ORIGINAL PAPER

DOI: 10.26794/2587-5671-2023-27-3-33-42
UDC 336.74(045)
JEL E40, G21, G28, H81, Q14

Possibilities of Using the Digital Currency of the Central Bank in Concessional Lending to the Agro-Industrial Complex

D.A. Korobeynikov
Volgograd State Agrarian University, Volgograd, Russia

ABSTRACT

The article is devoted to the study of niche opportunities for using the digital currency of the central bank (CECB or digital ruble) in the mechanism of concessional lending to agriculture. The purpose of the study is to identify possible effects from the use of the digital ruble for industry borrowers, the budget and banking system through the digitalization of transactions between participants in multilateral interaction and strengthening the control function. The relevance of the study is associated with a prospective assessment of the possibilities of digital modernization of existing areas of state financial support for agriculture, opened by the circulation of the digital form of the Russian ruble. The scientific novelty consists in clarifying the consumer properties of the digital ruble in relation to its possible use in agricultural lending with state support, which are practically not considered in modern scientific research, especially in an industry context. The author used the methods of abstraction, generalization, formalization, analogy, scenario forecasting. It is shown that digital financial instruments can improve the manufacturability and practical availability of concessional lending, as well as eliminate bureaucratic barriers. A promising model for the modernization of existing mechanisms for preferential lending to the agro-industrial complex using the Central Bank of Central Banks in the channels of loan capital and budget financing has been developed. Conclusions are drawn about the prospects of using digital labels that accept the permissible properties of spending funds (loans and subsidies) in the Central Bank of Central Banks, an algorithm for the automatic execution, control and documentation of all transactions regulated by the mechanism of concessional lending to the agro-industrial complex in the form of a smart contract on the projected digital ruble platform is described. The main positive effects from the use of the Central Bank of Central Banks are associated with an increase in the transparency of payments and the possibility of automating the control of target, cost and procedural parameters of transactions, accelerating the procedures for passing loan applications, and increasing the diffusion of modern digital innovations into the agricultural sector of the economy. Prospects for further research are related to the empirical verification of the proposed provisions in the process of approbation and issuance of the digital ruble by the Bank of Russia.

Keywords: digital currencies of central banks; digital ruble; credit; concessional lending to the agro-industrial complex; smart contract; state support for the agro-industrial complex; digitalization; digital economy

For citation: **Korobeynikov D.A. Possibilities of using the digital currency of the central bank in concessional lending to the agro-industrial complex.** ***Finance: Theory and Practice.*** **2023;27(3):33-42. (In Russ.). DOI: 10.26794/2587-5671-2023-27-3-33-42**

INTRODUCTION

Currently, Central Banks digital currencies (further — CBDC) as a new form of fiat money has not yet acquired clear and practical significance. Central banks are actively exploring the prospects and possible architecture of national CBDCs, opposing them to private cryptocurrencies and stablecoins in order to maintain the competitiveness of the centralized monetary system in the context of digital transformation of financial relations and increasing trends towards the decentralization of monetary and payment systems. A survey by the Bank for International Settlements showed that most Central Banks are conducting their own research and are at different stages of assessing the prospects of CBDC for issuance [1]. In particular, 86% of Central Banks are exploring CBDC issuance, 60% are experimenting with technologies, 14% are still under development or pilot phase [2]. The

European Central Bank, the Bank of Sweden, the Bank of Canada, the Bank of Russia, the Bank of England, the Reserve Bank of Australia, the People's Bank of China are active in this issue, considering CBDC as "a new form of fiat money released in digital form by the central bank which are legal means of payment" [3].

As motivation for CBDC issuance are considered: the need for increasing competition in the payment market, reducing transaction and emission costs [4]; the opposition to the development of private cryptocurrencies [5] and global stablecoins with potentially large consumer coverage and lack control from the regulator [6]; the fight against the shadow payment turnover and economic crimes [7]; the increase the availability of financial services as a result of the diffusion of digital financial innovation and the creation of an inclusive system of digital payments [8], support financial stability and improvement of monetary policy instruments [9], and increase the attractiveness of national currencies and weakening dollar positions in cross-border settlements [10]. Additional incentives for CBDC implementation were associated with the development of online transactions and contactless payments under the restrictions imposed by COVID-19 [11]. Problems — risks associated with digital fiat money (besides cybersecurity threats) are identified as: increasing competition between Central and commercial banks for deposits as CBDC allows customers to directly accumulate funds in a more secure Central Bank [12]; increasing competition among countries for international CBDC emission standards and payment technology compatibility based on them, as control over industry standards will ensure a monopoly position in the international payment markets of CBDC [10]; achieving a socially agreed balance of control (tax, financing of illegal business and money laundering, anti-terrorism, etc.) and confidentiality (loss of anonymity of CBDC compared to cash) [13, 14].

The most relevant research areas today are the development of the optimal design of CBDC and the assessment of the impact of network effects on it [15], selection of the best CBDC model for individual countries [16], identification of possible effects on the monetary and payment system [17], study of legal, managerial and regulatory prospects of digital currency emission and turnover, issues of cybersecurity, the role of CBDC in corporate and public governance [18], identification of possible risks for consumers, financial system and monetary authorities [19] etc.

In contrast to the existing research, the article is niche, and its subject is limited to the assessment of the possibilities of introduction of CBDC in the existing mechanisms of concessional lending of agro-industrial complex (further — AIC) within the framework of technological solutions and consumer design of digital ruble, indicated by the regulator. However, CBDC itself is not the subject of research and will only be seen as a tool for digitalizing and innovating loan and budget flows through the industry's concessional lending facility. Today there are no such studies, methods are not developed, possible effects are not evaluated, which determines the scientific novelty and practical significance of this research.

MATERIALS AND METHODS

In the study of the stated problems, private sectoral approaches to regulation of conditions of functioning of the financial and credit system in agriculture and methodological approaches of the Bank of Russia to emission and circulation of digital form of the national currency are used by the author. Sectoral methodology is regulated by legislative and regulatory acts of various levels, departmental methodological and administrative materials, internal regulations of financial intermediaries and development institutions. This determines the procedure and conditions for the provision of budgetary subsidies to agricultural producers, the

functioning of the mechanism for concessional lending, the provision of credit guarantees to small and medium-sized enterprises in agriculture, etc. The aim of the study is a search for possible points of convergence between the approaches to the development of financial and credit system and the reversal of the digital currency of the central bank for the development of practice-oriented approaches and applied methods of implementing digital ruble in existing channels concessional lending to AIC. From the point of view of the overall scientific methodology of the study, the solution of the identified problems is assumed using abstraction, generalization, formalization, analogies and other theoretical and general logical methods.

MODEL OF CONCESSIONAL LENDING TO AGRO-INDUSTRIAL COMPLEX WITH CBDC

Persistent problems in the implementation of mechanism for concessional lending to AIC [20] require the use of innovative financial instruments, such as the digital ruble, allowing to increase the processability, transparency and movement of funds, simplify and improve its monitoring. The proposed model of concessional lending to AIC using the digital ruble includes two directions of modernization: 1) digitalization of payment turnover; 2) automation of control and fulfill legal and financial transactions (*Fig. 1*).

Complete substitution in non-cash money payment channels with digital in all transactions is offered in the first direction:

- loan capital in the form of concessional credit from financial intermediaries to industry borrowers and further to suppliers of funds and items of work, as well as a return flow from borrowers to banks on loan repayment;
- budget funds in the form of subsidies to authorized banks — participants of concessional lending to AIC system, compensating for the difference between the preferential and market rate of loan interest.

The second direction follows from the first and is connected with the use of technical possibilities created by the technological platform of digital ruble, and the features of its consumer design for the development of control tools and automation of routine procedures:

1. Use of digital labels to mark funds in digital money with a special feature indicating allowable spending purposes. This applies both to the budget funds brought to the Ministry of Agriculture within the limits of the budget obligations for the purpose of subsidizing authorized banks, and loan capital within the limits of the concessional short-term and investment loans to AIC subjects.
2. Digitization of the "analog" register of potential borrowers, claiming to receive a concessional loan, by including it as a structural element in a special application in a protected environment in the form of a smart-contract containing all the basic conditions for the granting and use of concessional loan, as well as settlements between the budget and authorized banks.
3. Implementation of a credit flow scheme in the form of a smart-contract for concessional loans and budget funds in the form of subsidies to authorized banks.

The proposed model does not change the general approaches and algorithm for implementing mechanism for concessional lending to AIC, but functional changes associated with the use of CBDC, can lead to positive effects for industry credit system and industry borrowers in terms of meaningful improvements in payment, control and interaction tools.

DIFFERENCES OF THE PROPOSED MODEL OF CONCESSIONAL LENDING TO AGRO-INDUSTRIAL COMPLEX WITH CBDC FROM THE EXISTING MECHANISM

In order to specify the method of using the digital ruble in mechanism for concessional lending to AIC, it is advisable to structure

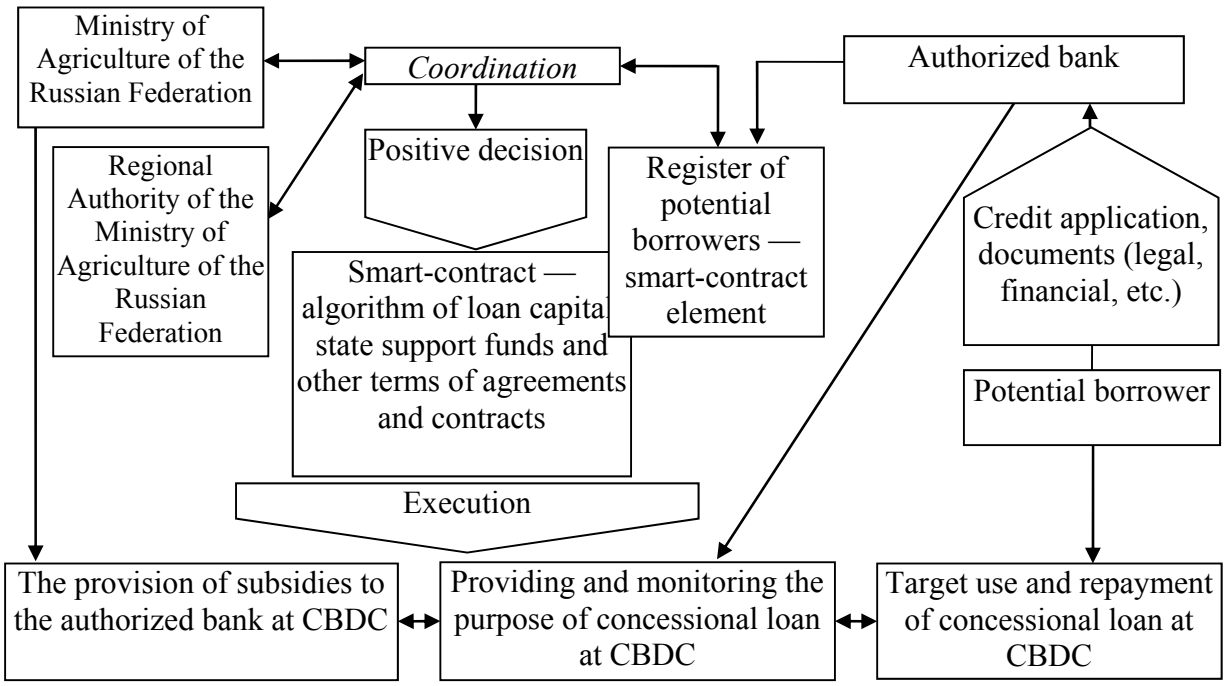

Fig. 1. **The Proposed Model of Concessional Lending to Agro-Industrial Complex Using CBDC**

Source: Compiled by the authors.

the algorithm of its implementation (*Fig. 2*) by identifying promising areas for using the technological capabilities of the digital ruble platform and digital money transactions for each stage.

In the first stage, the potential borrower determines the authorized bank, the type of concessional loan, specific objectives and loan terms. The result will be the submission to the authorized bank of a loan application and a set of accompanying documents.

In the second stage, the authorized bank, in accordance with internal rules and procedures, evaluates the creditworthiness of the borrower, its compliance with the established requirements and the target directions for the use of concessional loan. The result will be the formation of a register of potential borrowers, and the proposed algorithm will differ from the existing mechanism of concessional lending to AIC using the technological capabilities of the projected platform digital ruble. Its hybrid architecture, combining the components of a centralized system and distributed registries, will provide the necessary software environment for the launch and execution of smart-contracts (firstly, while blockchain smart-contracts are not functional, secondly, despite the fact that no CBDC blockchain-based projects have yet been implemented, permitted blockchain-based schemes are being investigated by 46 Central Banks around the world) [21].

Approbation of the digital ruble platform is planned for 2023, when the Bank of Russia, along with piloting calculations in digital money (C 2C, C 2B, B 2C), will allow a limited number of participants to conclude smart-contracts.[1] In this case, the regulator allows the use of smart-contracts in both lending and non-financial sectors of the economy.[2] As a result, it will be possible to gradually

[1] Official Website of Bank of Russia. The main directions of the Single State Monetary Policy for 2023 and the period 2024 and 2025. Project dated 11 August 2022. URL: https://cbr.ru/Content/Document/File/139691/on_project_2023(2024–2025).pdf (accessed on 14.09.2022).

[2] Official Website of Bank of Russia. Analytical review on the "Smart contracts". October 2018. URL: https://cbr.ru/Content/Document/File/47862/SmartKontrakt_18–10.pdf (accessed on 06.09.2022).

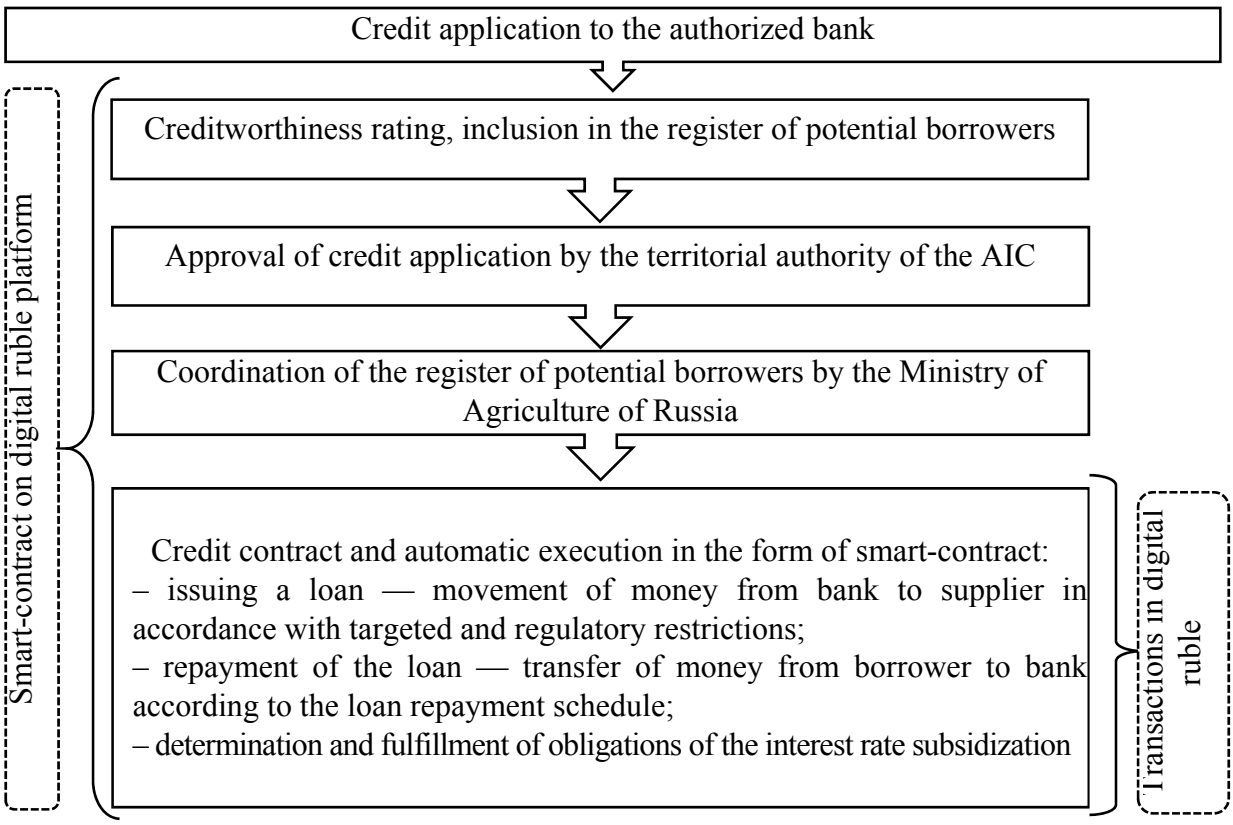

Fig. 2. **Algorithm for the Implementation of the Mechanism for Concessional Lending to Agro-Industrial Complex Using CBDC**

Source: Compiled by the authors.

implement the mechanism of concessional lending to AIC in the form of standardized smart contracts. At the initial stage, it is possible to perform individual elements of a smart-contract, i.e. transactions between banks, borrowers and the State. In the future, with the practice and wide-scale technology distributed registries, the development of legislative regulation and the digital ruble platform, smart-contracts will allow full algorithmic of the logic of occurrence, change or termination of legal and property rights between members of the mechanism for concessional lending.

The essence of the proposals for this stage of the algorithm implementation mechanism for concessional lending to AIC is the integration of data of the register of potential borrowers into a special application — smart-contract containing the terms and conditions for all subsequent payments and payments on approved loan applications in digital software code. Positive decision of the bank on the loan application and its inclusion in the register is "entry point", launching automatic execution of legally significant actions and financial transactions that comprise the content of the smart-contract.

In the third stage, the bank sends a credit application for approval to the territorial authority to AIC and after its approval sends the register of potential borrowers to the Ministry of Agriculture of Russia. At the same time, the procedure is prolonged (according to the regulation, the bank should send the extract from the register at least once a quarter, the Ministry of Agriculture of Russia reviews the data of the registers within 7 working days), which determines its duration and, as a consequence, probability of a complete devaluation of the idea of a concessionary short-term credit designed

to meet seasonal needs. The result of the third stage is the decision of the Ministry of Agriculture of Russia on the possibility of providing a concessional loan.

Using smart-contract on digital ruble platform and digital register of potential borrowers as its structural element will allow software: a) to organize the application process in real time; b) to automate the process of formal review of applications for compliance with legislative requirements for recipients of concessional loans. As a result, there are preconditions to reduce the time of coordination, simplify document management and its organization in electronic form. This will not only improve the efficiency of decision-making, but will also contribute to accelerate the loan application, to the length of which today large claims are made.

The fourth stage involves the implementation of the concessional lending mechanism. The change of forms of value and the exchange of property rights between participants during the emerging transactions allows to structure the content of this stage in the context of the relationship:

1) between the bank and the borrower to issue and repay a concessional loan, reflecting the processes of transformation of the loan capital into financial resources of enterprises when issuing credit and financial resources of enterprises into loan capital at repayment;

2) between the borrower and the supplier of purchase and sale of means and objects of labour, which are the subject of a loan agreement reflecting the movement of financial resources of business entities;

3) between the Bank and the Ministry of Agriculture on the fulfillment of budget obligations to subsidize the bank's windfall revenues, reflecting the transformation of budget funds into financial resources of financial intermediaries.

Unlike the current practices proposed algorithm for implementing the final phase of mechanism for concessional lending to AIC includes:

- entry into the software code of the smart-contract of the terms of the contracts between the parties (borrowers, banks and the Ministry of Agriculture of Russia), in which there will be automatic changes or termination of legal rights and obligations of participants in the distributed registry on the digital ruble platform, as well as the resulting payment transactions;
- automatic money transfers carried out by computer algorithm smart-contract in digital rubles using technology "coloring" (in terms of the Bank of Russia[3]), providing programming of permissible target parameters of use of concessional loans and budget funds.

PREDICTED EFFECTS OF CBDC IN MECHANISM FOR CONCESSIONAL LENDING TO AGRO-INDUSTRIAL COMPLEX

The most visible positive effects of using digital ruble in the mechanism of concessional lending will be associated with the reduction of transaction costs by automating the procedures of preparation, conclusion and execution of market agreements (loan agreement, contract of pledge, grant agreements), as well as automation and duplication of control tools in their implementation. In particular, the following possible effects are predicted:

1. Use of CBDC digital labels will eliminate the possibility of fraud and misuse of budget and credit funds at any stage of their movement. That is, the technology of "coloring" digital money will create an additional tool to control the target directions of spending, supplementing the computer algorithm of smart-contracts and automatically implemented in parallel with it in the network of distributed registries on the digital ruble platform.

[3] Official Website of Bank of Russia. The main directions of the Single State Monetary Policy for 2023 and the period 2024 and 2025. Project dated 11 August 2022. URL: https://cbr.ru/Content/Document/File/139691/on_project_2023(2024–2025).pdf (accessed on 14.09.2022).

2. The transparency of transactions with CBDC for the Central Bank will provide additional control tools that go beyond the boundaries of the distributed registry of the smart-contract, automatically implemented in the payment system of the platform digital ruble, allowing for budgetary control:

a) principles and amount for granting subsidies to authorized bank;

b) achieve results for granting subsidies;

c) verification and settlement of mutual obligations, including non-receipt of subsidies in cases of misuse of concessional credit, violations of conditions and procedure for granting subsidies or not achieving the threshold of the volume of concessional loans issued per ruble of subsidies.

3. The transparency of transactions with digital ruble (charge on the e-wallet of the borrower and crediting to the e-wallet of the provider of funds in CBDC for payment of the property that is the subject of the concessional loan) for financial intermediaries duplicates the tools for controlling the target nature of the borrower's use of concessional loan, given by the computer algorithm smart-contract and the technology of "coloring" digital money.

4. Automation of payments between the parties to a smart-contract will: reduce credit risks, risk of fraudulent activity, costs of banks (by automating document management and reducing labor cost on conclusion and monitoring of execution of banking contracts).

5. Automation of control of transaction target, cost and procedural parameters. A smart-contract containing in the form of digital codes all permissions and restrictions imposed by existing legal regulations, as well as agreements and contracts between the parties, provides for automatic suspension of its performance at any unacceptable deviation from the requirements. The result will be a triple (in addition to the digital footprint of CBDC and "coloring" technology) control over the movement, target nature and efficiency of budget and credit funds.

6. Acceleration of payment turnover as a result of automatic execution of smart contract by stages and procedures, which determine the procedure of granting and use of concessional loan, will significantly reduce time costs. Acceleration of payment turnover is especially important in short-term lending due to stringent technological requirements in the timing of the agricultural work.

7. Active penetration of the digital ruble into the payment turnover through mechanism of concessional lending to AIC will naturally contribute to strengthening the diffusion of modern digital innovations in the agricultural sector of the economy through the formation of digital habits of industry users when using this high-tech payment tool.

The use of digital ruble in mechanism of concessional lending to AIC will contribute to the overall development of information function of money and credit. However, its content in the activities of different actors will manifest itself in the goals and role in the system of emerging relationships, which allows to decompose the overall effects on more particular manifestations.

The main positive effects of using CBDC in mechanism of concessional lending to AIC can be reasonably expected for the State through:

- monetary policy — taking pressure off the money market rates that the regulator expects, especially at the stage of introduction of the digital ruble. Fixing the upper limit of concessional interest and setting limits on budgetary obligations for subsidizing authorized banks limit the ability of banks to influence both the formation of credit rates and the dynamics of lending, at least in terms of authorized bank operations by concessional lending to AIC. These funds, in fact, are not subject to the predicted negative effects associated with possible processes of transfer of funds between non-cash accounts and digital wallets of clients (reduction of bank deposits on demand, liquidity deficit, increase in the value of deposits and credits [22]). Further, as CBDC is scaled up, this private

effect will be exhausted and the influence of the CBDC model under consideration may manifest itself in the regulator's overall expectations, i.e. by strengthening the transmission of decisions on monetary policy through the system of authorized banks and the mechanism of concessional lending to the agricultural sector of the economy;

- fiscal policy — full transparency of transactions with CBDC for the regulator, the use of digital labels limiting software to the direction of use of a particular currency and the formation of a protected environment, creating conditions for the implementation mechanism of concessional lending in the form of a smart-contract, will have the greatest impact in improving the implementation of the budget policy by strengthening the control of the movement, target nature and efficiency of budget use. Additional effects for the budget system are associated with a decrease in the cost of control due to the possibilities of its automation and unloading by the Ministry of Agriculture in terms of routine control procedures, as well as a more objective and rapid assessment of the effectiveness of the use of subsidies as measured by the ratio of subsidies to banks and their concessional loans;
- agricultural policy — the use of CBDC will allow automatic monitoring of compliance of the objectives of concessional lending with the targets of the State agricultural policy, and will expand the possibilities for assessing the impact of concessional credit on the dynamics of the main macroeconomic indicators of industry development. The experience of the digital yuan pilot project in China shows that CBDC allows real-time intelligent big data monitoring to evaluate user behavior and market [23]. As a result, the additional information capabilities associated with CBDC technology can enhance the information and incentive functions of concessional agricultural loan. In terms of strengthening the information function, it is expected to increase the objectivity of the assessment of the economic impact of mechanism of concessional lending to AIC, manifested in the acceleration of economic dynamics of the industry. In terms of development, the stimulating function of CBDC will facilitate communication and reduce transaction costs for industry borrowers, which will have a positive impact on their access to concessional loans.

CONCLUSION

Without changing the essence and established approaches, the developed model of concessional lending to AIC using digital ruble includes two directions of modernization of the current mechanism. In the first direction — digitalization of the payment turnover — full replacement in payment channels of cashless money with digital money and use of technology "coloring" for programming the permissible purposes of their use. In the second direction — digitalization of control tools and automation of execution — proposed to use the technological capabilities of the digital ruble platform and features of its consumer design in part: use of digital labels indicating allowable spending purposes in CBDC; digitalization of the register of potential borrowers by including it as a structural element in the smart-contract (on the digital ruble platform); implementation of a credit flow scheme in the form of a smart-contract for concessional loans and budget funds in the form of subsidies to authorized banks.

To specify the methodology of using digital ruble in the mechanism of concessional lending to AIC developed an algorithm of its phased implementation. Starting from the stage of formation of the register of potential borrowers, mechanism of concessional lending to AIC can be automatically implemented in the form of a smart-contract on the platform of digital ruble. With the development of distributed registry technology, legislative regulation and digital ruble platform, smart-

contracts will allow to move from partial automation of individual transactions, to fully algorithmized and automatically realizable logic of multilateral interactions between banks, government and industry borrowers.

The use of CBDC in mechanism of concessional lending will reduce transaction costs in the preparation and conclusion of market agreements, as well as the automation of control tools in their implementation.

The possible impact of the use of CBDC in mechanism of concessional lending to AIC on the monetary, budgetary and agricultural policy of the state is described further. This research contributes to the theory of money (in terms of complementing the characteristics of the consumer properties of the new form of fiat money — digital ruble), public finance (complementing the control tools for the movement and efficiency of the use of budget funds) and credit (substantiation of possibilities of digitalization of procedures of the mechanism of concessional lending to the agro-industrial complex).

REFERENCES

1. Boar C., Holden H., Wadsworth A. Impending arrival — a sequel to the survey on central bank digital currency. BIS Papers. 2020;(107). URL: https://www.bis.org/publ/bppdf/bispap107.pdf
2. Boar C., Wehrli A. Ready, steady, go? — Results of the third BIS survey on central bank digital currency. BIS Papers. 2021;(114). URL: https://www.bis.org/publ/bppdf/bispap114.pdf
3. Mancini-Griffoli T., Martinez Peria M.S., Agur I. et al. Casting light on central bank digital currencies. IMF Staff Discussion Note. 2018;(08). DOI: 10.5089/9781484384572.006
4. Engert W., Fung B.S.C. Central bank digital currency: Motivations and implications. Bank of Canada Staff Discussion Paper. 2017;(16). URL: https://www.bankofcanada.ca/wp-content/uploads/2017/11/sdp2017–16.pdf
5. Alonso S.L.N., Jorge-Vazquez J., Forradellas R.F.R. Central banks digital currency: Detection of optimal countries for the implementation of a CBDC and the implication for payment industry open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*. 2021;7(1):72. DOI: 10.3390/joitmc7010072
6. Ozili P.K. Central bank digital currency research around the world: A review of literature. *Journal of Money Laundering Control*. 2023;26(2):215–226. DOI: 10.1108/JMLC-11–2021–0126
7. Cunha P.R., Melo P., Sebastião H. From Bitcoin to central bank digital currencies: Making sense of the digital money revolution. *Future Internet*. 2021;13(7):165. DOI: 10.3390/fi13070165
8. Kshetri N. The economics of central bank digital currency. *Computer*. 2021;54(6):53–58. DOI: 10.1109/MC.2021.3070091
9. Kochergin D.A. Central banks digital currencies of: World experience. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2021;65(5):68–77. (In Russ.). DOI: 10.20542/0131–2227–2021–65–5–68–77
10. Tong W., Jiayou C. A study of the economic impact of central bank digital currency under global competition. *China Economic Journal*. 2021;14(1):78–101. DOI: 10.1080/17538963.2020.1870282
11. Civelek M., Ključnikov A., Kloudová J., Vozňáková I. Digital local currencies as an alternative digital payment method for businesses to overcome problems of COVID-19 pandemic. *Polish Journal of Management Studies*. 2021;23(2):57–71. DOI: 10.17512/pjms.2021.23.2.04
12. Fernández-Villaverde J., Sanches D., Schilling L., Uhlig H. Central bank digital currency: Central banking for all? *Review of Economic Dynamics*. 2021;(41):225–242. DOI: 10.1016/j.red.2020.12.004
13. Goodell G., Al-Nakib H.D., Tasca P. A digital currency architecture for privacy and owner-custodianship. *Future Internet*. 2021;13(5):130. DOI: 10.3390/fi13050130
14. Davoodalhosseini S.M.R. Central bank digital currency and monetary policy. Bank of Canada Staff Working Paper. 2018;(36). URL: https://www.bankofcanada.ca/wp-content/uploads/2018/07/swp2018–36.pdf

15. Agur I., Ari A., Dell'Ariccia G. Designing central bank digital currencies. ADBI Working Paper. 2019;(1065). URL: https://www.adb.org/sites/default/files/publication/546921/adbi-wp1065.pdf
16. Zams B.M., Indrastuti R., Pangersa A.G., Hasniawati N.A., Zahra F.A., Fauziah I.A. Designing central bank digital currency for Indonesia: The Delphi-analytic network process. *Bulletin of Monetary Economics and Banking*. 2020;23(3):411–438. DOI: 10.21098/BEMP.V23I3.1351
17. Kochergin D.A., Yangirova A.I. Central bank digital currencies: Key characteristics and directions of influence on the monetary and payment systems. *Finance: Theory and Practice*. 2019;23(4):80–98. DOI: 10.26794/2587–5671–2019–23–4–80–98
18. Marple T. Bigger than Bitcoin: A theoretical typology and research agenda for digital currencies. *Business and Politics*. 2021;23(4):439–455. DOI: 10.1017/bap.2021.12
19. Larina O.I., Akimov O.M. Digital money at the present stage: Key risks and development directions. *Finance: Theory and Practice*. 2020;24(4):18–30. DOI: 10.26794/2587–5671–2020–24–4–18–30
20. Popova L.V., Korobeynikov D.A., Korobeynikova O.M., Telitchenko D.N. State regulation in the economic mechanism in agriculture. *Izvestiya Nizhnevolzhskogo agrouniversitetskogo kompleksa: nauka i vysshee professional'noe obrazovanie = Izvestia of the Lower Volga Agro-University Complex*. 2016;(4):292–299. (In Russ.).
21. Zhang T., Huang Z. Blockchain and central bank digital currency. *ICT Express*. 2022;8(2):264–270. DOI: 10.1016/j.icte.2021.09.014
22. Jun J., Yeo E. Central bank digital currency, loan supply, and bank failure risk: A microeconomic approach. *Financial Innovation*. 2021;7(1):81. DOI: 10.1186/s40854–021–00296–4
23. Samek M., Vlasta M. Digital yuan — currency or policy tool? *Acta Universitatis Carolinae — Iuridica*. 2021;67(3):111–127. DOI: 10.14712/23366478.2021.28

ABOUT THE AUTHOR

Dmitry A. Korobeynikov — Cand. Sci. (Econ.), Assoc. Prof., Department of Economic Security, Volgograd State Agrarian University, Volgograd, Russia
https://orcid.org/0000-0003-4499-1566
korobeinikov77@yandex.ru

Conflicts of Interest Statement: The author has no conflicts of interest to declare.

The article was submitted on 17.03.2022; revised on 30.04.2022 and accepted for publication on 27.01.2023.
The author read and approved the final version of the manuscript