent account and credits CBDC to its wallet
3. Client 1 (an individual or a legal entity) instructs bank / financial intermediary to open a wallet and purchase CBDC
4. Bank / financial intermediary opens a wallet for Client 1 and debits funds from Client 1 account
5. Bank / financial intermediary transfers CBDC from its wallet to Client 1 wallet
6. Bank / financial intermediary informs Client 1 on opening a wallet and crediting CBDC

CDBC PAYMENTS *Chart 4.5*



1. Client 1 (an individual or a legal entity) instructs bank / financial intermediary 1 to transfer CBDC from its wallet to Client 2 wallet
2. Bank / financial intermediary 1 transfers CBDC from Client 1 wallet to Client 2 wallet
3. Bank / financial intermediary 2 credits CBDC to Client 2 wallet
4. Bank / financial intermediary 2 informs Client 2 on crediting CBDC to its wallet

MODEL COMPARISON BY FUNCTIONS OF CENTRAL BANK AND BANKS / FINANCIAL INTERMEDIARIES

Table 4.1

	Model A		**Model B**		**Model C**		**Model D**	
Functions	Central bank	Bank / financial intermediary	Central bank	Bank / financial intermediary	Central bank	Bank / financial intermediary	Central bank	Bank / financial intermediary
AML/CFT/ CFPWMD procedures under CBDC transactions	✓ With respect to banks / financial intermediaries		✓			✓		✓
Opening wallets for clients	✓ Opens wallets for banks / financial intermediaries		✓		✓	Initiates opening wallets for clients	✓ Opens wallets for banks / financial intermediaries	✓ Opens wallets for clients
Payments and settlements over client wallets	✓ Between wallets of banks / financial intermediaries		✓		✓	Initiates payments and settlements		✓
Access to client's wallet from another bank/financial intermediary	—		—			✓		✓

4.2. MECHANISMS FOR THE TECHNICAL IMPLEMENTATION OF A CBDC

Globally, several options are being considered for the technical implementation of a digital central bank currency. The main task in developing a digital ruble is to ensure a seamless payment space, i.e. the integration of various elements of the payment system and ease of transferring money from one form to another for households.

Decentralised (distributed) ledger

A central bank digital currency can be designed using distributed ledger technology (DLT).

The accounting entity in distributed ledgers is a token. Such technologies provide greater stability through a distributed system of nodes,[2] as well as the automation of contract execution (so-called smart contracts).

However, the performance of the DLT is lower than that of a centralised system. It should also be noted that there is no generally accepted implementation of accounting, management and regulatory reporting standards, which will need to be developed when implementing this mechanism.

However, DLT is more resistant to various incidents than centralised systems owing to its distributed storage and processing of information.

Centralised ledger

A centralised solution is more productive than a decentralised one, therefore it can better cope with the heavy loads that are typical for a large volume of payments.

Such a solution may be easier to implement, with the responsibility for the availability, performance and fault tolerance of the entire system resting solely with a single participant.

Hybrid model

The potential technologies for implementing a digital ruble described above have their advantages and disadvantages, the significance of which may vary depending on the requirements for the central bank digital currency framework. If it is not possible to meet all the requirements for a digital ruble using only one of the technologies, it may be necessary to combine them.

Such hybrid solutions can combine the advantages of each technology where it is most appropriate; however, it is important to take into account the costs of maintaining both solutions, including their integration.

[2] *It is a system where transaction information is stored and validated by a number of network participants, so that in the event of a failure of one of them the functionality of the entire network can be maintained and transaction information is not lost.*

4.3. CONFIDENTIALITY

Confidentiality requires persons who have access to certain information not to pass such information to third parties without the consent of its owner.

When clients make payments on the CBDC platform, confidentiality restrictions may be established which imply that banks / financial intermediaries (models C and D) only have access to identification information about customers' wallets and not about the purpose and destination of payments made by customers using their CBDC wallets.

The CBDC infrastructure guarantees the confidentiality of information for users but does not imply the anonymity of transactions. They require identification, and the data is recorded on the central bank's platform. Payments and settlements in the CBDC system are not completely anonymous in the sense of anonymity of cash: for example, when cash changes hands or is used for payment in a shop (in this case, the personal information about the payer is not present anywhere). In this context, payments with a CBDC are similar to the already very common cashless payments using accounts with commercial banks. They do not provide complete anonymity as well, given that they require customer identification, however the confidentiality of customer information is ensured and the protection of customers' personal data is guaranteed by law.

As with cashless payments, the monitoring of data on payments with a CBDC will be carried out to counteract illegal activities that pose a threat to society, including AML/CFT/CFPWMD purposes.

Topics for discussion:

1. Which models of implementation of a digital ruble, in your opinion, can improve the efficiency of payments and settlements, and promote competition and innovation?

2. Which technological innovations, in your opinion, should be taken into account when designing a digital ruble in order to meet the needs of society?

3. What degree of confidentiality at the level of the central bank and commercial banks should be ensured when opening wallets for customers and making payments in digital rubles?

5. INFORMATION SECURITY

Approaches to ensuring information security

When implementing the CBDC project, the focus of the Bank of Russia's attention with regard to information security should be on creating a trusted environment, which will be ensured through the use of secure technologies and timely identification and elimination of potential vulnerabilities in the CBDC circulation technology and CBDC infrastructure components. One of the main objectives in managing information security risks is to ensure customer confidence in the technologies used.

The necessary level of trust must be ensured at all stages of the CBDC life cycle: safe development, design, implementation, maintenance, and use of technology by end users. Information security risk levels must be continuously updated with regard to ecosystem components and attack vectors, with the subsequent improvement of protection mechanisms and introduction of new security technologies.

At the same time, the choice of platform implementation technology will determine the choice of information security methods.

A **centralised system** can be implemented to a large extent using the already known and proven information security and cyber resistance technologies and tools, where requirements are set out in laws, regulations, standards and recommendations, including those developed by the Bank of Russia (for the credit and financial industry as a whole and payment systems in particular). It can be said that the professional environment is poised to develop the most effective solutions and mechanisms for the protection of online operations in centralised systems.

Decentralised and hybrid schemes based on distributed ledger technology will require the development of new information security technologies or the rethinking, analysis and scientific and technical elaboration of existing ones. Due to the distributed nature of systems, it is necessary to take into account possible threats not related to a specific user but to the system as a whole, such as cyberattacks on the operator's infrastructure, node or wallet owners.

Information security specifics of decentralised and hybrid technologies

When implementing DLT-based solutions, tasks arise which, due to their specifics, can be classified at the following levels: technological level (security of the protocols and data layer used), application software level, and technical level (infrastructure level).

Successful implementation of a CBDC in each specific case requires individual analysis of security, cryptographic functions, and functional aspects, as well as creating a group of protective measures in the following areas:

– interaction between a CBDC and third-party systems using, among other things, foreign cryptographic algorithms in making cross-border payments;

– implementation of offline payments, including the development of appropriate mathematical and physical models (hardware and software prototypes);

– confirmation of the formal payment capacity of a CBDC, including for offline settlements, proof of legal ownership of the CBDC submitted for payment and exclusion of unauthorised CBDC use by third parties without consent of the CBDC owner;

– ensuring trust in the process of developing smart contracts, the documentation basis for the certification of smart contracts and the processes of their development.

Regardless of the technological platform, it should be noted that the arrangement of cross-border cooperation will require the creation of a so-called 'environment of trust' that takes into account the differences in national regulation of ecosystem operators. Restrictions on the use of cryptographic information protection tools, lack of uniform standards for ensuring information security (including

cryptographic) and a single certification system for international conformity assessment (audit) procedures, on the one hand, are the reason why there is a need for unified distributed or hybrid systems, and on the other hand, by virtue of the mandatory nature of these requirements, dictate the need to develop legal structures to avoid contradictions with the current regulations.

The complexity of such a task can be illustrated by the organisation of cross-platform interaction within the Russian Federation. In order for the CBDC framework to function securely, it is necessary to ensure the monitoring of the information security of cross-platform operations, as well as the confidentiality and integrity of information transferred between various platforms. In addition, the system must allow for correct accounting and control of actions and statuses of transactions, as well as tracking the availability of services and the speed of information transfer. The possibility of embedding and integrating interaction protocols and information transfer formats, including the mutual recognition of the cryptographic protocols used, is a mandatory requirement.

Regardless of which technological platform is selected, the tasks that lay behind ensuring the information security of a CBDC remain providing for the integrity, availability, information confidentiality and proof of authorship, as well as minimising risks of the implemented infrastructure experiencing technological dependence on suppliers of IT services and products, ensuring the use of trusted software and hardware components both in ecosystem nodes and in retail applications, and countering social engineering.

In order to combat information security threats related to social engineering with respect to end users, it is necessary to actively develop and increase the number of participants of programmes dedicated to teaching consumers financial literacy, cyber hygiene, and awareness of information security risks and ways to counter fraud.

Topic for discussion:

In your opinion, what information security risks can affect online and offline payments, and what methods can be used to minimise these risks?

6. LEGISLATIVE AND REGULATORY CHANGES REQUIRED TO IMPLEMENT A DIGITAL RUBLE

Obviously, the main legal issue that needs to be resolved when introducing a central bank digital currency is its legal status.

Since Article 75 of the Constitution of the Russian Federation establishes that the ruble is the currency of the Russian Federation and monetary emission is performed exclusively by the Central Bank of the Russian Federation, there is no doubt that a CBDC issued by the Bank of Russia, regardless of its technical implementation, will be the official currency of the Russian Federation, mandatory for general acceptance as a means of payment.

It seems that since a CBDC will not be issued in kind, that is, it will not exist as a physical item but will represent a liability of the Bank of Russia, it is legitimate to consider it a type of non-cash funds. Furthermore, since a CBDC will be a liability of the Bank of Russia, the holder of a digital ruble will have the right to demand its exchange for both cash and non-cash rubles by increasing the balance of accounts opened with credit institutions.

The introduction of a CBDC will require a revision, first of all, of the Civil Code of the Russian Federation (with regard to including a digital ruble in the list of objects of civil law rights, establishing the possibility of making payments in a CBDC, and including a digital ruble in general regulations on settlements) and the Federal Law 'On the Central Bank of the Russian Federation (the Bank of Russia)' (with regard to expanding the functions of the Bank of Russia and defining issues of emission and circulation of a CBDC).

It is also important to resolve legal issues related to the use of a CBDC in the circumstances where the technological and operational infrastructure will be created by the Bank of Russia with the inclusion of credit institutions and, potentially, other financial intermediaries. It becomes particularly important to establish and allocate the responsibility for the sustainability and continuity of the information system within which a central bank digital currency will circulate.

7. APPENDIX. INTERNATIONAL DISCUSSION ON CENTRAL BANK DIGITAL CURRENCIES

In recent years, digitalisation has rapidly changed the payment market in many countries around the world; consumer behaviour is also changing. The use of non-cash money is increasing. In other words, the demand for cash from the central bank to which businesses and households have direct access is decreasing. This raises the question of the need for an additional digital form of central bank money that better matches the spirit of the digital age.

Regulators and international financial institutions are widely discussing the introduction of a central bank digital currency. Some of them are already testing pilot CBDC projects. Central banks are studying various CBDC model options, assessing which of them will best deliver the benefits to society. At the same time, central banks are analysing various aspects of the introduction of a CBDC, taking into account the specifics of the economies of certain countries, including the specifics of monetary settlements, the financial system, and monetary policy conditions.

Current status of CBDC research / implementation in different countries

Many countries are actively analysing options and the consequences of the introduction of a CBDC, holding public consultations, and implementing research projects, but have not yet announced their plans with regard to its implementation. In February 2020, the Central Banking website (UK) conducted a survey on the potential of a central bank digital currency ('Central Banking Digital Currency Survey'), in which 46 central banks took part (Central Banking 2020a). According to the survey, 65% of respondents, most of whom are from Western European countries, are actively conducting research in the area of digital currencies, which can be explained by this region's switch to cashless payments.

A number of countries are already actively piloting CBDC projects (or have plans to do so).[1]

Main reasons for foreign central banks to study / introduce a CBDC

Central banks that are studying the introduction of a CBDC identify a wide range of advantages of taking such a step (Chart 7.1). According to the Central Banking survey mentioned above, the majority of respondents noted the positive impact of a CBDC on domestic payments, innovations, and financial inclusion. Respondents highlighted that a significant increase in the share of cashless payments was a significant factor in the introduction of a CBDC. Some respondents believe that the introduction of a central bank digital currency will have a positive impact on monetary policy conditions and improve the overall efficiency of cross-border payments.

Many central banks see the main functions of a CBDC in playing the role of 'digital cash' amid a high level of cashless payments, increasing the stability and diversifying the risks of the payment system.

Certain central banks, such as the People's Bank of China (PBOC), which has announced digital yuan tests (Central banking 2020b), are trying to reduce the risks associated with the booming development of electronic payment systems (primarily non-bank payment systems). These include operational risks, concentration risks, risks of the monopolisation of the payment market, as well as risks of reducing the efficiency of the transmission of monetary policy and financial stability policy. In addition, central banks seek to exploit the opportunities offered by being leaders in financial technology, to which the development of a CBDC can contribute. Other tasks also include the internationalisation of the national currency and increasing its status.

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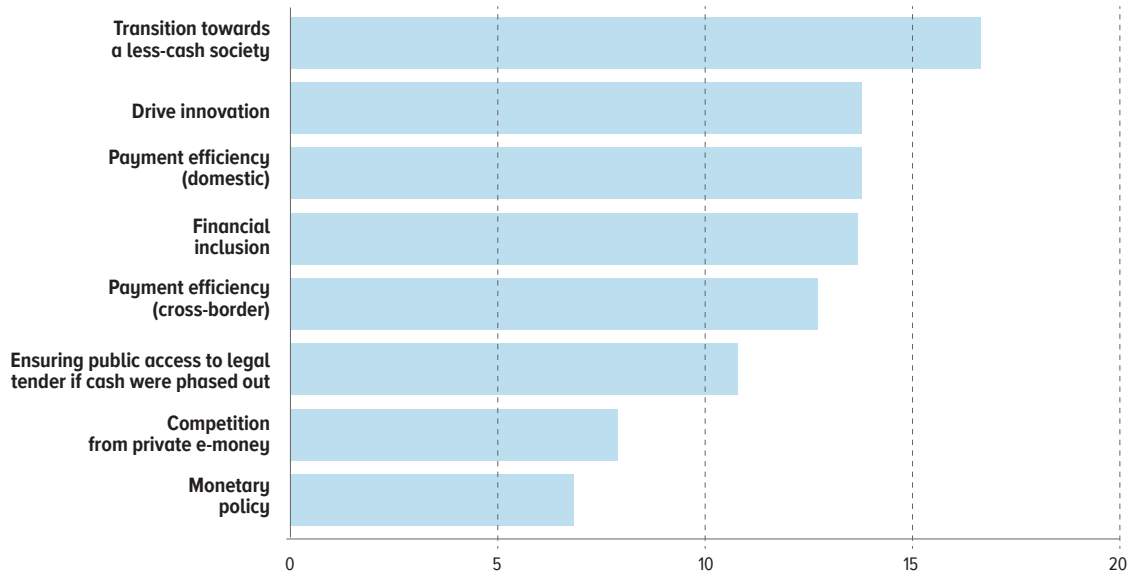
[1] *A summary of central banks' attitude to the introduction of a CBDC is also provided in the IMF and BIS surveys: Barontini, C., & Holden, H. (2019). Proceeding with caution-a survey on central bank digital currency. BIS Paper, (101); Tobias Adrian and Tommaso Mancini-Griffoli, Central Bank Digital Currencies: 4 Questions and Answers. 2019.*

BENEFITS OF IMPLEMENTING CENTRAL BANK DIGITAL CURRENCY *Chart 7.1*
(SHARE OF RESPONSES, %)



Source: The Central Bank Digital Currency Survey (2020) – debunking some myths (Central banking 2020a).

It is important to note that, when researching the introduction of a CBDC, regulators agree that it must be organised in such a way that it is in sufficient demand (therefore, its properties must take into account users' requirements) and does not create new risks or distortions in the functioning of the monetary system but reduces them.

An additional issue also being considered by central banks is the possibility of introducing an interest rate on a CBDC, which could potentially improve the efficiency of the transmission mechanism. The opinions on this issue are based, among other things, on the specifics of the financial sector in different countries, as well as monetary policy implementation conditions and challenges.

Possible effects of the introduction of a CBDC

Central banks are researching the potential impact of the introduction of a CBDC on the financial sector, and the conditions for implementing monetary policy and financial stability policy. In particular, it is assumed that the banking sector will need to develop approaches to its functioning and the management of risk and balance sheet structure in an environment where client funds will move between current and CBDC accounts. This may lead to increased competition for customers between banks, which may influence the level of deposit and loan rates and lending dynamics. It is noted that the role of central banks' liquidity provision instruments for the banking sector may increase with a CBDC in circulation, and a clarification of their operating procedures may be required.

In addition, it is being discussed that during economic crises a drastic outflow of economic agents' funds into a CBDC may occur, the same as into cash in similar situations.[2] In order to stabilise the situation, central banks must have appropriate instruments available to provide refinancing to banks in the required amount and at short notice.

Central bank surveys indicate that a CBDC may be subject to the same restrictions as cash, e.g. in terms of the amount of funds that can be converted from bank accounts and the volume of CBDC usage, including offline operations. This is necessary in order for the financial sector to perform all

[2] *Bank of England 2020, Bank of France 2020, Reserve Bank of New Zealand 2018, Norges Bank 2018, Denmark National Bank 2017, Bank of Lithuania 2019.*

functions in a sustainable manner, as well as to carry out its AML/CFT/CFPWMD activities effectively in the public interest.

It is also noted that the potentially increased competition among banks for customers with a CBDC in circulation will help improve the quality and diversity of services provided by banks. In addition, in a retail CBDC system, banks, acting as intermediaries in providing a central bank digital

CENTRAL BANKS' CHOICES AT EACH FORK *Table 7.1*

Country (CBDC)	Fork 1	Fork 2	Fork 3	Fork 4	Project status
	Wholesale or retail	Access via tokens or accounts	CB role in circulation	Infrastructure: distributed or centralised ledger	
China (DC/EP)	Retail; wholesale for cross-border payments	Tokens potentially linked to accounts; under discussion	Distribution via intermediaries; settlements without CB are possible	DLT for wholesale transactions; for retail transactions, a bank ledger is possible	Pilot
Sweden (e-krona)	Retail	Tokens	Distribution via intermediaries; settlements via CB	DLT (Corda)	Pilot
South Korea	Retail	Tokens	Under discussion	Consultations	Pilot
Canada	Wholesale, retail; under discussion	Under discussion	Under discussion	Consultations	Research
Euro area (e-euro)	Retail	Accounts; under discussion	Consultations	DLT	Research
Norway	Retail	Tokens	Distribution via CB	CB ledger	Research
'Digital Dollar' (USA)*	Wholesale and retail	Tokens; under discussion	Distribution via intermediaries	DLT	Research
UK	Retail	Under discussion	Consultations	Consultations	Research
Denmark (e-krona)	Retail	Tokens	Distribution via CB	Consultations	Research
Switzerland (e-franc)	Wholesale; under discussion	Under discussion	Consultations	Consultations	Research
Iceland (rafkróna)	Retail	Accounts	Distribution via CB	Consultations	Research

** Not a project initiated by the US central bank (the Federal Reserve System).*
Sources: Auer, R., & Böhme, R. (2020), Boar, C., Holden, H., & Wadsworth, A. (2020); Center for the Fourth Industrial Revolution (2020).

currency to their customers, will be able to develop various CBDC-based services. In this context, regulators will have to ensure that the competition for customers does not lead to excessively risky strategies and does not affect the stability of the banking sector.

CBDC models and implementation mechanisms

A retail or wholesale CBDC model. In their surveys, central banks focus primarily on a retail CBDC system, as it involves significant innovations with respect to the existing forms of money, and can better meet customer needs and contribute to the development of the digital economy. Wholesale CBDC systems imply the improvement of the payment systems already existing between financial institutions (real-time, cross-border, more reliable, cheaper) or the expansion of the central bank's regulation and liquidity provision with respect to non-banking or international financial institutions. Neither of the above is fundamentally new. Therefore, the task of improving the respective 'wholesale' payment systems is not considered to be the most urgent one.

CBDC architecture and the role of the central bank as a CBDC issuer. Many central banks prefer a mixed architecture where the central bank maintains a CBDC ledger (i.e. the central bank, as in the case of cash, has liabilities to the non-financial sector), but operations with the real sector are performed by intermediaries. The direct model, where all functions are performed by the central bank, overloads the regulator with extra functions which the private, profit-oriented sector is more competent at dealing with, including adherence with 'know your client' guidelines. The profit oriented approach of intermediaries creates the right incentives to offer the best services and to further implement technological customer-oriented solutions on their part.

Choice of infrastructure: distributed or centralised ledgers. This is a technical fork that affects the stability and reliability of the CBDC system. Distributed ledgers are considered to have lower risks of information loss. However, they are usually outsourced, leaving contractors with the possibility of owning keys for such ledgers; this can have an impact on trust in the system.

The Bank of Sweden notes that the system must be able to function without access to the Internet (via SMS).

Type of access: tokens or accounts with the central bank / with CBDC operators. It is noted that in some versions, a token-based retail CBDC better implements such important properties of cash as the confidentiality of settlements (however there will be no absolute anonymity, given that payment information will be recorded on the central bank's platform) and their unconditionality (transaction irrevocability).

Classification of liquid financial assets

In the discussion on a CBDC, the classification of liquid financial assets presented in Bech and Garrat (2017) is often considered. It reflects the correlation between the existing forms of money and digital currencies as well as other liquid financial assets, as shown in Chart 7.2 ('the money flower').

The classification criteria include availability (direct or indirect), form of issue (electronic or physical), type of issuer (central bank or not), and technologies used (centralised or decentralised settlements).

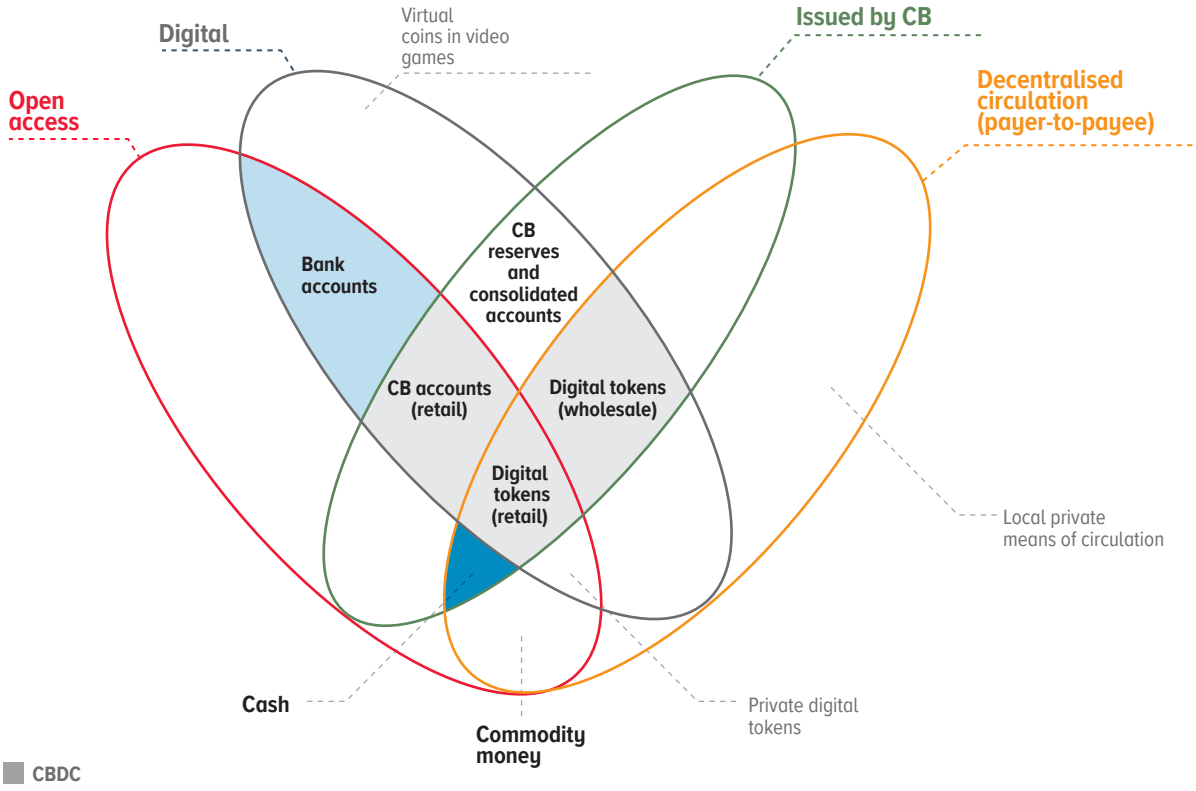
The CBDC modifications discussed in this report (retail and wholesale) are located at the intersection of the 'digital assets' petal with the 'issued by the central bank', 'open access' and 'decentralised circulation' petals. Depending on the implementation technology (in the form of tokens or accounts), retail digital currencies are located in different parts of the 'flower': while tokens resemble to a certain extent fiat or commodity cash money, accounts with the central bank exist in the form of records and in this sense are similar to bank reserves or accounts with commercial banks.

Some assets represented in the chart are not money. These include 'cryptocurrencies' (private digital tokens), local private means of circulation, and virtual money in computer games.

For a more detailed description of the classification presented, refer to Bech and Garrat (2017).

TYPOLOGY OF FINANCIAL ASSETS BY ISSUER, FORM, ACCESSIBILITY, AND TECHNOLOGY

Chart 7.2



Source: an extended version of the scheme originally published in Bech and Garrat (2017).

TOPICS FOR PUBLIC DISCUSSION

The Bank of Russia proposes to discuss the following topics. Please send your comments and thoughts to the Bank of Russia at cbdc@cbr.ru by 31 December 2020. If you believe that there are important issues that have not been covered below, please also inform us about them along with your other suggestions at the above-mentioned address.

Section 1

1.1. Is it necessary to introduce a digital ruble now and why?

1.2. Which factors can increase the need for a digital ruble in the next few years?

1.3. What other aspects should be considered when developing the digital ruble project in addition to those specified in subsection 1.2?

Section 2

2.1. Which key properties from among those listed in Section 2 should a digital ruble as a form of money have in order to be useful to society? What other properties are important?

2.2. In your opinion, will the introduction of a digital ruble provide significant advantages over existing payment and settlement forms?

2.3. Do you consider it a prerequisite for the successful implementation of a digital ruble that all trade and service companies accept it?

2.4. How important is the ability to use a digital ruble in offline mode? What is the optimal limit on the amount of digital rubles to be used in offline mode? Should there be a limit on the maximum time for a digital ruble wallet to remain offline without synchronising it with the online digital ruble infrastructure?

2.5. Are offline payments in digital rubles necessary in the event that the entire country is covered by the Internet and every person has access to it?

2.6. Should it be possible to restore digital rubles stored on users' devices intended for offline payments if they are lost?

2.7. At the first stage of the launch of a digital ruble, would it be advisable to provide for offline payments?

2.8. Is it necessary to provide for offline payments in digital rubles between legal entities?

2.9. Which specific consumer protection measures do you consider necessary to implement if a digital ruble is introduced? What means of controlling digital ruble transactions should be entrusted to consumers?

2.10. What impact do you think the introduction of a digital ruble will have on competition in the financial market, and on the business models of banks and other financial intermediaries?

2.11. Who do you think should perform the AML/CFT/CFPWMD functions with respect to the circulation of a digital ruble: the central bank or financial intermediaries?

Section 3

3.1. Do you consider the introduction of a CBDC to be a significant factor that may affect monetary policy? How can this influence manifest itself and how should this be taken into account by the central bank?

3.2. Do you consider the introduction of a CBDC to be a significant factor that may influence financial stability policies, including macroprudential policies? How can this influence manifest itself and how should this be taken into account by the central bank?

3.3. How appropriate do you think it would be to introduce restrictions on the use of a digital ruble, including potential restrictions on the volume of CBDC transactions (e.g. similar to cash) and on the owned amount, in terms of macroeconomic policy objectives?

3.4. What could the strategies of banks and other financial intermediaries be at the initial stage of the introduction of a CBDC and further on down the road?

Section 4

4.1. Which models of implementation of a digital ruble, in your opinion, can improve the efficiency of payments and settlements, and promote competition and innovation?

4.2. Which technological innovations, in your opinion, should be taken into account when designing a digital ruble in order to meet the needs of society?

4.3. What degree of confidentiality at the level of the central bank and commercial banks should be ensured when opening wallets for customers and making payments in digital rubles?

Section 5.

5.1. In your opinion, what information security risks can affect online and offline payments, and what methods can be used to minimise these risks?

GLOSSARY

AWS (automated workstation) is an interface for interaction between a person and software which automates activities of a certain type.

A **two-level banking system** is a system where financial institutions are divided into two groups. The first includes the central bank, which is responsible for issuing money, regulating the financial market, and performing settlements between credit institutions. The second includes financial institutions regulated by the central bank which provide services to end customers. In the Russian Federation, the functions of the central bank are established by the Russian Constitution and Federal Law No. 86-FZ, dated 10 July 2002, 'On the Central Bank of the Russian Federation (Bank of Russia)' (amended as of 20 July 2020).

A **bearer instrument** is a financial instrument whose possession is sufficient to certify the bearer's right to cash or an asset. Cash is the most common bearer instrument.

Cryptocurrency custodial storage is a storage method where the cryptocurrency holder does not have full control over their funds, since the operator (custodian) also has access to the password (key).

Cryptocurrencies are decentralised virtual currencies based on mathematical algorithms and protected by cryptography methods operating in a decentralised payment system.

Payment is one of the ways of fulfilling monetary liabilities.

A **smart contract** is an agreement between two or more parties to establish, change or terminate legal rights and obligations, where some or all of the terms and conditions are recorded, executed and/or secured by a computer algorithm in a specialised software environment.

Stablecoins are a type of cryptocurrency with built-in mechanisms for stabilising their exchange rate with respect to other assets or secured by such assets.

A **token** is a unit of accounting in the blockchain network used to represent a digital balance in a particular asset or to account for interchangeable digital assets. Tokens are usually used to create derivatives based on distributed ledgers.

Settlement is performance of obligations under a contract or another form of agreement between the parties. In the case of a financial liability, a settlement is the payment of monetary funds to the recipient of funds at a specific point in time.

A **financial institution** is an organisation operating in the financial market. A financial institution may be a credit institution or a non-bank financial institution.

Electronic money is a property right that is reflected in a technical record and is prepaid in nature. According to Clause 18 of Article 3 of Federal Law No. 161-FZ, dated 27 June 2011, 'On the National Payment System', electronic money is money provided in advance by one person to another person that records information on the amount of funds provided without opening of a bank account.

ABBREVIATIONS

- CBDC – central bank digital currency
- DLT – distributed ledger technology
- DVP – delivery versus payment

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