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CONCEPTUAL APPROACHES TO MODELING THE GREEN CREDITS MARKET IN UKRAINIAN BANKING SYSTEM

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КОНЦЕПТУАЛЬНІ ПІДХОДИ ДО МОДЕЛЮВАННЯ РИНКУ ЗЕЛЕНИХ КРЕДИТІВ В УКРАЇНСЬКІЙ БАНКІВСЬКІЙ СИСТЕМІ

The article considers conceptual approaches to modeling the green credits market in the Ukrainian banking system, taking into account environmental, social

and governance (ESG) factors. The article reveals the main characteristics of ESG factors, offers possible parameters for their calculation, and also analyzes the current state of implementation of green practices in Ukraine and abroad. The focus is on presenting three models of the green credit market and their comparative analysis.

Green credit is a financial instrument that is provided to support environmentally friendly projects and initiatives that have a positive impact on the environment. The article focuses on the importance of the development of the green credit market for stimulating the transition to a "green" economy, as well as on the role and motivation of the main actors of the economy, which are interested parties in the implementation of methodologies for the identification and verification of green credits, credit risk assessment models and regulatory requirements.

The authors study the main problems and world experience in the development of the green credit market and, more broadly, ESG-oriented loans. Key ESG risks that require analysis in lending and parameters that can be collected and included in assessment models are identified. The article also discusses examples of successful implementation of green lending in other countries, which may be useful for Ukraine. In particular, mechanisms of support and stimulation from the state, the role of international financial institutions and partners in the development of green financing are analyzed.

Within the framework of the study, the possible role and personal motivation of the main subjects in lending were analyzed - the borrower himself, the commercial bank that provides the loan, and the regulator that represents the state and implements systemic policy. Three conceptual models of the operation of the green credit market were formulated, which can be applied. Their main advantages and disadvantages are determined. As the most optimal model for implementation in Ukraine, the market model with the exchange of information and independent assessment is proposed, which is designed to level the risks of greenwashing and ensure a high level of efficiency in the processes of risk analysis and assessment credit risk.

У статті розглядаються концептуальні підходи до моделювання ринку зелених кредитів в українській банківській системі з урахуванням екологічних, соціальних та управлінських факторів (ESG). У статті розкрито основні характеристики факторів ESG, запропоновано можливі параметри для їх розрахунку, а також проаналізовано поточний стан впровадження зелених практик в Україні та за кордоном. Основна увага приділяється представленню трьох моделей ринку зелених кредитів та їх компаративному аналізу.

Зелений кредит – це фінансовий інструмент, який надається для підтримки екологічно чистих проектів і ініціатив, що мають позитивний вплив на навколишнє середовище. Стаття акцентує увагу на важливості розвитку ринку зелених кредитів для стимулювання переходу на "зелену" економіку, а також на ролі та мотивації основних суб'єктів економіки, що є зацікавленими сторонами при впровадженні методології ідентифікації та верифікації зелених кредитів, моделей оцінки кредитних ризиків та регуляторних вимог.

Авторами досліджено основну проблематику та світовий досвід розвитку ринку зелених кредитів та, більш широко, ESG-орієнтованих кредитів. Визначено ключові ESG ризики, що потребують аналізу при кредитуванні та параметри, що можуть бути зібрані та включені до моделей оцінки. Також розглянуто приклади успішного впровадження зеленого кредитування в інших країнах, що можуть бути корисними для України. Зокрема, проаналізовано механізми підтримки та стимулювання з боку держави, роль міжнародних фінансових інститутів та партнерів у розвитку зеленого фінансування.

В рамках дослідження було проаналізовано можливу роль та персональну мотивацію основних суб'єктів при кредитуванні – самого позичальника, комерційного банку, що надає позику, та регулятора, що уособлює державу та реалізує системну політику. Сформульовано три концептуальні моделі функціонування ринку зелених кредитів, які можуть бути застосовані. Визначено їх основні переваги та недоліки. В якості оптимальної моделі для реалізації в Україні пропонується модель ринку з обміном інформації та незалежною оцінкою, яка покликана нівелювати ризики грінвошингу та

забезпечити високий рівень ефективності процесів аналізу та оцінки кредитних ризиків банків.

Keywords: *ESG, ESG risks, green lending, credit risk, green credit market, identification of green projects, sustainable development, greenwashing, risk management.*

Ключові слова: *ESG, ESG ризики, зелене кредитування, кредитний ризик, ринок зелених кредитів, ідентифікація зелених проектів, сталий розвиток, грінвошинг, управління ризиками.*

Statement of the problem in a general form and its connection with important scientific or practical tasks. Analysis, modeling, and practical implementation of sustainable development dynamic are currently a topical issue of research in a number of scientific areas. In particular, it is the subject of research in the field of ecology, economics, finance, management, etc. Regulators in many countries are developing strategies to support sustainable development and seeking effective forms of their practical implementation.

Consideration of sustainable development from an economic point of view is closely intertwined with the concept of ESG (Environmental, Social, Governance) factors. ESG factors refer to environmental (E), social (S) and governance (G) aspects of a company's operations that affect its performance and market value. By considering these factors, enterprises can better manage risks, develop business strategies that combine profitability with sustainability and social responsibility, and form an investment policy taking into account the E, S, G criteria.

ESG factors are having an increasingly significant impact on credit markets. Many credit institutions, in particular, banks, are implementing ESG policies to take these factors into account in lending. The most developed in this direction today is the direction of "green lending". The banking sector, which is one of the main sources of financing for entrepreneurial activity, essentially stimulates business activity (which it finances) in an ecological direction.

The problem to which our research is devoted is that the Ukrainian banking system has not yet formed a clear model of green credit market functioning (or more broadly, market of ESG-oriented credits). Many Ukrainian banks are very active in this direction, starting to issue such loans. But the identification of green loans, the analysis of the risks of such loans, the formation of bank portfolio of green loans, the possible approaches of the regulator in stimulating the market are rather vague, not formed. This paper is devoted to the study of this problem through the analysis of conceptual approaches to the construction of green credit market models.

It should be noted that the study of this problem (the formation of the green credit market) is, in a certain sense, the first step in the development of the ESG-oriented credit market. That is, having green credit market models, it is possible to expand the logic of their construction within the framework of ESG-oriented lending.

Analysis of recent research and publications. To date, there are quite a few publications in the scientific literature devoted to the implementation of ESG criteria in banks, the introduction of issuing green loans, the expansion of banks' risk management systems to include ESG risks. This is explained by the strong development of this direction and a wide range of issues that require scientific understanding. Thus, the authors of [1] Risna K., Herlina E., & Villanueva M. present their view on the development of the theory of green banking. Sohns T., Aysolmaz B., Figge L. Joshi A. present in [2] the results of a study on the motivation of small and medium-sized businesses to implement green business processes to build a sustainable business model. Results of this research provides answer for question: What is the demand factor for green loans? There are very interesting research results presented in [3]. The authors investigated the practice of green banking in Sri Lanka and developed a toolkit for evaluating the effectiveness of such practice. In work [4] A. Ryshniak and V. Kondratieva analyze the European plan of the "green deal" in the context of climate neutrality for Ukraine. Vovchenko O. in [5] examines ESG strategies as a basis for managing risks of sustainable development in banks.

Despite the large number of publications related to esg strategies of banks, the topic is not studied enough. What exactly do green loans represent in theoretical and

practical aspects? What should be the disclosure of green credits? What are the approaches to assessing the credit risk of such loans? These and many other similar issues form the context of relevancy to research on approaches of modeling a green credit market. The results of our research in this direction are presented in our article.

Formulation of the goals of the article (statement of the task). The purpose of this article is to define and justify conceptual approaches to the green credit market modeling within the Ukrainian banking system.

MAIN RESEARCH EVIDENCE

1. The global context of ESG factors implementation in economic activity

In the global context, the processes of implementing ESG factors in economic activity include two components: regulatory and market-based. Regulators in various countries are quite active in this direction. They substantially improve legislation aimed at all aspects of ESG factors. The dominant focus is on climate change and the need to support the transition to alternative energy sources. Regulatory policies become an important incentive for the gradual transition of companies, technologies and industries to sustainable development, the inclusion in their activities ESG criteria, the transition to green energy, etc. It is worth noting that this process is spreading not only at the national, but also at the international level.

Such initiatives include:

- **REPowerEU.** The European Commission's plan for the fast reduction of dependence on russian fossil fuels and the promotion of the "green transition". It is assumed that the "green transition" should contribute to economic growth, security and approaches to overcoming the climate crisis. ([6])
- **Green Climate Fund (GCF).** Fund established by the United Nations. Its purpose is to develop and finance climate change adaptation projects. ([7])
- **The Green Deal Industrial Plan.** The European Commission's plan, which is focused on supporting the competitiveness of the European net-zero industry. ([8])

- **Kunming-Montreal Global Biodiversity Framework (GBF).** It is an initiative of states to reduce negative impacts on nature. It is the result of the UN Conference on Biodiversity Conservation in 2022. The initiative, similar to the Paris Agreement on climate change, consists of global goals to be achieved by 2030 aimed at preserving biodiversity. ([9])

It should be noted that the USA, China, Japan, EU countries and many other countries are also actively implementing their national strategies for sustainable development, which involve a significant reduction in emissions and intensive measures to protect the environment.

In general, the world's governments and regulators are showing increasing attention and activity in the field of sustainable development, directing their focus to green initiatives and promoting the development of clean energy and biodiversity conservation. One of the good examples is European Central Bank (ECB). It has developed a guide that defines the understanding of safe and prudent management of climate and environmental risks. It sets out how the ECB expects institutions to consider climate and environmental risks – as drivers of existing risk categories – when formulating and implementing their business strategy and risk management. It also explains how the ECB expects institutions to become more transparent by improving disclosure of their climate and environmental activities. Although it does not regulate mandatory algorithms for working with such risks [10].

The market-oriented component is determined by the fact that these processes are paid more attention by key business stakeholders. Namely, consumers, investors, company employees, local communities in the locations of production facilities, etc. are increasingly paying attention to the implementation of ESG criteria in the activities of companies. The presence of attention and interest in these aspects creates competition for companies in the context of their monitoring of these factors and the disclosure of information in the context of ESG.

2. "Green" financing and implementation of ESG factors in Ukraine

In Ukraine, despite the war, the green economy and the implementation of ESG criteria are gradually developing. This is especially relevant in the context of the

European integration of Ukraine, within which the implementation of a number of green economy standards is foreseen.

In the regulatory aspect, it is worth noting the Decree of the President of Ukraine No. 722 of September 30, 2019 ([11]). The decree provides for ensuring compliance with the Sustainable Development Goals of Ukraine for the period up to 2030. Namely, the adaptation of the global goals of sustainable development, announced by the resolution of the UN General Assembly in 2015, is envisaged, taking into account the specifics of Ukraine's development.

In 2021, the National Commission for Securities and the Stock Market Національної комісії з цінних паперів та фондового ринку (NSSMC) formed the practice of applying legal norms in the field of corporate governance and spread the tools of sustainable financing. Important, within this framework, is the development of an appendix on ESG issues to the corporate governance code.

In 2021-2023, the National Bank of Ukraine implemented the Green Financing and ESG project [12]. The goals of the project included the development of the internal capacity of financing green energy projects by Ukrainian financial institutions and the promotion of the development of green financing instruments.

In addition to the above-mentioned approach to green financing instruments, other prerequisites for the development of relevant areas are also being created in Ukraine. Thus, for example, the "green" tariff operates as an economic reward mechanism for the generation of electricity from renewable sources. The "green" tariff was intended to become a starting point for the transition to alternative energy sources, to reduce dependence on fuel imports. In Ukraine, a third of the "green" power generation capacity was built at the expense of credit funds. An important component of the market of alternative energy sources in Ukraine is the state enterprise "Guaranteed Buyer". Its mission involves stimulating the development of Ukraine's alternative electricity industry. At the same time, Russia's full-scale invasion of Ukraine created a lot of problems, including significant losses for banks, primarily state-owned banks [18]. Missile strikes on Ukrainian TPPs created a huge deficit in electricity generation in Ukraine. This actualizes the issue of electricity

generation for consumer needs through the use of alternative sources. One of the approaches to the development of this direction is the provision of bank loans.

The mentioned processes in Ukraine actualize the need to find ways and new tools for the development of alternative energy and the greening of the economy as a whole. One of these approaches is business stimulation by possible obtaining additional financing, in particular, bank lending. However, such an approach gives rise to a number of conceptual issues of the "economics" of these processes, methodological, regulatory, riskological and other issues. Consideration of such issues requires a holistic approach, one of the components of which is the modeling of the green bank lending market.

3. ESG risks

Companies that build a model of sustainable development based on the implementation of ESG criteria objectively face ESG-related risks. The same applies to banks that provide green loans, investors when making capital investments in financial instruments of a certain company. ESG risk management is a complementary part of building a sustainable development company. However, the identification of ESG risks, their analysis, assessment and, accordingly, approaches to risk management are now just being formed and often include conflicting views on it.

As the first component of ESG risk analysis, we can identify risks that are directly related to ESG criteria. As a second component, consider the impact of the manifestation of ESG risks on the ERM (Enterprise Risk Management) system of the company, as well as on certain types of "classic" risks, in particular, financial. When considering bank lending, the relationship between ESG risks and credit risks turns out to be key.

Considering the first component, it is possible to base the actual indicators that characterize these factors. In particular, the following key indicators can be identified within the ESG criteria [21]:

- Environmental: carbon dioxide emissions, water and air pollution, biodiversity conservation, energy efficiency, deforestation, water scarcity, amount of garbage and waste;

- Social: privacy and data protection, gender equality, protection of employee rights and attitude towards consumers, labor standards and labor legislation;
- Governance: taking into account the interests of stakeholders, the presence of independent members in the supervisory boards, remuneration of the management, attitude to bribery, corruption, lobbying, etc..

One of the modern approaches to identifying ESG risks can be the ESG scoring system, which has developed significantly over the last decade. Examples include Sustainalytics' ESG Risk Ratings, S&P Global ESG Score, ISS Ratings and Rankings, LSEG ESG Scores (formerly Refinitiv ESG Scores). The advantage of this approach is the integral nature of the assessment of the level of ESG in the company. A downward change in ESG can be interpreted as a numerical assessment of the manifestation of risk. The problem with such an assessment is that the manifestation of risk in one block can be offset by growth in another. A partial solution to this problem can be the consideration of sub-scorings in different areas of assessment. For example, LSEG ESG Scores offers 3 sub-scorings in E, 4 sub-scorings in S, and 3 sub-scorings in G. This can provide a more accurate risk assessment by area of occurrence. Along with this, the problem of this approach is the application of the mentioned scorings only for large companies that use market methods of raising funds to a large extent (issues of shares and bonds), and credit instruments to a lesser extent. Also, the scores are formed on the basis of the analysis of the reporting carried out by the company. For medium and small companies, ESG scores are not calculated by the specified scoring providers and this is one of the problems for banks when issuing green loans.

To date, the identification, analysis and assessment of ESG risks have been developed for environmental risks. Environmental risks are traditionally divided into physical and transitive risks. ([13])

- Physical risk in finance arises from the effects of climate change, which includes extreme weather events and gradual changes in the environment. Physical risk is divided into 'acute', arising from extreme events such as droughts, floods and storms, and 'chronic', caused by progressive changes such as rising temperatures, sea levels, water scarcity, loss of biodiversity and

resources. This can lead directly to property losses, reduced productivity, or indirectly to downstream events such as supply chain disruptions. An important feature of physical risk is that it is not individual for a specific enterprise and the enterprise is not always able to reduce it. For example, if the company's assets are located in a seismically active zone, their value as collateral will be significantly lower. But this will be the case for all businesses in the area.

- Transitive risk refers to financial losses of institutions that may arise as a result of the process of adaptation to a sustainable economy. This can be triggered, for example, by the rapid (and ill-conceived) adoption of climate and environmental policies, technological progress, or changes in market sentiment and preferences. Business readiness and flexibility for such changes becomes a serious competitive advantage in today's world.

Solving the above problems through the implementation of new practices, mechanisms, tools and monitoring increases the attractiveness of business for investors, banks and society, which increases the efficiency of activities and improves business reputation, and directing funds, including loans, to related projects is appropriate. However, the possibility of creating a single standardized ESG indicator for all related qualitative indicators is quite difficult due to the fact that each sector of the economy and each enterprise may have a specific structure that requires separate study.

When considering banks that provide green loans, the problem of the relationship between ESG risks and credit risk emerges. Yes, the presence of environmental risks in a company that borrows funds can lead to an increase in the probability of the company's default or a decrease in the value of the collateral, but not all of these risks can be directly affected by them. On the other hand, creating part of the portfolio from green loans can reduce the risk of the entire portfolio.

Regarding the criteria that can be applied to assess the level of environmental risks of companies, there are primarily quantitative ones, such as carbon emissions and fuel consumption. In addition, control over the environmental friendliness of production should be carried out by relevant regulatory bodies. Ukraine has an environmental tax [19], which obliges companies to declare the amount of

environmental pollution, but not all companies publish such information openly. This information is key in assessing the transitive risks of real sector companies and their readiness for increased industry requirements. The assessment of physical risks of companies can be carried out on the basis of information about the geographical location of assets, collateral and production facilities. In the conditions of a full-scale invasion, Ukrainian banks have gained a lot of experience in working with borrowers who bear increased physical risks caused by hostilities and shelling.

Thus, banks, implementing the lending policy, face a certain duality in the process of risk management of the credit portfolio. From one side it is necessary to assess ESG risks. From the other side it is necessary to assess of credit risks of such loans. This feature should be embedded in approaches to building credit market models of green loans.

4. Motivation of green credit market subjects

The green credit market is a segment of the overall credit market. Therefore, borrowers and lenders are key market subjects. So, the basic subject of our analysis is the set of economic relations that arise in the process of the lender providing funds to the borrower. When considering green credits, the specific goals of the subjects, their motivation and limitations are layered on these economic relations. These elements are complementary to the classic goals, restrictions and motivations in obtaining loans.

In our research, we narrow the market in such a way that the market subjects are: borrowers - small and medium-sized enterprises (SME), lenders - banks. Also, we consider the presence of a regulator (the central bank, in particular) in the market. Let's consider the goals, limitations and motivations of each of the subjects.

Borrowers, especially small and medium-sized enterprises, increasingly understand the benefits of sustainable development and the implementation of green technologies in their business processes. The basics of motivational aspects are as follows.

First, the introduction of green technologies into business processes (more broadly, ESG practices) allows improving business processes in terms of cost

reduction by optimizing resource consumption. Cost reduction can be either directly due to the use of green technologies (for example, installing solar panels), or through improving the efficiency of business processes as a whole. In particular, effective waste management can reduce the costs of their disposal and allow to receive additional income from the sale of secondary raw materials. Thus, the incentive to take green loans is the improvement of business efficiency.

Secondly, compliance with green standards can help enterprises to reduce the risks of environmental pollution (in economic terms this leads to avoid fines). Many countries have introduced environmental taxes that depend on the amount of emissions. The reduction of such payments also serves as an incentive to use loans for the introduction of new, environmentally safe technological processes.

Third, by implementing green technologies, enterprises can improve their competitiveness and business development. Stakeholders pay attention to environmental friendliness and social responsibility of companies from which they buy goods or services. Therefore, enterprises that implement green technologies and ESG practices have a better reputation, it is easier for them to find new customers and to continue cooperation with existing ones. This is expressed in increasing sales and expanding sales markets. Also, investors who show an inclination towards ESG-oriented investing can increase the volume of investment resources for such companies.

One of the main limitations is innovative nature of new technologies and the need for extensive marketing research on business development prospects in the relevant segment. This aspect increases the risk of business development and affects the assessment of creditworthiness.

Thus, businesses have a number of reasons to be interested in receiving green credits. The basis of this is the aspect of improving business efficiency, its development and the possibility of expanding investment opportunities.

Commercial banks, as lenders, have an interest in the development of the green credit market for the following reasons. One of the main reasons is the growing demand for green financing, which is one of the expressions of sustainable development. Considering the dynamic development of demand for loans in this

segment, banks are interested in forming a market offer for such loans. However, it should be noted that the risk-income ratio in this credit segment is still in the formative stage. Mainly due to the imperfection of statistics. The factor of risk reduction is the stability of business development with the introduction of green technologies. And the factor of increasing credit risk is the innovative nature of green technologies.

Banks also face the motivations of their stakeholders and the regulator. Thus, the bank's shareholders can approve the policy of the bank's development in the direction of sustainable development, part of which is the issuance of green loans. The issuance of green loans can be a powerful factor in attracting deposits.

The creation of a portfolio of green loans is also an important factor in attracting financing from the market by banks. This applies to both the stock market and the credit market. This can be expressed in the form of simplifying access to financing, or it can include a reduction in the cost of funds raised. This also applies to the issue of bonds and shares)

Finally, banks must follow regulatory requirements. They can be mandatory, or they can be in an incentive form (for example, in provisions for green loans). Regulatory compliance helps banks, among other things, maintain their reputation as responsible and sustainable financial institutions.

The main limitation for banks is the need to implement procedures for the identification, analysis and assessment of ESG risks into the bank's general risk management system. To date, these procedures are only in the stage of formation.

The Central Bank, as a regulator, is primarily a state institution that implements state policy within its mandate, takes care of financial stability and is interested in the country's economic development at the systemic level. This includes, typically, the implementation of sustainable development policy, which is taking place in most countries of the world.

First of all, we can single out some main reasons for the regulator's interest in the implemented ESG criteria. In the global context, large banks support the initiatives of the UN and other international organizations to combat negative climate change in the world. Within the markets of individual countries, central banks can

implement various incentives regarding the implementation of ESG criteria by banks, issuance of green loans and other banking environmental programs. For Ukraine, it is worth highlighting such aspects as the high dependence of the agricultural sector, which is the most vulnerable to climate risks. Another problem is the complicated situation with electricity generation in connection with Russian terrorist attacks. Therefore, the National Bank of Ukraine can use certain incentives in these areas.

An important component is the process of integration with the European Union, which includes both the implementation of existing practices regarding compliance with climate requirements, the development of relevant legislation, compliance with the taxonomy of ESG loans, and the general direction of the economy with the maximization of environmental standards, social equality and managerial efficiency. The state is interested in the implementation of ESG assessment in view of international obligations and the desire to integrate into the global economy. Many international financial institutions, investors and partners are paying more and more attention to ESG criteria when making investment and cooperation decisions. To ensure access to international capital, increase competitiveness in global markets and attract investment, it is important that the national financial system meets these requirements. The implementation of ESG standards allows for the harmonization of national regulatory frameworks with international practices, decreasing negative impact of instruments such as CBAM, promoting transparency and trust in the country's financial market.

The limitations of central banks are to some extent generated by state policy priorities. For example, now, during the war, in Ukraine, the priority is to finance enterprises for the production of weapons and the restoration of destroyed thermal power plants. Therefore, the prioritization of attention regarding ESG credits is somewhat limited.

5. Critical analysis of approaches to modeling the green credit market in Ukraine

In the last few years, an interest in ESG-oriented and green loans in the Ukrainian banking system grew essentially. A number of banks are introducing this direction. In particular, Oschadbank[13], Ukrgasbank[14] and others implement ESG

standards in lending. However, in our opinion, there is still no systematic approach in this direction. One of the important tasks in this direction is the formation of the green credit market model. Based on the above in the article, we formed three conceptual approaches to building green credit market models. Each model includes certain assumptions on which the model operates. The essence of the models and their critical analysis are given below.

5.1. Model of independent ESG activity of banks

This approach to model construction assumes that development and use of the ESG assessment methodology and the collection of information about each borrower is carried out directly by the bank. The central bank does not create regulations in this segment. Banks independently form lending policies in the ESG and green credit segments. Identification of green loans, assessment of ESG risks, analysis of the impact of issuing such loans on credit risks, creation of the structure of the loan portfolio is carried out by each bank independently. There is not suppose the exchange of information about "green loans" (by analogy with the exchange of information through bureaus of credit histories).

The advantages of this approach include the following:

- The bank is able to flexibly adjust its model for issuing green loans. Taking into account own experience and the possibility of direct operational communication with the client. The bank is the most interested party in risk assessment, and in any case, it is advisable to implement new indicators into the internal risk management system that corresponds to its goals, policies, strategies, etc. In addition, the European practice of banking regulation provides for greater autonomy of commercial banks in the application of their own models, while the domestic practice is more conservative.
- Different approaches (not standardized in the market) to ESG assessment stimulate innovation in the financial sector. Competition between banks to develop more efficient and accurate models can lead to the emergence of advanced ESG assessment methods and tools and, as a result, innovative financial products.

- The bank can create a model that best takes into account its own risk profile and risk management strategy. This helps banks better identify and manage environmental, social and governance risks.
- Banks can develop specialized offers and conditions for their clients that contribute to increased environmental and social responsibility. It can be gradation of interest rates depending on the rating, ancillary products and advice, etc.

At the same time, this approach to building a model has certain drawbacks. In particular:

- The main disadvantage of this approach is the risk of greenwashing. Submission by borrowers of projects for obtaining loans as "green", which are not such. The lack of clear rules can leave too much room for this. This problem is also relevant in Europe. The desire to improve business reputation and attract investments on the topic of green lending can lead to the use of biased and non-transparent approaches to the evaluation and display of this part of the bank's loan portfolio.
- The variety of approaches to ESG assessment can lead to a lack of consistency and comparability between different banks. This makes it difficult for investors, regulators and other stakeholders to evaluate and compare ESG indicators.
- Developing customized ESG assessment models requires a significant investment in time, money and expertise. This can be particularly difficult for small and medium-sized banks, which may not have sufficient resources to create effective models.
- As each bank develops its own model, there is a risk that different approaches may be incompatible or conflict with each other. This can lead to a loss of confidence in the ESG assessment process as a whole.
- The lack of uniform standards can make it difficult to ensure transparency and trust in ESG assessments. Investors and other stakeholders may question the accuracy and reliability of individual valuation models.

Separately, it is also worth noting that a significant part of the largest banks in Ukraine are state-owned. The business models under which they operate and the goals they pursue may differ from the activities of private banks. This creates somewhat unequal conditions and motivation regarding the implementation of the model, which in turn can cause a significant bias in lending practices towards state banks.

Thus, the approach in which each commercial bank creates its own ESG assessment model has its advantages and disadvantages. It allows banks to be flexible and innovative, but at the same time requires significant resources and can lead to a lack of standardization and transparency. In general, this model corresponds to the concept of "free market".

5.2. Market model with information exchange and independent ESG assessment

According to the second approach proposed by us, the model assumes that banks form a taxonomy of green loans as a first step on their own initiative. The presence of a taxonomy will allow to unify the characteristics of submitted applications and assign them to one or another group. In the second step, banks agree to exchange information regarding the type of loan as "green". This can be implemented through the addition of credit information that is transferred to the credit registry or bureau of credit histories. In the third step, an infrastructural institution is created on the market, which carries out a standardized assessment of projects regarding their classification as green credits. Such an infrastructure institution acts by analogy with independent rating agencies. Banks are delegating a function not inherent to them

The idea of this approach to building a market model is to create transparent and standardized approaches that allow you to define and evaluate the type of green credit. By adopting a taxonomy, the type of loan is clearly identified here. The risk of greenwashing is reduced. In addition, banks will have the opportunity to analyze an analogue of the credit history of borrowers. The availability of statistics will allow a better assessment of the credit risk for different types of green loans.

The infrastructural element (specialized agency) will take on the function of independent assessment of the "greenness" of the loan. The presence of an independent assessment should be the basis for identifying the loan as green, but the assessment of solvency remains an internal task for the bank. The risk of greenwashing is significantly reduced.

The advantages of this model include the following aspects:

- Uniform ESG assessment criteria and methodology developed by an independent agency ensure consistency and comparability between different banks. This facilitates the analysis and comparison of ESG indicators for investors, regulators and other stakeholders.
- An independent agency can guarantee the objectivity and impartiality of assessments. This increases the credibility of the ESG assessment process, reducing the risks of manipulation and greenwashing.
- A professionally developed, unified assessment allows reducing the efforts and resources of banks to build internal similar systems. It is significantly easier for banks to develop their own models, which reduces costs and simplifies the process of implementing ESG assessment, as well as the speed of its updating, adaptation, correction, etc.
- A specialized independent agency can attract experts from relevant fields, which allows for the creation of high-quality and scientifically based methods for assessing the presence of ESG factors in projects proposed for lending. This contributes to a more accurate and reliable assessment of environmental, social and management risks. In addition, the agency can develop additional products such as consulting services in one direction or another.

Despite the fact that this approach to building a green credit market model solves a large number of problematic nuances, it has certain disadvantages:

- Creating and maintaining a specialized agency requires significant financial resources. The costs of its operation may be imposed on banks or the state, which may cause additional financial burdens. In particular,

the issue of banks agreeing to delegate assessments to this agency and paying for this service is one of the key issues.

- A standardized assessment model may not take into account the specifics of individual banks or regions. This may reduce the possibility of adapting assessment methods to the specific conditions and needs of banks.
- The elimination of the risks of greenwashing is not 100% - it will depend to some extent on how the activities of such an agency will be controlled. At the same time, this risk will be clearly lower than in the first model.

In addition, within the framework of the construction of such a model, it is necessary to investigate the relationship between local market characteristics and international practice, to correctly form the mandate of such a structure. Another operational risk of this mechanism can be high bureaucracy.

5.3. A model of the green credit market based on central bank regulation

As part of this approach, the regulator (in Ukrainian case this is NBU) initiates the formation and implementation of the ESG credit assessment model as part of the requirements for determining credit risk, determines the indicators that will be subject to reporting (such as GAR - Green Asset Ratio). The purpose of this approach is to standardize the model and reduce the risks of greenwashing, enable the state to more effectively influence the development of a sustainable economy and apply green lending support programs. This mechanism has the following advantages:

- One universal, mandatory (regulatory) model for all banks ensures consistency and comparability of ESG indicators and green credit indicators. This facilitates analysis and decision-making by banks, investors, regulators and other stakeholders, as all banks use a single valuation methodology.
- The model developed by the regulator is generally considered more reliable and objective than the models of individual banks. This increases the credibility of ESG assessments and reduces the risks of

manipulation and greenwashing. The regulator can implement strong control mechanisms to ensure the accuracy and reliability of assessments.

- Since the model is developed by the regulator, banks do not have to spend significant resources on developing their own models. This allows to reduce the costs of implementation and maintenance of ESG assessment, which is especially important for small and medium-sized banks.
- Mandatory regulatory model contributes to increasing the overall level of environmental, social and managerial responsibility in the banking segment. This helps to achieve national and international sustainable development goals.

The main drawback of this approach to building a market model is the low flexibility of the approach and the inability to take into account all possible issues that arise when considering green lending and assessing their risks. In addition:

- The regulatory model may be less responsive to changes in market conditions or new challenges. The process of updating the model can be long and bureaucratic, which reduces its adaptability.
- Even the best model designed by a regulator may have flaws or may not take into account all possible risks and factors. If the model is not perfect, it can have negative consequences for the entire financial sector, since all banks will be obliged to comply with it.

The above features have similar advantages and disadvantages to the second approach and it is important to distinguish here that the main difference is who will perform the assessment. If in the second approach it is carried out by a separate institution (agency), then in the case of implementation of the model by the regulator, the task of its implementation lies with the banks themselves. This brings us back to the possible problems with the first approach. First of all, the problem can be the incorrect application of the mandatory model and the difficulty of supervising this process. Although, of course, the option of creating a similar agency in the regulatory

aspect can be proposed (by analogy with the creation of the Credit Register at the NBU).

In our opinion, of the above 3 approaches to building models of the banking market of green loans in Ukraine, the second model is the most effective. This is explained by the fact that in Ukraine, private credit bureaus work quite well, which accumulate information on credit histories, and adding information on the characteristics of a green loan is significantly simplified. Therefore, the issue of information exchange is familiar to Ukrainian banks and is included in business processes. Building a green credit rating infrastructure can be challenging if developed from the ground up. The difference between the second and third approaches lies in its functioning on a commercial basis or on a regulatory basis. In our opinion, the first option is better because it encourages developing products and services based on demand from banks. Moreover, you can invite global players to the market in this direction. They already have considerable experience, which is an advantage. An example is the Synesgy (<https://www.synesgy.com/>) platform of the leading European credit bureau CRIF (<https://www.crif.com/>). Evaluation of green credits according to the unified methodology of the leading European agency will promote confidence in banks' assessments of their share of green credits in loan portfolios. This will facilitate access to credit lines of international banks with a focus on ESG characteristics of the loan portfolio.

Problems with the first model may be related to the long period of transition by banks to the initial period of market formation. The problem of the third model (the driver of which can be the National Bank of Ukraine) may be the regulatory "imposed" order of market organization, which will not reproduce the specific features of the market. Although the existence of the Credit Register of the NBU is an advantage for creating a system for exchanging credit information on green loans at the regulatory level.

Conclusions.

Modern credit relations are being actively transformed now in the direction of including ESG factors in consideration. One of the manifestations of this is the

emergence and rapid formation of the market of green bank loans. In the Ukrainian banking market, this process is also gaining momentum, but is in the initial stage. One of the problems of market development is the formation of a model of such a market, which would take into account the genesis and specific characteristics of the market of an individual country.

In the paper, we present three conceptual approaches to the construction of models of the functioning of green loans in the Ukrainian banking system. When developing the approaches, the analysis of the goals and limitations of the main participants of such a market was used: enterprises implementing green projects, banks and the regulator. On this basis, approaches were developed, on the basis of which three models of the green credit market can be built. Namely:

- model of independent ESG activity of banks;
- market model with information exchange and independent assessment;
- a green credit market model based on central bank regulation.

Each model has a number of advantages and a number of disadvantages, which were analyzed within our research.

When analyzing the genesis and specific characteristics of the Ukrainian banking market, the work substantiates the greatest relevance to the implementation of the market model with information exchange and independent assessment.

Prospects for research in this direction include the expansion of the market of green loans to a wider market of ESG-oriented loans in the Ukrainian banking system.

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