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ADJUSTING INSTITUTIONAL ENVIRONMENT OF BANKS TO CLIMATE CHANGE AND RISKS

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Climate change issues increase the role of sustainable economic growth, which requires sustainable financial sector. For development of sustainable financial sector, results of scientific studies demonstrate a special role of banks, which are able to generate private investments for environmental and consequent socio-economic challenges. According to scientific literature, the authors emphasize that involvement of banks in development of sustainable financial sector depends on three directions for addressing climate change in financial sector – climate risks assessment practices, regulatory framework that takes into account climate change and characteristics of climate risks, corporate social responsibility. Additionally, the recent knowledge displays that climate change appears as cascading risks with possible negative effects on soundness of banking sector. As far as institutional environment of banks is substantial for their soundness, special attention has to be paid to its characteristics in the context of climate change and climate risks, which actualize necessity of adjustments. The aim of the present study is to find, which accents appear for each factor of institutional environment of banks as well as to expand a set of factors by understanding a place of climate change and climate risks through their effects on financial sector. As a result of the analysis, for the institutional environment of banks, the authors indicate new accents, which appear due to climate change and climate risks as well as offer additional factors such as regulatory framework for banks in terms of climate change, social responsibility of banks related to climate change as well as application of financial instruments for development of technologies for solving environmental issues. The novelty of research appears in the complex considering of institutional environment of banks in the context of climate change what rarely is presented in studies.

Keywords: institutional environment of banks, climate change, environmental sustainability, sustainable financial sector, sustainable decision-making, sustainable development, ecological economics.

Banku institucionālās vides pielāgošana klimata pārmaiņām un klimatiskiem riskiem

Klimata pārmaiņu radītas problēmas palielina ilgtspējīgas ekonomiskās izaugsmes lomu, kurai ir nepieciešams ilgtspējīgs finanšu sektors. Zinātnisko pētījumu rezultāti parāda, ka ilgtspējīga finanšu sektora attīstībā īpašu lomu spēlē bankas, kuras spēj piesaistīt privātās investīcijas vides un no tiem izrietošiem sociālekonomiskiem izaicinājumiem. Analizējot zinātnisko literatūru, autori uzsver, ka banku iesaiste ilgtspējīga finanšu sektora attīstībā ir saistīta ar trim virzieniem, kuri nosaka, kā risināt klimata pārmaiņu jautājumus finanšu sektorā – klimata risku novērtēšanas praksēm, normatīvo regulējumu, kas ņem vērā klimata pārmaiņas un klimata risku iezīmes, korporatīvo sociālo atbildību. Turklāt, jaunāko pētījumu rezultāti parāda, ka klimata pārmaiņas parādās kā kaskādes riski ar iespējamu negatīvu ietekmi uz banku sektora stabilitāti. Tā kā banku institucionālā vide ir būtiska to stabilitātei, īpaša uzmanība jāpievērš tās īpatnībām klimata pārmaiņu un klimata risku kontekstā, kas aktualizē nepieciešamību pielāgoties. Šī pētījuma mērķis ir noteikt jaunus akcentus katram banku institucionālās vides faktoram kā arī paplašināt faktoru kopumu, izprotot klimata pārmaiņu un klimata risku vietu caur to ietekmi uz finanšu sektoru. Analīzes rezultātā autori parāda jaunus akcentus banku institucionālajā vidē, kas parādās klimata pārmaiņu un klimata risku ietekmē, kā arī piedāvā papildu faktorus, kā piemēram, banku normatīvais regulējums un banku sociālā atbildība klimata pārmaiņu jomā, kā arī finanšu instrumentu pielietošana tehnoloģiju izstrādei apkārtējās vides problēmu risināšanai. Pētījuma novitāte parādās kompleksajā banku institucionālās vides analīzē klimata pārmaiņu kontekstā, kas pētījumos tiek atspoguļots reti.

Atslēgvārdi: banku institucionālā vide, klimata pārmaiņas, apkārtējās vides ilgtspēja, ilgtspējīgs finanšu sektors, ilgtspējīga lēmumu pieņemšana, ilgtspējīga attīstība, ekoloģijas ekonomika.

Адаптация институциональной среды банков к изменению климата и климатическим рискам

Проблемы изменения климата повышают роль устойчивого экономического роста, для которого необходим устойчивый финансовый сектор. Результаты научных исследований демонстрируют, что особую роль для развития устойчивого финансового сектора играют банки, которые способны привлекать частные инвестиции для решения экологических и вытекающих из них социально-экономических задач. После анализа научной литературы, авторы подчеркивают, что участие банков в развитии устойчивого финансового сектора связано с тремя направлениями для действий с изменением климата в финансовом секторе — практиками оценки климатических рисков, развитием нормативно-правовой базы согласно тенденциям изменения климата и особенностями климатических рисков, корпоративной социальной ответственностью. Кроме того, результаты новейших исследований показывают, что изменение климата проявляется в виде каскадных рисков с возможным негативным воздействием на стабильность банковского сектора. Поскольку институциональная среда банков существенна для их стабильности, особое внимание необходимо уделять ее характеристикам в контексте изменения климата и климатических рисков, что актуализирует необходимость адаптации. Целью настоящего исследования является определение новых акцентов для факторов институциональной среды банков и расширение набора факторов за счет понимания места изменения климата и климатических рисков через их влияние на финансовый сектор. В результате анализа для институциональной среды банков авторы указывают новые акценты, которые появляются в связи с изменением климата и климатическими рисками, а также предлагают дополнительные факторы, такие как нормативно-правовая база для банков и социальная ответственность банков в условиях изменения климата, применение финансовых инструментов для разработки технологий для решения экологических проблем. Новизна исследования

заключается в комплексном рассмотрении институциональной среды банков в контексте изменений климата, что редко представлено в исследованиях.

Ключевые слова: институциональная среда банков, изменение климата, устойчивость окружающей среды, устойчивый финансовый сектор, устойчивое принятие решений, устойчивое развитие, экономика экологии.

Introduction

Sustainable growth of economy requires sustainable financial sector. Particularly, safeguarding of macro-financial stability and attracting finances to sustainable economic growth need in-depth participation of financial sector (e.g., Dikau, Volz 2021; Eiropas Komisija n/d).

Banks have special role in the development of sustainable financial sector. Caby et al. (2020: 1) point out: “Banks are both impacted by climate change and crucial for the implementation of sound practices and behaviors to combat climate change”. Involvement of banks is required, because solutions for socio-economic and environmental challenges need private investments (e.g., Clark et al. 2018; Purkayastha, Sarkar 2021; European Commission n/d) and financial intermediation for increasing the carbon neutral credits (e.g., Umar et al. 2021). Consequently, green credit policy is a way in which financial sector contribute to preventing the climate change (e.g., Luo et al. 2021).

Additionally, involvement of banks in developing sustainable financial sector is based on forecasting data and regulatory measures. For example, the European Central Bank indicates: “Our economy-wide climate stress test that was conducted in 2021 showed that the costs to banks and companies of adapting swiftly to green policies are much lower than the costs of doing nothing and dealing with severe natural disasters in the future” (European Central Bank 2022).

According to the studies, banks understand effects from climate risks on their business and address them, for example, though, lending contracts (e.g., Javadi, Masum 2021; Fard et al. 2020) and corporate social responsibility (e.g., Luo et al. 2021). Overall, banks demonstrate interest in sustainable activities (especially in environmentally friendly developed countries) (Caby et al. 2020) and even can gain financial benefits because of their eco-friendly behaviour (e.g., Umar et al. 2021). Although, scientists find a gap between displaying responsible behaviour and actual practice (Caby et al. 2020) and indicate on case studies with moderate interest of commercial banks in financing sustainable activities (e.g., Sunio et al. 2021).

Researchers pay attention to the factors that are topical for development of sustainable financial sector. The authors basing on the scientific literature classify the most significant aspects that are topical for the process of development of sustainable financial sector – practices for assessment of climate risks, changes in regulatory framework for banking sector, and corporate social responsibility of banks. These aspects affect banks’ decisions and their speed of involvement in making financial sector more sustainable (some of the studies in the field Battiston et al. 2021; Battiston et al. 2017; Simpson et al. 2021; Fard et al. 2020; Caby et al. 2020; Dikau, Volz 2021; Luo et al. 2021).

Besides positive examples about contribution of banks to development of sustainable financial sector (for example, stopping to finance coal-related projects or coal power firms (Javadi, Masum 2021) and gaining financial benefits as a result of eco-friendly behaviour (e.g., Umar et al. 2021)), there are several hindering factors. These factors are additional costs, high financial risks, incomplete regulatory framework and lack of information due to gaps in approaches to climate risks assessment (e.g., Luo et al. 2021; Nieto 2019; Safarzynska, van den Bergh 2017; Battiston et al. 2021).

The recent trends display that climate change may affect banking sector through cascading risks (e.g., Simpson et al. 2021) what may negatively result in soundness of banks. As far as institutional environment of banks is substantial for their soundness (e.g., Baltgailis et al. 2018; Hou, Wang 2016), special attention has to be paid to its characteristics. In the long run, institutional quality and financial development are recognised as driving force for sustainable economic growth (e.g., Ahmed et al. 2021). Dikau and Volz (2021: 1) highlight that: “All institutions ought to incorporate climate-related physical and transition risks into their policy frameworks to safeguard macro-financial stability”. In this regard, significant stage of transformation of financial system in favour to sustainability relates to adjustments of institutional environment of banks to climate change and to particular risks among others. Overall, it could be concluded that banks need institutional environment, which include climate risks and related issues for better dealing with new requirements for their tasks and saving soundness. Thus, comprehensive inclusion of activities stimulating more sustainable financial sector have to appear in all components of institutional environment of banks.

Given the above mentioned, in the present study, the authors continue to develop composition of institutional environment of banks taking into account climate change. According to the previous studies (Menshikov et al. 2019), institutional environment of banks may be presented as set of six factors: external economic conjuncture, internal political conjuncture, technological conjuncture, socially humanitarian conjuncture, economic and legal positions of debtors and creditors, quality of analysis and monitoring of banks. The aim of the present study is to expand a set of factors of institutional environment of banks by understanding a place of climate change and climate risks through their effects on financial sector.

The research is organized in four sections. The second section demonstrates and analyses interconnectedness of climate change and climate risks with financial sector. The third section explains a place of climate change and climate risks within institutional environment of banks. The fourth section concludes the article.

The research results demonstrate new accents in factors of institutional environment of banks and add new factors given the climate change. The novelty of research appears in the complex considering of institutional environment of banks in context of climate change what rarely is presented in studies.

Understanding interconnectedness of climate change and climate risks with the financial sector

Climate change and climate risks are unfavourable for stability in both the real economy and the financial sector. Lamperti et al. (2021: 11) emphasize: "... the real economy and climate change are interrelated: climate change shocks ... affect the bankruptcies of firms and banks..."

Researchers conclude that economic activity may decline from hotter weather and higher ultraviolet radiation (e.g., Andersen et al. 2016). Following the recent trends, researchers highlight connectedness of climate risks and financial system (Simpson et al. 2021) and pay attention to interactions between climate change and financial markets (Calvet et al. 2022).

Particularly in financial sector, researchers discover negative effects from hot weather on financial market performance. For example, Peillex et al. (2021) find out that trading volumes at stock markets fall significantly, when daily temperature exceed 30°C. According to Peillex et al. (2021), such effects have to be taken into account, when designing managerial and public policies. In addition, central banks and financial supervisions recommend to participants of financial markets to evaluate climate risks and design scenarios for climate stress tests (e.g., Battiston et al. 2021). Saliya, Wickrama (2021: 263) highlight: "There is a growing concern among central bankers that climate change poses not only serious environmental problems but also a potential economic and financial crisis."

It is noteworthy that growing society's and policy makers' interest to climate change has stimulated a revised understanding of the meaning of climate change for the financial sector. Financial markets participants already start to pay attention to climate change as risk what affects financial performance through, for example, firms' valuation and decisions on loans for firms with worse climate-related characteristics (e.g., Javadi, Masum 2021; Ramelli et al. 2021). Deepened society's attention to climate change has encouraged revisions in long-term earnings forecasts depending on firms' carbon intensity (Ramelli et al. 2021) and the Paris Agreement stimulated investors' interest in green investments (Fahmy 2022). Such tendencies demonstrate that financial market participants reconsider distribution of finances depending on climate-related issues.

In broader perspective, climate risks appear in nature disasters, as a result of which employment, investment decisions, monetary policy, financial development, government budgets, and debt are affected (e.g., Gregory 2021; Umar et al. 2021). Additionally, scientists demonstrate that risks are possible not only due to effects from climate change, but also due to activities devoted to preventing climate change (e.g., Simpson et al. 2021). For example, Diluiso et al. (2021) highlight that an addressing of climate warming may affect macroeconomic and financial stability.

It is inevitably that climate risks and shifts in economic structure in favour to low carbon intensive sectors will affect sectors of economy, households, entrepreneurs, governments but effects will differ. Lamperti et al. (2021: 1) highlight: "An increasing body of literature shows that unmitigated climate change will significantly impact a

number of economic variables, ranging from agricultural yields and electricity production to labour and capital productivity, with ineluctable ripple effects on multiple sectors, including the financial one.” In this regard, researchers devote special attention to the income level of households and countries. It is pointed out that poorer households and high-income countries will be affected in a bigger extent (e.g., Pereira da Silva, Koirala 2020; Mandel et al. 2021). This due to costs of adaptation to climate change (e.g., Pereira da Silva, Koirala 2020).

Special attention researchers pay to risks for the financial sector and, particularly, to the banking sector (e.g., Simpson et al. 2021). For example, Simpson et al. (2021) using case study of sea-level rise demonstrate that financial conditions of banks services may worsen and financially more vulnerable may be especially affected through worsened financial conditions to banking services. Such changes may significantly affect profit in the banking sector. Simpson et al. (2021: 497) write: “Although climate change risk is currently not fully priced into banking and (re)insurance markets, globally there is evidence that the financial services sector is beginning to respond to such risk signals by adopting risk-based pricing for high-intensity rainfall events, sea-level rise, and drought.”

Particularly, the banking sector has key role in the process of preventing and mitigating climate risks and development of sustainable financial sector (e.g., Caby et al. 2020; Umar et al. 2021; Dunz et al. 2021). Caby et al. (2020: 1) indicate: “Banks are crucial for economic and social well-being, as they are one of the main providers of capital, and they decide what activities to finance.” Following this logic, Umar et al. (2021: 1) highlight that “...banks are the major contributor to corporate financing, and their inclusion is vital to support sustainable growth.” Thus, lending and investment activities of banks are significant to mitigate climate change (Umar et al. 2021).

Banks gain high attention in terms of climate change because of their lending activities, which may support carbon intensive firms (e.g., Chaudhry et al. 2021; Dunz et al. 2021). For improvements, banks need to design lending policy according to environmental needs and to base it on correct and timely data (Chaudhry et al. 2021). Particularly, green credit is key component of environmental policy (Luo et al. 2021). Thus, environmentally friendly behaviour of banks is highly recommended and appreciated from stakeholders. There are financial benefits for banks also as a result of their environmentally friendly behaviour. For example, Chaudhry et al. (2021) emphasize that application of eco-friendly policies reduce financial risks and thus increase banks' attractiveness for investors. Luo et al. (2021) contribute to the debates by indicating the positive effects on banks' reputation risks as a result of their eco-friendly behaviour. Similar conclusions on risk minimising are found in research of Umar et al. (2021). Researchers indicate that “green lending helps mitigate the credit risks of banks” for all size banks (Umar et al. 2021: 2). At the same time, studies discover that green credits may create liquidity risks and additional costs for banks (e.g., Luo et al. 2021).

Thus, banks need to participate in activities devoted to preventing and mitigating climate change with well-designed and well-grounded eco-friendly strategy.

As far as climate risks may result in instability of economy and, particularly, financial sector (e.g., Mandel et al. 2021), the authors using scientific literature classify three main timely directions for acting with climate risks in financial sector, which gain high attention:

- Assessment approaches of vulnerability level due to climate risks, which will allow for timely decision-making (e.g., Battiston et al. 2021; Battiston et al. 2017; Galaz et al. 2018),
- Regulatory framework, which will stimulate low-carbon investments (e.g., Pereira da Silva, Koirala 2020; Baer et al. 2021; Diluiso et al. 2021; Gunningham 2020; Dafermos, Nikolaidi 2021).
- Corporate social responsibility of financial institutions (e.g., Caby et al. 2020; Wu, Shen 2013; Luo et al. 2021).

The mentioned above is tended to stimulate resource reallocation for development of sustainable financial sector. At the same time, assessment measures, regulatory framework, and corporate social responsibility in the financial sector are at early stages of development, because of high financial risks (e.g., Safarzynska, van den Bergh 2017), risks from responses to climate change (Simpson et al. 2021), and characteristics of climate risks (deep uncertainty, non-linearity and endogeneity) (Battiston et al. 2021).

Assessment. Assessment of climate risks for financial sector may be divided in two directions – a) assessment of vulnerability of financial sector due to climate change and climate risks (e.g., Battiston et al. (2021) call these risks as Climate physical risks and Climate transition risks) and b) assessment of participants and clients of financial sector regarding to carbon intensity of their activities. Both directions still is developing, because, first, climate risks are characterised by deep uncertainty, non-linearity and endogeneity (Battiston et al. 2021), second, the internationally accepted and recognised taxonomy for understanding sectors with high risks and negative effects on environment still is in the process of development (e.g., Nieto 2019). Although, there are attempts to develop climate risks assessment in financial institutions. For example, Battiston et al. (2021) mention recommendations for stress tests and climate scenarios elaborated by the Network for Greening the Financial System, guidelines of the EU Taxonomy Regulation, and alignment methodologies offered by the Paris Agreement Climate Transition Assessment.

Assessments have to be regularly updated given high uncertainty of climate risks (e.g., Simpson et al. 2021) and international standards to assessment approaches have to be generated (e.g., Battiston et al. 2021; Javadi, Masum 2021). Researchers emphasise that particular significance has to be devoted to the assessment of appearance of climate risks depending on different climate mitigation scenarios and such approach is in short supply at the present moment (e.g., Battiston et al. 2021).

As (Simpson et al. 2021) indicate, climate risks assessments contribute to responses that are more effective also taking into account the area where climate risks appear. Researchers indicate that climate risks are complex and may result in interacting and cascading effects (e.g., Simpson et al. 2021). Battiston et al. (2021: 3) write: “Empirical analyses of climate risk pricing in investment decisions and of financial actors’ and markets’ reaction to climate change are still at an initial stage. A main challenge in

this area is the lack of standardised information on the climate relevant characteristics of firms and financial products and the difficulty in identifying low- carbon and high-carbon assets.”

Simpson et al. (2021) consider differentiated approaches to climate risks evaluation by using what if scenarios, impact cascades, expert evaluation, storyline approaches, exploratory modelling, and deep uncertainty analytical methods. Simpson et al. (2021: 497) write: “Given deep uncertainty, careful evaluation by a range of experts and stakeholders is a necessary step in this process, and scenario and storyline approaches can be used to engage diverse stakeholders. There must also be sustained co-production of risk assessments among multiple stakeholders that leverages multi-level and poly-centric governance approaches to climate change risk.”

Mitigation of climate change aims to reduce carbon intensity of economic activities. Lending is a key tool for stimulating changes, but it requires guidelines for clients’ assessment in terms of carbon intensity of their activities. Fard et al. (2020: 2) write: “... it is a well-established notion in the banking literature that banks ... are in a unique position to assess their borrowers’ risk and their ability to repay loans. Therefore, if environmental regulation is a relevant (risk) factor that affects firms, banks are among the best stakeholders, if not the best, to show sensitivity to this risk factor and reflect it in their loan contracts.” In their research, Fard et al. (2020) conclude that banks adjust their loan contracts to characteristics of clients depending on environmental regulations. Javadi and Masum (2021) make similar conclusion on loan contracts, but at the same time indicate that climate risks are underpriced because of still incomplete requirements to disclosure of climate-related activities. Researchers also discover that lending activities of banks are based on inclusion of climate risks in clients’ evaluation with the aim to stop financing of carbon-intensive activities (e.g., Javadi, Masum 2021).

Regulatory framework. Regulatory framework is considered as significant for encouraging eco-friendly behaviour of financial market and redirect investments in low-carbon economic activities. Cao et al. (2021) and Caby et al. (2020) indicate that serious motivation for commercial banks to develop green financial instruments appear from regulatory mechanisms. For example, European directives as regulatory measures for development of sustainable financial sector (e.g., Caby et al. 2020). Cao et al. (2021) mention that regulatory measures stimulate banks to develop green financial instruments (e.g., bonds). Besides green credits, such activities are able to contribute to preventing and mitigating climate change through financial sector. Environmental projects, which have many undeniable benefits for the well-being of society, require long-term investment. Green bonds are considered as possible tool and the global market for green bonds is growing. It is expected that formation of international and national markets for green bonds will appear widespread. Green bonds are an important financial tool for development of technological solutions in the area of environmental security. It is possible to define EcoTech as approach of application of financial instruments to development of technologies for solving environmental issues. This approach needs further studies and development.

Banks demonstrate interest to the eco-friendly policies and there are several voluntary initiatives. For example, Caby et al. (2020) mention such voluntary initiatives as

Principles for Responsible Banking, Banking Environment Initiative, and Principles for Sustainable Banking. Dikau and Volz (2021) also indicate on Sustainable Banking Network, Central Banks and Supervisors Network for Greening the Financial System.

However, in relation to the banks, regulatory framework is continuing to be on an active debate, for example, about the role of central banks (Dikau, Volz 2021). Experience of supervision in terms of sustainability is differentiated. For example, Dikau and Volz (2021) conclude that there are central banks, which already work according to principles of development of sustainable financial sector, however the general requirements yet are not developed and actual practices will differ. Researchers highlight significance of central banks' mandates according to which banks may incorporate sustainability principles in their activities as objective and to promote green finance. According to the studies, mostly central banks are tended to support public policies in terms of sustainable development (Dikau, Volz 2021). At the same time, researchers indicate on necessity to incorporate sustainability principles in activities of central banks for saving price and financial stability (Dikau, Volz 2021). Dikau and Volz (2021) conclude that central banks have to contribute to sustainable development through both micro and macro prudential policies, but at the same time, the extent to which they have to be active in this regard is not clear because of possible mismatch with other core responsibilities related to price and financial stability.

As a result of studies, researchers advice to regulatory institutions and policy makers to stimulate environmentally friendly activities of banks through development of appropriate policies (e.g., see Chaudhry et al. 2021). Introducing of new capital requirements, which take into account climate change are considered as necessary and desirable for banks as researchers highlight (e.g., Caby et al. 2020). Prudential rules are considered as a tool for stimulating banks to expand green lending activities as far as such activities may reduce credit risks (Umar et al. 2021).

Regulatory measures for banking sector in terms of climate change appear gradually. For example, as higher pressure from banks on entrepreneurship with the aim to reduce carbon intensity of economic activities (Caby et al. 2020). In this regard, researchers highlight that strategies of banks, economic and financial characteristics of a country as well as interest of public sector and society in the issue are significant (Caby et al. 2020).

Corporate Social Responsibility. Corporate social responsibility can improve financial performance in long-term period, facilitate brand differentiation, and contribute to improvements of asset quality (Wu, Shen 2013). In terms of climate change, banks sign official commitments, develop corporate social responsibility programs and thus not only realise environmentally friendly initiatives and social responsibility but also compete (e.g., Caby et al. 2020). Green credit is a tool, which helps banks to realise corporate social responsibility (e.g., Luo et al. 2021). Additionally, banks have to practice sustainable behaviour in their daily operations as well (e.g., Luo et al. 2021).

Regards to environmentally friendly behaviour of banks, researchers suppose that there is a reason for dominance of greenwashing, when banks mostly support commitments in the developed and environmentally friendly countries, but may avoid rigorous carbon disclosure as well (e.g. Caby et al. 2020). Researchers indicate that bank size and country characteristics affect banks environmental behaviour. Social pressure is

higher for large banks in less advanced countries (e.g. Caby et al. 2020). Esteban-Sanchez et al. (2017) mention that intentions to achieve financial sustainability and good reputation, as well as altruistic and ethical motives encourage banks to practice corporate social responsibility, although, the data of reports in the banking sector still are not sufficient.

Nowadays, activities within the financial sector have to be in line with climate policies (e.g., Chen et al. 2021). Banks as key participants of lending activities have central role in preventing and mitigating climate change. Given the factors that affect the process of development of sustainable financial sector (assessment measures, regulatory framework, corporate social responsibility), banks need to manage several issues, which affect their financial decisions:

- Climate risks affect behaviour and decisions of economic agents;
- Effects from climate risks are hardly predictable;
- Regulatory measures still are unclear and are in progress of development, but will become stricter to carbon-intensive activities;
- Assessment of climate risks on financial sector still is under design and standard approaches have to be reconsidered.

In such conditions, banks pay attention to maintaining soundness. Simpson et al. (2021: 497) in their research demonstrate that banks in the areas affected by sea-level rise may meet several cascading risks: "... cascade to risk of foreclosure on loans from banks, risk of banks having to maintain higher deposit ratios (i.e., lend less)... Further, climate change risks leave banks exposed because they hold long-term mortgages ..."

Possible negative effects from climate risks may result in lower soundness of banks. Researchers (e.g., Baltgailis et al. 2018; Hou, Wang 2016) stress that soundness of banks depends on quality of their institutional environment among other factors. Thus, it is significant to incorporate climate risks and related issues in banks' institutional environment for addressing climate change successfully. The next paragraph is devoted to understanding a place of climate change and climate risks within institutional environment of banks.

Searching a place for climate change and climate risks within institutional environment of banks

Batae et al. (2021: 17) indicate: "Banks are not major polluters ..." However, researchers devote high significance to banks in the process of development of sustainable financial sector. Lamperti et al. (2021: 18) write: "At the same time, banks have a pivotal role in fostering the transition to sustainable growth by channelling credit towards green firms and exposures away from carbon-intense assets. A smooth transition would require a system that mitigates emissions while keeping the banking system stable in the face of physical and transition risks."

Regulatory and social pressure that appears due to climate change makes banks to pay attention to climate risks and possible financial losses as well make them to search new possibilities for gaining profit. Stakeholders involved in the process of

development of sustainable financial sector and society as a whole expect banks to be responsible and to contribute to redirecting financial flows in favour to environmentally friendly activities. For dealing with the new issues, banks need adjustments in institutional environment.

There are several habitual factors of institutional environment of banks, which relate to economy, technologies, society, politics, supervision, and law (e.g., Menshikov et al. 2019). Climate change and climate risks add new accents to these factors as well as create additional factors of institutional environment. In the Table 1, the authors offer possible accents, which have to be considered within institutional environment of banks in relation to each factor.

Table 1

**Factors of institutional environment of banks and
climate change related issues**

Factors of institutional environment of banks	Climate change and climate risks related issues
1	2
External and internal economic conjuncture	<ul style="list-style-type: none"> • Vulnerability of macro-financial stability due to linked and cascading climate risks, shifts in favour to low carbon economic activities • Attracting finance to development of sustainable financial sector and the economy as a whole • Investments in green vs brown sectors and firms • Characteristics of market participants in terms of carbon intensity of their activities • Investments in development of green technologies • Intentions to develop internationally accepted taxonomy on high environmental risk sectors • New competition forms across banks by including climate related issues in lending contracts and by participating in voluntary initiatives on development of sustainable financial sector • Development of green monetary policy
Internal and external political conjuncture	<ul style="list-style-type: none"> • Inclusion of climate risks in policy design and supervisory duties • Development of environmental strategies • Alignment with the goals of the Paris Agreement • Political leadership in addressing climate risks • Saving societal well-being during economy decarbonisation • Application of fiscal instruments for climate change issues • Adjusting activities of central banks by including climate risks • Investments of public finance to commercialization of green technologies • Development of digital systems for innovative climate finances • Changes in environmental regulations and appearance of new environmental agreements

Sequel to Table 1 see on the next page

Sequel to Table 1

1	2
Technological conjuncture	<ul style="list-style-type: none"> • Reduction of ecological footprint in terms of production, usage and utilization of cash • Application of energy effective payment systems • Application of digital systems for innovative climate finance • Facilitation of transparent and standardized transactions, exchange of data and information (e.g., distributed ledger technologies) • Diversification of equity portfolio • Involvement of fintech firms in activities for preventing and mitigating climate change • Application of financial instruments for development of technologies for solving environmental issues
Socially humanitarian conjuncture	<ul style="list-style-type: none"> • Reallocation of labour force and investments as a results of nature's disasters caused by climate risks • Effects on government budgets due to nature's disasters caused by climate risks • Negative effects of decarbonisation of economy on financially vulnerable households • Worsening of banks contract conditions for financially vulnerable social groups • Increasing costs related to saving societal safety and well-being in terms of climate change • Development of strategically oriented philanthropy policy of banks • Increasing role of corporate social responsibility
Economic and legal positions of debtors and creditors	<ul style="list-style-type: none"> • Relationship between management of climate risks, profitability and financial performance of banks • Increased credit risks in the area of financing decarbonisation of economy • Changes in taxation policy related to climate risks • Changes in regulatory framework of banks in terms of climate change • Bank capital requirements devoted directly to climate risks overcoming (e.g., "green supporting factor", "green differentiated capital requirements") • Reduced financial risks and reputation risks, improved attractiveness for investors because of participation in decarbonisation of economy • Financial risks because of climate change and activities devoted to preventing and mitigating climate change
Quality of analysis and monitoring of banks	<ul style="list-style-type: none"> • Assessment of managerial practices according to Sustainable Development Goals and reports about the progress • Development of internationally accepted standards and guidelines for defining environmentally friendly and risky sectors of economy • Adjusting activities of central banks by including climate risks

Sequel to Table 1 see on the next page

Sequel to Table 1

1	2
	<ul style="list-style-type: none"> • Commitment of banks to voluntary initiatives and networking devoted to climate change • Explanation and avoiding greenwashing in activities related to preventing and mitigating climate change • Changes in traditional approaches to macroeconomic and financial analysis • Support of priorities set in public policies in terms of climate change • Assessment of interconnected and cascade risks which appear from climate change
Additional factors of institutional environment, which appear after adding climate change in the analysis:	
<ul style="list-style-type: none"> • Regulatory framework in terms of climate change • Social responsibility related to climate change • Technological solutions for environmental issues by using financial instruments 	

Source: elaborated by the authors using Baer et al. 2021; Baltgailis et al. 2018; Batae et al. 2021; Battiston et al. 2017; Battiston et al. 2021; Baur, Oll 2021; Caby et al. 2020; Capasso et al. 2020; Cheung et al. 2022; D’Orazio 2021; Dafermos, Nikolaidi 2021; Dikau, Volz 2021; Dunz et al. 2021; Esteban-Sanchez et al. 2017; Faiella et al. 2022; Galaz et al. 2018; Gregory 2021; Hummel et al. 2021; Lamperti et al. 2021; Latvijas Banka 2021; Mandel et al. 2021; Menshikov et al. 2019; Nieto 2019; Pereira da Silva, Koirala 2020; Pratama, Mac Dowell 2022, Safarzynska, van den Bergh 2017; Saidane, Ben Abdallah 2021; Saliya, Wickrama 2021; Sardianou et al. 2021; Schulz, Feist 2021; Simpson et al. 2021; Šipilova et al. 2020; Sreenu 2022; Teresiene et al. 2021; Wu, Shen 2013.

External and internal economic conjuncture. For the economic conjuncture, the main tendencies, which have to be taken into account by banks due to climate change relate to maintaining stability of the sector, changing approaches to evaluation of financial risks and clients as well as possible new requirements in monetary and prudential regulations.

Internal and external political conjuncture. For the political conjuncture, banks have to be in line with changes in overall institutional environment, which covers climate change issues in social and economic well-being, legislation, and technological solutions. Significant role is devoted to the alignment with international agreements on preventing and mitigating climate change.

Technological conjuncture. For the technological conjuncture, attention has to be paid to digital solutions, which ensure activation of investments in mitigating climate change and economy decarbonisation and collaboration with fintech firms. Additionally, development of financial instruments, which may be applied for development of technologies for solving environmental issues, is topical.

Socially humanitarian conjuncture. For the socially humanitarian conjuncture, banks have to take into account so-called physical and transition risks, which appear due to climate change. These risks may stimulate reallocation of resources and changes

in investment decisions as well as worsening of well-being what would result in worsening of banks' financial performance.

Economic and legal positions of debtors and creditors. For the economic and legal positions of debtors and creditors, climate change creates both risks and opportunities. Hardening of regulatory measures and changes in credit policies as well as investment decisions may provide risks for profitability of banks. Although, banks involvement in economy decarbonisation is considered as positive for their attractiveness for clients and investors.

Quality of analysis and monitoring of banks. For the quality of analysis and monitoring of banks, new dimensions appear due to climate change. Adjusted regulatory measures, international commitments and voluntary activities as well as changes in approaches to macroeconomic and financial analysis in terms of climate change make the processes of analysis and monitoring more complicated and widened.

As a result of the research, additional factors of institutional environment of banks may be highlighted – regulatory framework that takes into account climate change, social responsibility of banks related to climate change as well as application of financial instruments for development of technologies for solving environmental issues. In this regard, adjustments of institutional environment of banks will differ depending on country-level and bank-level characteristics as well as costs related to adaptation and implementation of decarbonisation course but with the single commitment to find a balance between stability and profitability of banking sector and the necessity to prevent and mitigate climate change.

Conclusions

Researchers devote attention to institutional quality and financial development among others, when study sustainable economic growth in a long-term (e.g., Ahmed et al. 2021). As far as sustainable economic growth needs sustainable financial sector, banks are recognised as key participants of increasing sustainability of the financial sector, because environmental and consequent socio-economic challenges need private investments (e.g., Clark et al. 2018; Purkayastha, Sarkar 2021; European Commission n/d). Additionally, intentions of development of sustainable financial sector has forecasting and regulatory reasons (e.g., European Central Bank 2022; Pereira da Silva, Koirala 2020; Baer et al. 2021; Diluiso et al. 2021; Gunningham 2020; Dafermos, Nikolaidi 2021), which demonstrate vulnerability of banking sector due to climate risks (e.g., Simpson et al. 2021; Lamperti et al. 2021). Research results demonstrate that banking sector understands climate risks and is able to work for addressing them, although, there is a place for greenwashing as well (Caby et al. 2020; Javadi, Masum 2021, Fard et al. 2020).

Climate change and climate risks require comprehensive inclusion of activities stimulating more sustainable financial sector, which appear in all components of institutional environment of banks. This article aims to expand a set of factors of institutional environment of banks by understanding a place of climate change and climate risks through their effects on financial sector. For the aim, the authors analyse intercon-

nectedness of climate change and financial sector and search for a place of climate change and climate risks within institutional environment of banks.

Interconnectedness of climate change and financial sector appears from understanding that, first, extreme weather will negatively affects economic agents, second, climate risks will stimulate shifts in economic structure in favour to low carbon intensive sectors what will affect sectors of economy, households, entrepreneurs, governments and financial sector.

Scientific literature devotes attention to climate change and financial sector. According to scientific literature, the authors emphasize three directions for acting with climate change in financial sector – climate risks assessment practices, regulatory framework, and corporate social responsibility. Now, there are several challenges for development of sustainable financial sector, first, incomplete practices for assessment of climate risks, second, still developing regulatory framework for banking sector and differentiated understanding and commitment of banks to inclusion of climate risks into their daily practices.

Given facts that climate risks affect behaviour and decisions of economic agents but effects from climate risks are hardly predictable banks need institutional environment, which takes into account climate risks. The authors highlighted climate change related aspects for the factors of institutional environment of banks.

In terms of economic conjuncture, maintaining of stability of banking sector and development of new requirements in monetary and prudential regulations will modify institutional environment of banks. In terms of political conjuncture, changes in overall institutional environment in social, economic, legislative and technological processes will appear due to climate change and will affect institutional environment of banks. In terms of technological conjuncture, digital solutions and collaboration with fintech firms for dealing with climate change will stimulate adjustments of institutional environment of banks to the application of the newest technologies. In terms of socially humanitarian conjuncture, reallocation of resources and changes in investments decisions as well as worsening of well-being level will challenge financial performance of banks and will require adjustments in institutional environment as well. In terms of economic and legal positions of debtors and creditors, hardening of regulatory measures and changes in credit policies as well as in investment decisions will challenge profitability of banks, but at the same time, banks' green activities will increase their attractiveness for clients and investors. In terms of quality of analysis and monitoring of banks, the processes will become more complicated and widened by including data, information and requirements related to climate change issues.

The research made allows the authors to highlight additional factors of institutional environment of banks – regulatory framework for the banking sector that takes into account climate change, social responsibility of banks related to climate change as well as application of financial instruments for development of technologies for solving environmental issues. Given the new factors, institutional environment of banks will experience gradual and consequent adjustments by taking into account characteristics of countries and banks. The research provides novel contribution to the complex considering of institutional environment of banks in context of climate change.

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