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IMPLEMENTATION OF CLIMATE-RELATED RISKS IN BANKING REGULATION

Specialty 5.2.4. Finance

ABSTRACT

of the dissertation for the degree
of Candidate of Economic Sciences

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The relevance of the research topic

The regulation of climate risks within the banking system represents one of the most promising areas of research in financial theory. One of the key theoretical challenges is that climate risks fall outside the scope of traditional business cycles. The 'Green Swan' concept has shaped the contemporary understanding of climate risks in financial science and banking regulation. The combination of systemic nature and non-stationarity of climate risks constitutes a fundamental problem. Traditional risk assessment, which relies on statistical probabilities, may be ineffective for evaluating climate risks, given the complexity of determining their short- and long-term probabilities. Financial theory lacks resolved approaches to assessing the probability and financial impact of unprecedented climate events, modeling abrupt and nonlinear climate changes, and understanding the transmission of climate shocks from the real economy to bank balance sheets.

The realization of climate risks impacts macroprudential stability, which requires a reassessment of the theoretical basis and regulatory frameworks governing the banking sector. In banking practice key challenges at the regulatory level remain: defining strategic direction, particularly the prioritization of measures tailored to national specificities; calibrating climate change adaptation measures; addressing difficulties in accessing climate data.

The Bank of Russia has identified the integration of climate risks into banking regulation as a promising area for the development of banking regulation and supervision, which underscores the relevance of this research topic for the national banking system. The impact of climate risks on the banking sector has been demonstrated through climate stress testing conducted by the Bank of Russia. Climate stress can lead to a decrease in banks' capital adequacy ratios by 0.2 to 3 p. p. The impact of climate disasters depends on national economic adaptation and banks' ability to shift lending to 'green' borrowers.

The hypothesis of this study is that hazardous natural events significantly deviate from long-term historical trends in terms of frequency and intensity, which may lead to substantial financial losses in the banking sector through various transmission channels. The inability to quantitatively assess transition risks creates significant uncertainty in forecasting losses from their materialization. This underscores the need to establish conditions for integrating climate risks into bank risk management frameworks and defining appropriate regulatory measures.

Consequently, the relevance of this study is driven by the insufficient development of banking legislation regarding the regulation of physical and transition risks as specific sources of risk for the banking sector, as well as by inadequate practices in incorporating climate risks into bank risk management. The existence of unresolved issues in financial theory concerning the management of climate risks and the definition of their nature, considering their inherent systemic and non-stationary properties, further confirms the relevance of this research topic.

The state of scientific research on the problem

Issues regarding the integration of climate risks into banking regulation have been extensively addressed by the Bank for International Settlements (BIS), the Network for Greening the Financial System (NGFS), the Task Force on Climate-related Financial Disclosures (TCFD), the Financial Stability Board (FSB) of the G20, the Intergovernmental Panel on Climate Change (IPCC), the World Bank, and the International Monetary Fund (IMF). The development of methodological guidelines for managing climate risks is being carried out by the European Central Bank, the Bank of Japan, the Bank of Canada, the Bank of Korea, the Hong Kong Monetary Authority, the Bank of England, the People's Bank of China, the Monetary Authority of Singapore, the Central Bank of Brazil, the Reserve Bank of India, the Reserve Bank of New Zealand, and other regulatory authorities.

The causes of global warming have been examined by Glazyev S.Y., Bezrukov L.B., Dolgolaptev A.V., Larin N.V., Syvorotkin V.L. The relevance of analyzing the impact of climate change on the national economy has been addressed by scholars from the Russian Academy of Sciences. Ivanov V.V. and Nurmuhametov R.K. have established that climate-dependent financial risks are extensive in scale, which necessitates their integration into financial risk management frameworks. Issues regarding the incorporation of climate risks into banking regulation have also been explored by Akimov O., Burova A., Deryugina E., Ivanova N., Morozova M., Penikas G., Popova S., Sinyakov A., Turdyeva N., Tochitskaya I., Trushina K.

The Bank of Russia publishes consultation papers on the integration of climate risks in the financial sector, alongside information and analytical materials regarding climate risk monitoring, comparisons of regulatory approaches to the ESG agenda, financial institutions' approaches to managing climate risks, and climate risk stress testing.

Furthermore, the Bank of Russia has developed recommendations for incorporating climate risks into the risk management frameworks of financial institutions.

Significant contributions to the study of economic aspects related to climate change have been made by scholars such as Edenhofer O., Klein C., Lessmann K., Sachs J., Wilkens M. A major milestone in the discussion on the interplay between climate change and financial markets was marked by the proposals of Carney M., who advanced the concept of the 'tragedy of the horizon' in the context of climate change and financial stability.

The impact of climate factors on macroeconomic indicators and the banking system has been demonstrated by foreign researchers, including Dasgupta S., van Maanen N., Gosling SN., Piontek F., Otto C., Schleussner CF., Moore F. C., Baldos U. L. C., Hertel T., Gafoor A.C.P., Shamshadali P., Fousiya P.N., Subeesh V.K., Dinesh P.K., Dell M., Jones B. F., Olken, B. A., Burke M., Kotz M., Brighi P, Bellinvia A., Venturelli V., Algeri C., Bressler R. D., Frost J., Madeira C., Abinzano I., Corredor P., Mansilla-Fernández J. M., Kanagaretnam K., Maso L. D., Jia X., Kapetanakis K. M., Floros C., Tan Y., Kumari V., Pandey D. K., Mueller I., Sfrappini E., Santilli G., Fiordelisi F. and others.

Based on the reviewed literature, it can be noted that there is a scarcity of national studies on the topic of this dissertation. Issues regarding the implementation of climate risks into banking regulation, the assessment of the impact of climate factors on the activities of domestic credit institutions, and the integration of climate risks into bank risk management have not been fully explored in the scientific community. Furthermore, no national dissertation-level research has been identified on the topic of implementing climate risks into banking regulation.

Research aim and objectives

The aim of this study is to propose measures for improving approaches to incorporating climate risks into banking regulation and the risk management frameworks of credit institutions.

In order to accomplish the stated aim, the following objectives were formulated and subsequently resolved:

1) to evaluate the essence of climate risks regarding their influence on the banking sector driven by climate factors;

2) to systematize the approaches used by regulators for assessing climate risks and to analyze the quality of climate risk management in financial institutions;

3) to employ econometric modeling to examine the correlation between ESG index volatility and metrics reflecting corporate borrower credit risk, and to analyze the influence of climate factors on the dynamics of non-performing loans among national corporate borrowers;

4) to develop regulatory measures that enable macroprudential policy to mitigate threats associated with climate risks;

5) to formulate theoretical and methodological frameworks and practical recommendations aimed at improving the national banking regulatory framework concerning the integration of climate risks;

Object and subject of the study

The research object is the condition of the banking sector in the context of climate factors' impact. The research subject of this study is the theoretical and methodological framework concerning the incorporation of climate-related risks into banking regulatory practices.

Scientific novelty of the research

The key research findings achieved by the author in this study are as follows:

1. The conceptual understanding of climate risks has been expanded. National and international experience in integrating climate risks into banking regulation and the risk management frameworks of financial institutions has been systematized. Recommendations for the effective management of climate-related financial risks have been consolidated. The significance of regulatory monitoring of how supervised entities incorporate climate risks into their risk management practices has been confirmed.

2. This research identifies key challenges in integrating climate risks into the risk management of national financial institutions. The necessity for credit institutions to incorporate climate risks into corporate governance, internal control systems, risk management practices, capital adequacy assessments, liquidity management, and stress testing has been substantiated. A comparative study of climate risk management was conducted using the examples of a systemically important credit institution and a non-systemically important credit institution.

3. Based on the developed econometric model, the impact of climate factors on changes in non-performing loans (NPLs) of domestic corporate borrowers has been established. Furthermore, econometric modeling has revealed a correlation between ESG index volatility and credit risk indicators of corporate borrowers.

4. Proposals have been developed for the enhancement of macroprudential tools aimed at building capital buffers in the banking sector to absorb potential losses under stress conditions.

5. Recommendations are made to update banking legislation and regulatory-reporting frameworks to explicitly account for climate-related risks.

Theoretical significance of the study

The theoretical significance of this research consists in advancing the conceptual understanding of climate risks and broadening the range of instruments available for their management within the banking sector. Furthermore, it systematizes domestic and foreign practices regarding the integration of climate risks into regulatory frameworks and provides an evaluation of how climate factors influence the activities of national banks.

Practical significance of the study

The practical significance of this dissertation research lies in the development of an econometric model that demonstrates the impact of climate factors on the creditworthiness of domestic corporate borrowers. The formulated recommendations for integrating climate risks into banking regulation can be utilized to enhance the regulatory framework regarding the incorporation of climate factors, as well as to ensure the methodologically sound integration of these risks into risk management systems.

Research methods

The research base consists of legislative and regulatory acts governing banking activities, works by domestic and foreign scholars in the field of bank management of climate risks and assessment of climate-related risks, as well as supervisory guidelines. Additionally, the study utilizes analytical reports from the Bank of Russia and foreign central banks, along with materials from the Bank for International Settlements (BIS), the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), the Financial Stability Board (FSB), the Task Force on Climate-related Financial Disclosures (TCFD), and the Network for Greening the Financial System (NGFS).

This research adopts an interdisciplinary approach, combining traditional scientific analysis methods – such as systemic and analytical frameworks – with comparative data analysis grounded in applied research. Econometric modeling and parameter estimation were conducted using the EViews software package. Statistical data processing and the visualization of results were performed using MS Office tools.

The empirical foundation of this research relies on open-source data from the Federal State Statistics Service of the Russian Federation (Rosstat), the Bank of Russia, PJSC Moscow Exchange, the Climate Data Centre of Roshydromet, climate databases.

Research contributions

1. The essence of the climate risk concept has been broadened by adding to the Bank of Russia's definition the recognition that climate factors, which tend to deviate from long-term historical trends, can lead to substantial financial losses. To improve macroprudential instruments, the study proposes the implementation of a differentiated climate risk capital buffer. This buffer is designed to create capital reserves for absorbing increased losses during stress scenarios and to strengthen the banking sector's resilience to climate risks. The calibration of this buffer should adhere to the principle of proportionality. To improve the institutional structure, it is proposed to establish a specialized development institute for climate risks. This entity would function as a climate data hub and a center of competence, thereby helping to mitigate the deficit of high-quality data and the shortage of expertise in managing climate risks within the banking sector (p. 5. «Banking regulation. The system of banking supervision and its elements», p. 24 «Financial markets: typology, specifics, features of functioning. Regulation of financial markets» of the Passport of scientific specialty 5.2.4 Finance).

2. The study develops an econometric model proving that climate factors significantly influence the creditworthiness of national corporate borrowers in the transport and communications industries. Furthermore, it establishes a correlation between fluctuations in ESG index values and the level of non-performing loans among corporate borrowers. It is hypothesized that firms with full transparency regarding sustainable development issues and better dynamics in sustainability indicators maintain higher payment discipline, thereby contributing to a reduction in the overall volume of non-performing loans within the corporate borrowing sector. Based on econometric modeling, the stated correlation between the dynamics of the Moscow Exchange – RUIE

'Responsibility and Openness' Index and the level of non-performing loans (NPLs) extended to corporate borrowers in the transport and communications sectors has been confirmed (p. 5. «Banking regulation. The system of banking supervision and its elements», p. 24 «Financial markets: typology, specifics, features of functioning. Regulation of financial markets» of the Passport of scientific specialty 5.2.4 Finance).

3. Theoretical and methodological frameworks and practical recommendations have been developed to enhance national banking legislation regarding the integration of climate risks:

– paragraph 2.4 of Chapter 2 of Regulation No. 310-P of the Bank of Russia dated September 7, 2007, it is proposed to include information on the effectiveness of the bank's management of climate risks in the bank's dossier compiled by the curator, which will make it possible to assess the impact of climate risks on the bank's stability;

– in subparagraph 3.1.1 of paragraph 3.1, Chapter 3 of Bank of Russia Regulation No. 590-P dated June 28, 2017, it is proposed to stipulate the requirement to reflect, within the borrower's professional judgment, information regarding the methodology used to analyze the impact of climate risks on the borrower's economic activities. It is proposed to supplement Paragraph 3.3 of Chapter 3 of Bank of Russia Regulation No. 590-P dated June 28, 2017, with a requirement to account for the impact of adverse consequences associated with the materialization of climate risks when assessing the borrower's financial position. In the event that significant financial losses are identified for a borrower due to the materialization of climate risks, the borrower's financial position cannot be assessed as 'good'. This criterion could be incorporated into subparagraph 3.4.1 of paragraph 3.4, Chapter 3 of Bank of Russia Regulation No. 590-P dated June 28, 2017. Furthermore, it is proposed to amend Chapter 6 of the same Regulation to explicitly prohibit the recognition of collateral when calculating loan loss reserves, provided that the collateral is significantly exposed to climate risks;

– it is proposed to amend Bank of Russia Directive No. 4336-U dated April 3, 2017, to require an analysis of the integration of climate risks into the activities of credit institutions, specifically regarding the assessment of risk management indicators, internal control, strategic risk management, and concentration risk;

– it is proposed to amend Annex 1, 'Requirements for the Organization of Procedures for Managing Specific Types of Risks,' to Bank of Russia Directive No.

3624-U dated April 15, 2015, by adding a dedicated chapter on the methodology for assessing climate risks.

The study recommends amending Report Form 0409303 ('Information on Loans Granted to Legal Entities') to include fields disclosing the extent of the borrower's exposure to climate risks and identifying any loan collateral situated in zones of high climate risk. The study recommends adding a dedicated section to Report Form 0409310 ('Information on Collateral Accepted by Credit Institutions as Security for Loans') to identify pledged assets whose valuation is highly vulnerable to climate risks. Importantly, such regulatory requirements should adhere to the principle of proportionality, taking into account the size, complexity, systemic importance, and risk profile of the credit institution (p. 5. «Banking regulation. The system of banking supervision and its elements», p. 24 «Financial markets: typology, specifics, features of functioning. Regulation of financial markets» of the Passport of scientific specialty 5.2.4 Finance).

Validity and reliability of the findings

The reliability of the research findings is ensured by a comprehensive approach to scientific analysis and computations, based on the application of well-established econometric methods and the use of modern software tools, specifically the specialized EViews software package for econometric analysis. Furthermore, the findings possess a high level of reliability due to the utilization of representative samples. The validity of the findings is substantiated by the statistical significance of the econometric model's results. The significance of both the individual parameters and the overall model is confirmed via Student's t-tests and the Fisher F-test, respectively. Additionally, the model demonstrates a high coefficient of determination and a low approximation error, indicating a strong fit. The empirical foundation of the study comprises data from the Federal State Statistics Service of the Russian Federation (Rosstat), the Bank of Russia, PJSC Moscow Exchange, as well as data from the Climate Data Centre of Roshydromet.

Compliance with the scientific specialty

The dissertation research aligns with scientific specialty 5.2.4 Finance. The research focuses on the following areas: p. 5. «Banking regulation. The system of banking supervision and its elements», p. 24 «Financial markets: typology, specifics, features of functioning. Regulation of financial markets».

Approbation of research results

The research findings have been incorporated into the undergraduate course 'ESG Banking.' The study materials were presented and discussed during lectures for Bank of Russia employees. The key provisions, conclusions, and results of the research were validated through publications in scientific journals. The author has published 5 articles with a total volume of 4.74 printed pages (author's contribution: 4.7 printed pages). Among these, 4 articles were published in journals included in the list of publications recommended by the Higher Attestation Commission (VAK) of Russia for publishing the main scientific results of dissertations for the degree of Candidate (Doctor) of Sciences. This includes 3 articles published in peer-reviewed scientific journals recommended for defense at the Dissertation Council of the Russian Presidential Academy of National Economy and Public Administration (RANEPA) under the President of the Russian Federation for the relevant specialty; these journals are classified as Category 1 (K1) and Category 2 (K2) by the VAK under the Ministry of Science and Higher Education of the Russian Federation. Furthermore, the research results were discussed at 4 scientific and practical conferences.

Author's publications

1. Klek A.V. Assessment of the Efficiency of Mortgage Lending Implementation through the Lens of Contributing to National Socio-Economic Development // Fundamental Research. 2023. No. 7. Pp. 26-33.

2. Klek A.V. The Impact of Climate Risks on the Creditworthiness of Domestic Corporate Borrowers // Economic Development of Russia. 2025. Vol. 32. No. 12. Pp. 323-327.

3. Klek A.V. National Experience in Implementing Climate Risks into Banking Regulation // Eurasian Science Journal. 2025. Vol. 17. No. s1. URL: https://esj.today/PDF/35FAVN125.pdf

4. Klek A.V., Rubtsov B.B. International Experience in Accounting for Climate Risks in Banking Regulation // Finance, Money, Investments. 2025. No. 1. Pp. 11-18.

5. Klek A.V. Minimizing the Negative Consequences of Credit Risk Materialization in the National Banking Sector // Scientific Review. Economic Sciences. 2021. No. 2. Pp. 23-28.

6. Klek A.V. Climate Risk Management in Banking Regulation / A.V. Klek // Scientific Forum: Economics and Management: Collection of articles based on the materials of the CVI International Scientific and Practical Conference. MCNO. – 2026. – No. 5(106).

7. Klek A.V. Climate Risks as an Object of Bank Risk Management / A.V. Klek // Current Issues of Economic Sciences and Modern Management: Collection of articles based on the materials of the CVIII International Scientific and Practical Conference. SibAK. – 2026. – No. 7(91).

8. Klek A.V. Climate Risks in Banking Practice / A.V. Klek // Issues of Management and Economics: Current State of Urgent Problems: Collection of articles based on the materials of the CIX International Scientific and Practical Conference "Issues of Management and Economics: Current State of Urgent Problems". Internauka. – 2026. – No. 7(99).

9. Klek A.V. Accounting for Climate Risks as a Promising Direction in Banking Regulation / A.V. Klek // Prospective Scientific Research: Theory, Methodology, and Practice of Application: Collection of articles of the International Scientific Conference. MIPI named after Lomonosov. – 2026. – No. 0623. DOI: 0.58351/260623.2026.44.47.001

Structure of the Dissertation

The structure of the dissertation is organized in accordance with the stated aim and objectives. It comprises an introduction, three chapters, a conclusion, and a bibliography containing 244 entries (including 146 sources in foreign languages). The dissertation spans 189 pages and includes 4 tables and 28 figures. Chapter 1 elucidates the conceptual and theoretical aspects of researching the paradigm of banking supervision in the context of climate risk regulation. Chapter 2 is dedicated to the incorporation of climate risks into the risk management frameworks of domestic financial institutions. Chapter 3 presents the development of an econometric model to assess the impact of climate factors on the creditworthiness of domestic corporate borrowers. Furthermore, this chapter provides recommendations for integrating climate risks into banking regulation and the risk management practices of credit institutions. The Conclusion summarizes the key findings of the study, offers practical recommendations, and outlines prospects for further research on the topic.