

## CLIMATE-RELATED RISKS: IMPACT AND CHALLENGES FOR FINANCIAL INSTITUTIONS

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### Abstract

*Climate change awareness and the necessity of taking steps to lessen its long-term implications on the economy, regions, cities, and population have gained importance in recent years. The transition to a low-carbon economy presents various challenges for governments, organizations, authorities, businesses, and the public. In this context, financial institutions, as key participants in the economic landscape, can and should play a significant role in translating environmental strategies into the real economy. The purpose of the study is to identify and examine how banks are affected by climate change risks and determine the primary mitigation strategies that banks must use to guarantee a sufficient risk management system, control the impact on financial results and maintain the financial stability at country level, while continuing to be a main player in stimulating the global economy in implementing sustainable practices and reducing climate impact. Materials and methods used were driven by collecting statistical data provided by banks and non-banking financial institutions (IFN) which were analysed in order to come to conclusions as regards changes needed on bank's risk policies, quantification systems and methods (including stress-test. The study main results underline that banks need to continue and intensify incorporating climate risks in the internal risk management policies and risk assessment models (including stress testing) which will support anticipating and managing the impact of future extreme events, potential disruptions in clients' supply chains, interdependencies, and cascading impact potential. Moreover, through financing green investments, banks can contribute to achieving sustainable economic growth and reducing carbon emissions and the impact of climate change.*

**Key words:** climate risks, transition, low-carbon economy, green investments, risk management, financial stability

### INTRODUCTION

As climate change intensifies and becomes an important topic for international organizations, states, public opinion, mass media, etc., credit institutions, in their capacity as financial intermediaries, respectively financiers of the real economy, are seen more and more than having an essential role in translating environmental strategies into lending policies for corporate and natural customers.

As such, through the lending decisions/orientation of the resources attracted in loans granted to economic sectors, credit institutions contribute, together with states, regulatory and supervisory authorities, to stimulating the global economy in the implementation of sustainable practices and reducing the climate changes impact, by

including these items as specific requirements in their own credit policies [2].

The topic of exposure to climate risks must also be addressed at the country level. Countries exposed to climate risks can substantially increase the level of systemic risk of banks operating in that country, mainly due to losses from loans granted (as an effect of the impact of climate risks on customers' ability to repay committed loans) [15].

In this situation, credit institutions have an interest in identifying, assessing, and minimizing exposure to credit risk, specifically the non-payment of loans made to clients who are exposed to the effects of climate change. As a result, they must make investments in risk management strategies and tactics associated with this area.

This is a reason why the authorities have begun to pay more attention to the regulation and supervision of this field, including by

carrying out crisis simulations (stress-test) on the impact of financial and capital losses that banks can register in certain negative scenarios. Also, reporting requirements regarding exposure to climate risks and measures taken by financial institutions were implemented [2].

In addition, banks must meet transparency standards regarding internal governance on addressing climate risks (aiming, for example, the senior management involvement, etc.).

For policymakers, the conflict in Ukraine brought to light some medium-term structural concerns, such as the potential for the geopolitics of energy security to endanger the climate transition, and emphasized the urgency of reducing dependence on carbon-intensive energy and accelerating the transition to more renewable resources with reduced impact on the environment [7].

Additional actions are intended to increase funding for the shift to a greener economy and enhance the infrastructure for gathering data on funding in this field.

On the other hand, environmental protection associations and bank shareholders put pressure on them to reduce the carbon footprint of their activities.

The main purpose of the study is, on one hand, to identify and analyse the impact of climate change related risks at the level of individual banks and the systemic risks for financial stability at the level of countries or the EU and to identify the main channels (for example credit risk, market risk, litigation losses etc).

On the other hand, the study is targeting the identification of main mitigating actions needed to align the banks credit risk strategy with environmental objectives, which encourages sustainable economic development but also a healthy loan portfolio. While supporting the opinion that banks are a main player in stimulating the customers in implementing sustainable practices and reducing climate impact via the loans granted.

## **MATERIALS AND METHODS**

The present study uses an integrative methodology for the assessment of climate

risks associated with the credit portfolios of banking institutions, aiming at their alignment with the objectives of sustainability and sustainable development. The methodology involved three main stages: the collection of statistical data, the analysis and assessment of risks and the integration of the results into conclusions regarding possible lending strategies, all carried out with attention to the particularities of each affected economic sector.

The statistical analysis of the data was carried out on the basis of the information provided by banks and non-banking financial institutions (IFN), using the following methodological steps:

### **Classification and quantification of risks**

The data was organized into climate and environmental risk categories with the greatest impact on financial stability, generating an aggregate picture of the perception of physical and transition risks.

### **Physical risk assessment takes risk assessment into account.**

The analysis made it possible to rank the risks based on how frequently banks and IFNs consider them.

### **Identifying potential risks associated with climate risks**

Data were collected on related risks assessed by financial institutions, and responses were averaged in descending order of perceived importance.

### **Analysis of green products**

Information on the adoption of green financial products was evaluated, allowing a classification of institutions according to their involvement in sustainable products.

Data were statistically analyzed to establish general trends, differences between institution types and rank risks and sustainable solutions based on reported frequency.

## **RESULTS AND DISCUSSIONS**

The complexity of climate-related risks implies the use of advanced risk assessment tools/methods and a risk management framework that allows banks to align their credit risk strategy with environmental objectives, which encourages sustainable

economic development but also a healthy loan portfolio.

A recent development/opportunity is the use of artificial intelligence (AI) and Machine Learning methods, which allow providers of climate risk assessment tools and banks to maximize existing data and information, provide opportunities to identify high-risk areas and even predict natural disasters, such as fires and floods, with a higher degree of accuracy than previous techniques [2].

Purchasing trustworthy instruments to evaluate the effects of climate change and having access to enough climate data for risk models are very important for credit institutions in the process of assessing risks and identifying business opportunities.

This can help them anticipate future extreme events in the localities/sectors of the real economy where they operate and identify potential disruptions to customer supply chains, interdependencies and potential cascading impacts.

Depending on the results, banks can set their lending policy to various customers and adopt proactive strategies such as requiring insurance of fixed assets/products etc.

Their implementation requires appropriate budgets, experience and implementation efforts over time.

Risk models must take into account the challenges given by the specifics of some economic sectors, such as agriculture and the real estate sector (in the latter, for example, data on carbon dioxide emissions, energy consumption, the need to transform into buildings with low/even zero carbon dioxide emissions, etc.).

As part of its annual stress test from 2022, the European Central Bank (ECB) administered a climate risk stress test to 104 major institutions. The test examined the development of the methods banks use to conduct these tests and the primary risks that banks face in terms of transition risks and major physical risk events.

One conclusion is that banks still do not adequately consider climate risks in their internal risk assessment models and stress tests, although the situation has improved since 2020.

At the same time, most banks in the Eurozone do not have a sufficiently developed framework for modeling climate risks and, in general, do not take them sufficiently into account when granting loans.

In Romania, according to a BNR report, the economic sectors considered to be the most exposed to transition risks are the following: agriculture, extractive industry, beverage manufacturing, food industry; manufacture of tobacco products, paper, coke oven products, chemical substances and products, basic pharmaceutical products and pharmaceutical preparations, other products from non-metallic

minerals, metallurgical industry, industry of metal constructions and products from metal, production and supply of electricity and thermal energy, gas, hot water and air conditioning, land transport and pipeline transport, air transport, construction, real estate transactions, etc. [11].

The importance of monitoring the exposure to the risks related to these sectors exposed to transition risks also derives from the high weight, respectively between 41% and 60% of interest and commission income for Romanian banks, a similar level being registered at the European level (more than 60 percent of banks' interest and fee income according to the results of the ECB's climate risk stress test in 2022) [11].

In the same context, at the level of the European Union, a high correlation can be observed between the exposure from loans on economic sectors that participate more in the emission of carbon dioxide (for example, banks' exposure to loans in the manufacturing sector is about 20%, which is rather significant given that these sectors contribute over 40% of emissions) [14].

Through conventional channels, such as credit risk and market risk, as well as litigation losses, such as those pertaining to credits that finance polluting activities, the effects of climate change involve risks for financial stability at the national or EU level as well as risks for individual banks [4].

The risks determined by climate change can be classified according to their impact on the sustainability of the business model of credit

institutions in Romania into two main types, respectively:

a. **physical risks**, caused by extreme weather (storms, hail, tornadoes, floods) and rising temperatures;

b. **issues related to the shift to a carbon dioxide-neutral economy** from the perspective of carbon dioxide emissions (e.g., legislative actions, changing customer preferences) (Figure 1) [11].

The dynamic effects of physical and transition risks on economic sectors should not be understated by climate-related risk analyses. Some of these effects have not yet been demonstrated, but they could materialize in the future in areas like the risk of armed conflicts and social, with associated political and economic ramifications from forced migration brought on by rising temperatures. [2].

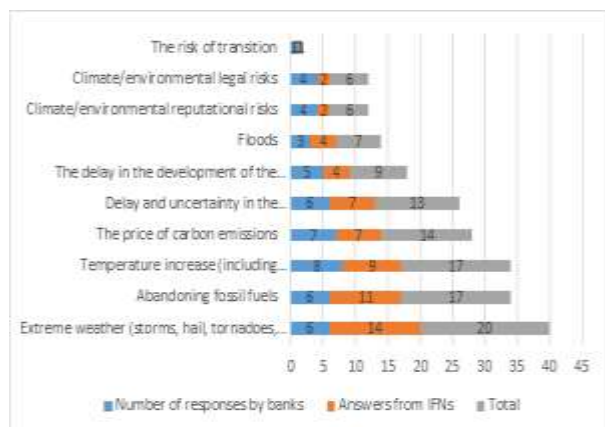


Fig. 1. Top of climate and environmental risks for banks and IFNs in Romania  
 Source: data processing [11].

Another dimension of the problem is that of the possibility of cascading disasters, determined by the impact of some natural disasters on other disasters, such as drought that produces fires, which in turn negatively affect flora and fauna.

The risk categories included in physical risk exposure assessments carried out by banks are usually the most important of those mentioned above, namely floods, extreme weather, drought (Figure 2) [11].

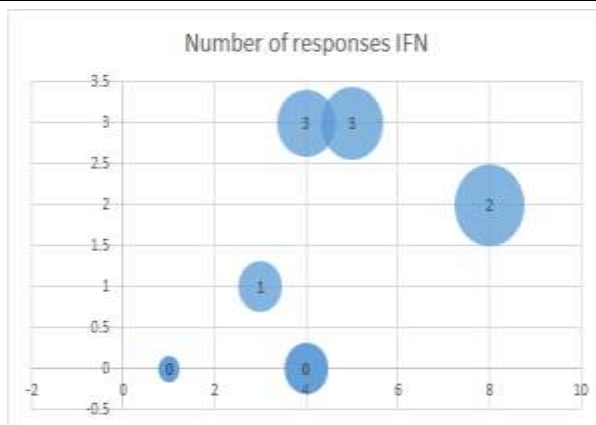


Fig. 2. Top of risks considered by financial institutions when assessing physical risk  
 Source: data processing [11].

Romanian banks have implemented measures to monitor and mitigate climate risks and have established objectives, targets, limits, climate risk maps or sectoral policies or intend to develop such indicators in the coming period. [11].

The implementation and integration of climate risk assessment systems in the management of the activity of financial institutions is very important for them because it allows them to proactively address potential vulnerabilities/risks that may affect their profitability, strengthening their ability to withstand shocks/crisis and improving the strategic decision-making process.

From the taxonomy of risks specific to the activity of credit institutions, the top risks that can be affected by climate factors are credit risk, reputational risk and operational risk (Figure 3) [8, 9].

At EU level, losses related to credit and market risks resulting from the improper transition to an economy with low carbon dioxide emissions could have the following evolution:

- for legal entities: physical risks could become a major problem in the next 15 years;
- for banks: losses of up to 1.75% of risk-weighted exposures could be recorded until the middle of the current century, concentrated in the electricity and real estate sectors [14].



Fig. 3. Types of risks considered by financial institutions  
 Source: data processing [11].

Romanian financial institutions believe that financing green investments generates opportunities for business development and contributes to achieving sustainable economic growth, reducing carbon emissions and increasing the rate of green assets (including by issuing green bonds or investing in such bonds issued by government institutions or by non-financial corporations) (Figure 4) [11, 13].

The "Other" category refers to the increase in financing in green assets: electric locomotives, electric and hybrid cars, electric or alternative fuel trucks, electric charging stations, photovoltaic panels, etc.

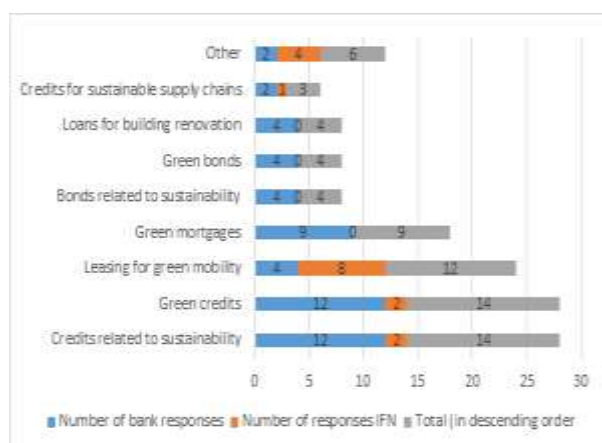


Fig. 4. The main green products granted by credit institutions and IFNs  
 Source: data processing [11].

Financial institutions can offer green loans as well as financing to help meet other environmental goals aimed at the transition to a circular economy, the sustainable use and protection of water and marine resources, the

prevention and control of pollution, and the protection and restoration of biodiversity and ecosystems [1, 3, 5, 6, 10, 12].

## CONCLUSIONS

The impact of climate change is felt across many sectors, including credit institutions, which can primarily contribute—through the loans granted to clients—to stimulating the global economy in implementing sustainable practices and reducing climate impact.

As this is a relatively new field, banks need to continue or intensify their investment in methods and techniques for managing the associated risks.

Additionally, they should increasingly incorporate climate risks into their internal risk assessment models (including by setting objectives, targets, limits, climate risk maps, or sector-specific policies) and in stress testing or crisis simulations. Their implementation requires appropriate budgets, experience and implementation efforts over time.

This approach can help them anticipate future extreme events in the regions or sectors of the real economy where they operate and identify potential disruptions in clients' supply chains, interdependencies, and cascading impact potential.

Moreover, by financing green investments, banks create opportunities for business development and contribute to sustainable economic growth and a reduction in carbon emissions and the impact of climate change.

Banks have to align their credit risk strategy/set their lending policy principles with the environmental objectives.

## REFERENCES

- [1] Burlacu, O.S., Turek-Rahoveanu, M.M., Zugravu, C.L., 2020, Circular economy applied in the Romanian society and institutions-perspectives, innovation. Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development", Vol. 20(1), 111-118.
- [2] Carlin, D., Li, W., Lorkowski, L., Cheng, H.-Y., UNEP FI's 2023 Climate Risk and Task Force on Climate-Related Financial Disclosures (TCFD) Programme, 2024 Climate Risk Landscape Report, April 2024, pp. 2-22, <https://www.unepfi.com>

org/themes/climate-change/2024-climate-risk-landscape/, Accessed on 10.11.2024.

[3]Croitoru, I.M., Grigoras, M.A., Popescu, A., Grigoras, B.A., 2024, Embracing the circular economy: a paradigm shift for sustainable prosperity, *Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development"*, Vol. 24(2), 397-406.

[4]European Commission, Report from the European Commission on the monitoring of climate-related risk to financial stability, Brussels, 28.6.2024, C(2024) 4372 final, pp. [https://finance.ec.europa.eu/publications/report-monitoring-climate-related-risk-financial-stability\\_en](https://finance.ec.europa.eu/publications/report-monitoring-climate-related-risk-financial-stability_en), Accessed on 11.11.2024.

[5]Frone, D.F., Frone, S., 2023, Green public procurement as a circular economy policy, *Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development"*, Vol. 23(2), 237-246.

[6]Frone, D.F., Frone, S., 2015, Resource efficiency objectives and issues for a green economy, *Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development"*, Vol. 15(3), 133-138.

[7]International Monetary Fund, Global financial stability report: shockwaves from the war in Ukraine test the financial system's resilience, April 2022, pp. xi-xiv, <https://www.imf.org/en/Publications/GFSR/Issues/2022/04/19/global-financial-stability-report-april-2022>, Accessed on 10.11.2024.

[8]Gorgon, E., Marcuta, A., 2023, Study on the role of factoring in business financing, *Scientific Papers Series Management, Economic Engineering in Agriculture & Rural Development*, 23(3), 323-334.

[9]Marcuta, A., Marcuta, L., 2022, The impact of the COVID-19 crisis on the banking system in Romania. *Scientific Papers Series Management, Economic Engineering in Agriculture & Rural Development*, 22(3), 389-395.

[10]Marcuta, L., Onea (Stanciu), M.G., Marcuta, A., 2023, Analysis of the relationship between tourism and the circular economy: a critical review of the literature. *Scientific Papers, Series "Management, Economic Engineering in Agriculture and rural development"*, Vol. 23(3), 555-564.

[11]National Bank of Romania, Climate risk dashboard for the banking sector in Romania 2023, Annexes 1 Climate-relevant sectors, pp. 5-21, <https://www.bnr.ro/PublicationDocuments.aspx?icid=31565>, Accessed on 10.11.2024.

[12]Nicolau, A.I., Ionitescu, S., Moagar-Poladian, S., Tilea, D.M., Dinu, A.M., 2024, Challenges in implementing circular economy strategies in Romania, *Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development"*, Vol. 24(1), 669-684.

[13]Nuță, F., Marcuta, A., Marcuta, L., Nuta, A.C., 2024, National Bank of Romania: Recent Challenges. Governance and Policy Transformations in Central Banking, pp. 156-168.

[14]Phiebert, P., 2021, Tackling climate-related risks in the European Union: Evidence-based macroprudential reflections, Panel "Climate-related risks – the potential role of borrower-based measures" Bank of Lithuania 2021 Macroprudential Policy Conference, 5 October 2021, slides 9-13, [https://www.lb.lt/en/media/force\\_download/?url=%2Fuploads%2Fdocuments%2Ffiles%2FSession+5\\_PHIEBERT.pdf](https://www.lb.lt/en/media/force_download/?url=%2Fuploads%2Fdocuments%2Ffiles%2FSession+5_PHIEBERT.pdf), Accessed on 10.11.2024.

[15]Wu, B., Wen, F. Zhang, Y., Huang, Z. (J.), 2024, Climate risk and the systemic risk of banks: A global perspective, *Journal of International Financial Markets, Institutions and Money*, Vol. 95, Sept. 2024, 102030, pp. 1-3, <https://www.sciencedirect.com/science/article/pii/S1042443124000969#s0125>, Accessed on 10.11.2024.