REVIEW

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Banks Financing the Green Economy: A Review of Current Research

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ABSTRACT

Achieving the goals of sustainable development and the transition to a green economy requires significant financial resources. Banks are active participants in the financing of projects and industries with a positive environmental and social impact. In this regard, the emerging responsible banking and its regulation are of scientific and practical interest, which ensures **the relevance** of the study. **The aim** of the study is to generalize and systematize the results of scientific research on the participation of banks in financing the green economy. In the context of the historical approach, the authors apply **the methods** of critical analysis, logical generalization, systematization, and grouping. The research is based on scientific publications by Russian and foreign authors. As **a result**, the authors substantiated the correlation of the concepts "green", "sustainable", "responsible" bank, and identified that such green financial instruments as green bonds, in some countries — green loans, green deposits, green leasing, and green insurance are being introduced into banking practices. Responsible banking is regulated using monetary and macroprudential policy instruments; in some countries, incentive-based regulation of responsible banking is mandatory. The authors **concluded** that responsible banking is moving towards the transformation of classic products and services into environmentally and socially oriented ones, accompanied by the transformation of business processes, management culture, and the content of banking policy. Responsible banking contributes to ensuring financial stability, but the regulator needs to use macroprudential tools to timely identify a green credit bubble, including through climate and environmental stress testing. **Prospects for further research** are aimed at assessing the impact of green financial instruments on the bank's performance, the role of responsible banking in achieving sustainable development goals, at finding the most effective monetary and macroprudential tools to stimulate responsible banking and ensure financial stability.

Keywords: banks; green economy; green loans; green bonds; green financial instruments; sustainable development; stimulating banking regulation

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INTRODUCTION

Over the past few decades, the attention of the world community has been focused on shifting the vector of development of economic processes and relations towards the rational and environmentally friendly use of natural resources. In June 1992, at the UN Conference in Rio de Janeiro, the concept of "sustainable development" was defined as development that meets the needs of the present and future generations.

The adoption of the concept of "sustainable development" required a search for ways to achieve sustainable goals, determine the directions of the transformation of economic relations, the emergence of a new term "green economy". "Green" refers to an economy that improves the welfare of individuals and social justice, significantly reduces environmental risks, and implies a favorable interaction between the environment, social development, and economic growth[1] [1].

The transition to a green economy requires more support, particularly financial [2]. This transition contributes to the transformation of the world financial system, the creation of new institutional structures, a change in the financial architecture, the redirection of financial flows, the introduction of new financial instruments, the formation of a regulatory framework, prudential regulation, a new culture of management of financial institutions. These transformations are called "greening" the financial system [3]. Supporting sustainable development by the financial system should have a positive effect on financial stability [4] and can play a key role in finance [5].

One of the directions of the transformation of the global and national financial architecture is the formation of a green banking system with a "network" type of financial intermediaries: green banks, development banks, as well as commercial banks with separate eco-financial divisions [6, 7]. The financial policy of banks, focused on achieving sustainable goals of society, is a tool for creating opportunities for the development of the green economy [8–10].

Since the 90s 20th century banks promoted sustainable development by financing first environmental and then social projects [11]. During the same period, the practice of doing business, including banking, is expanding in accordance with the Concept of Corporate Social Responsibility (CSR) [12]. In 1991, Deutsche Bank (Germany), HSBC Holdings, National Westminster Bank (US), Royal Bank of Canada and Westpac Banking Corporation (Australia) adopted the United Nations Environment Programme Finance Initiative (UNEP FI) [13], aimed at integrating environmental approaches into the operations and services of the financial sector. At the beginning of 2020, this programme was supported by about 170 banks around the world, including leading international banks, regional leaders, development banks, and banks specializing in financing environmental and social projects.[2]

The ongoing processes of greening the banking system have led to the special relevance of the theoretical understanding of the role of banks in financing the green economy, the need to generalize and systematize the results of relevant scientific research.

The structure of the article includes the following elements: the evolution of the concepts of green, sustainable, responsible

[1] Global Green New Deal: UNEP Report.: http://greenlogic.by/content/files/GREENTRANSPORT/UNEP90_RUS.pdf (accessed on 14.03.2020); Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. URL: http://old.ecocongress.info/5_congr/docs/doklad.pdf (accessed on 14.03.2020).

[2] UNEP FI. URL: https://www.unepfi.org/banking/banking/ (accessed on 15.03.2020).

bank and banking, an overview of green financial instruments used in banking practice, and instruments for regulating responsible banking by the banking regulator. Finally, the main results are summarized and directions for future research are identified.

BANKS FINANCING GREEN ECONOMY: DEVELOPMENT OF TERMINOLOGY

The greening of the financial system was facilitated by the development of the theoretical apparatus of banking, the introduction of the concepts of "green", "sustainable", "responsible" banking into the scientific vocabulary.

The first mention of green banking as an environmentally friendly bank is associated with Triodos Bank, founded in 1980 in the Netherlands. In 1990, Triodos Bank launched a Green Fund strategy to finance environmentally friendly projects, later called green initiatives. Following the example of Triodos Bank, banks around the world are starting to implement green initiatives in their operations. In this regard, green banking was understood as any form of banking services that contribute to the country's and nation's obtaining environmental benefits,[3] green banks are engaged in green banking.

Officially, green banking has existed since 2003.[4] Despite the fact that the banking business is inherently environmentally neutral, the initial idea of a green bank was to minimize environmental damage from the bank's activities (reduce paper consumption, switch to electronic document flow, use of alternative energy sources, etc.). Also, banks could voluntarily participate in financing private environmental projects.

In 2007, a new financial instrument appeared on the world financial market — climate and green bonds, the first issuers of which were development banks [14–16]. Later, separate green development banks began to be created as public financial institutions. A 2015 report by the Organization for Economic Co-operation and Development (OECD)[5] defines a Green Bank as a public entity established specifically to facilitate private investment into low-carbon, climate-resilient infrastructure and other green sectors such as water and waste management; the green bank's mission is to leverage innovative finance to accelerate the transition to clean energy and combat climate change [2].

In the studies of the last decade, the green bank is considered not only as a state but also as a commercial financial institution [17–19], acting as one of the instruments of the green economy, contributing to environmentally sustainable development and socially responsible investments that attract entrepreneurs to cleaner production through financing environmental projects [20–22].

Research on green banking is carried out in two directions: internal and external [23]. The focus of internal research is the internal organizational business processes of the bank to reduce the negative impact on the environment [21, 24–26]; external focus — attracting and providing financial resources for the green economy [27–30].

In addition to the terms "green banking", "green bank" in the scientific literature the terms "sustainable banking" and "sustainable bank" are used.

[3] Dash R.N. Sustainable "green" banking: the story of Triodos Bank. URL: https://ru.scribd.com/document/37388173/Sustainable-Green-Banking (accessed on 15.05.2020).

[4] Green Banking Consultants Homes Ltd. URL: http://greenbankingbd.com/index.php/uncatagorise/2-history-of-green-banking (accessed on 15.05.2020).

[5] OECD report "Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate — resilient Infrastructure" (2015). URL: https://www.oecd.org/environment/cc/Green-Investment-Banks-POLICY-PERSPECTIVES-web.pdf (accessed on 10.07.2020).

The first mentions of sustainable banking are from Sustainable Banking with the Poor: A Worldwide Inventory of Microfinance Institutions,[6] 1997. The study analyzed the credit and savings programs of microfinance institutions in Africa for their potential use to achieve sustainable development goals for improving human welfare. The study analyzed the credit and savings programs of microfinance institutions in Africa for their potential use to achieve sustainable development goals to improve human welfare. The subject of the research is microfinance organizations whose business model is focused on the social sphere. However, the term "sustainable banking" was not defined and was used by the authors of the report in the context of the financial institution's activities to provide financial assistance to low-income groups of the population.

A further interest of researchers in the interpretation of a sustainable bank is determined by the spread of the Concept of sustainable development, which becomes relevant not only for banks but also for other stakeholders. Banking policy, communication and transparency, environmental investment, and environmental risks are becoming central and interrelated components of the term "sustainable bank".

An analysis of the definitions of a sustainable bank in the scientific literature makes it possible to identify several non-contradictory approaches based on the internal and external directions of research in green banking and to develop them in interconnection towards sustainable banking. The first approach focuses on the bank's awareness of its role in sustainable development and the implementation of activities aimed at achieving sustainable goals. Such studies are devoted to the problems of transforming the bank's business processes, its financial policy, the development of operations with green financial instruments and their impact on the bank's efficiency, as well as the problems of forming a new internal management culture, including risk management, information disclosure [8, 31–36].

One of the directions of the transformation of the global and national financial architecture is the formation of a green banking system with a "network" type of financial intermediaries: green banks, development banks, as well as commercial banks with separate eco-financial divisions.

The second research approach to the term "sustainable bank" focuses on the external performance of the bank, which has a positive impact on people and the environment as a result of the adaptation of classic banking products and services to new social needs [8, 31, 37–40, 42]. Such a bank integrates ESG,[7] criteria into its activities, paying attention to

[6] The World Bank. Sustainable Banking with the Poor: a Worldwide Inventory of Microfinance Institutions. URL: https://silo.tips/download/a-worldwide-inventory-of-microfinance-institutions-abstract (accessed on 10.07.2020).

[7] Environmental, Social, and Corporate Governance (*ESG*) criteria are a set of performance standards for companies and banks that they use to test potential investments. Environmental criteria consider how the company operates in the field of environmental protection. Social criteria take into account how a company or bank manages employees and works with customers. Management criteria refer to company management, executive compensation, audit, internal control, and shareholder rights. The history of investing in accordance with ESG criteria begins in 2004. Former UN Secretary-General Kofi Annan invited the largest financial institutions to take part in a joint initiative under the auspices of the UN Global Compact with the support of the IFC. The term ESG was first coined in 2005 in the historical study "*Who Cares Wins*".

environmental risk management, socially responsible investments, and their impact on the environment [42–47].

Sustainable banking plays a triple role in promoting sustainable business thinking by providing financial resources to economic agents, in some cases financial advice for new projects or initiatives, aimed at supporting non-governmental organizations and government development programs a new sustainable model of the national economy, improves the reputation and image of the banking sector, demonstrating interest in the development of a green economy; characterized by the transparency of environmental information and communication [31, 40, 41].

The development of the terminology of green, sustainable banking was influenced by the concept of CSR. During the UN General Assembly on September 22–23, 2019 in New York, 132 banks from 49 countries (180 banks in 2020) signed the Principles for Responsible Banking,[8] to help any bank — regardless of the stage of its inclusion in the process of achieving sustainable development goals — aligning your business strategy with the goals of society. The implementation of the "Principles" is aimed at the formation and development of a stable (that is, ensuring the achievement of society's goals) banking system. These principles include:

- *the principle of alignment,* which implies the adaptation of the bank's business strategy to the needs and goals of society within the framework of national and regional requirements related to sustainable development;
- *the principle of impact and target setting,* implying a reduction in the negative impact on the environment and the reduction of environmental and social risks associated with the activities of the bank itself; implementation of the principle involves the publication by banks of environmental and social goals, which will receive the greatest attention from the bank's management;
- *the principle of clients and customers,* which involves building mutually beneficial relationships with customers to encourage achieving sustainable development goals and ensuring prosperity for current and future generations;
- *the principle of stakeholders,* which presupposes a proactive position of banks in relations with stakeholders in consultation, various interactions, and cooperation to achieve society's goals;
- *the principle of governance and culture,* which consists in effective intra-bank management and the formation of a culture of responsible banking;
- *the principle of transparency and accountability,* which implies that banks regularly review individual and collective implementation of the Principles of Responsible Banking, provide transparent reporting accounting for their positive and negative impact on the environment, and also assess their contribution to society's goals.

Thus, in 2019, representatives of the international banking community adopted the term "responsible bank", the activities of which can be defined as "responsible banking".

Research into the use of the terms green, sustainable and responsible banking in the scientific literature leads to the following conclusions. It combines the concepts of banks' awareness of the need to operate in a manner that minimizes environmental harm. The term green bank is used both in relation to the state green development banks and in relation to commercial banks, the terms sustainable and responsible bank — in relation to commercial banks.

[8] The Principles for Responsible Banking. URL: https://www.unepfi.org/banking/bankingprinciples/#:~: text=is%20urgently%20needed.-The%20Principles%20for%20Responsible%20Banking, and%20across%20all%20business%20areas (accessed on 06.06.2020).

In fact, sustainable banking is a broader concept that includes green banking: the activities of a green bank are aimed at minimizing the negative impact on the environment, while the activities of a sustainable bank contribute to the achievement of a sustainable development goal not only in the environment but also socially-wise.

A responsible bank is a more formalized concept based on outlined principles than sustainable and green in relation to commercial banks. Responsible banking can be characterized as the perfect form of sustainable banking, which has received official international recognition and implemented certain principles.

BANKS AND GREEN FINANCIAL INSTRUMENTS

The adoption by the world community of the concept of sustainable development has led to the formation of a new terminological apparatus, which implies the addition of "green" to the existing economic and financial terms, filling them with new content. The terms green finance, green investments, green financial instruments are used to denote relations associated with the accumulation of funds and their subsequent direction for the implementation of projects of environmental and social orientation, including with the participation of banks. In the scientific literature, there are two different approaches to define green finance and green investment. Representatives of the first approach identify both terms [48–50]. Representatives of the second approach distinguish between these terms: green finance is a wider range of relationships [16, 51]. Finance is green when it participates in financing public and private green investments, enforces public policies that encourage green projects, and is a component of the financial system that deals with green investments.[9]

For the banking sector, green finance is defined as financial products and services, under the consideration of environmental factors throughout the lending decision making, ex-post monitoring and risk management processes, provided to promote environmentally responsible investments and stimulate low-carbon technologies, projects, industries, and businesses.[10]

In 2007, a new financial instrument appeared on the world financial market – climate and green bonds, the first issuers of which were development banks.

Green financial instruments can be defined as financial assets and financial liabilities used by economic agents to achieve sustainable development goals. The green financial instruments for which the bank acts as a counterparty include green loans, green bonds, green deposits, green leasing, green insurance [7, 52–56].

The use of certain green financial instruments by different banks varies. Development banks have historically been green bond issuers, lending directly to environmental projects, and sustainable, responsible commercial banks, their green business units, are adapting their classic financial assets and liabilities to achieve sustainable development goals [45, 18].

Green lending is any type of credit instrument that is provided exclusively

[9] Lindberg N. Definition of Green Finance. German Development Institute. URL: https://www.die-gdi.de/uploads/media/Lindenberg_Definition_green_finance.pdf (accessed on 25.05.2020).

[10] Pricewaterhouse Coopers Consultants (PWC): Exploring Green Finance Incentives in China (2013). URL: https://www.pwchk.com/en/migration/pdf/green-finance-incentives-oct2013-eng.pdf (accessed on 25.05.2020).

for financing or refinancing, in whole or in part, new and/or existing available environmental projects [57, 58]. Green lending is the link between cleaner industries and financial institutions [36].

Depending on the category of the borrower, there are two main types of green loans: loans to organizations in strategic sectors (performing strategic national goals) and loans to other organizations [59, 60]. Depending on the lending mechanism, direct green lending and green relending are distinguished.

According to Bloomberg data, green loan volumes (including guarantee lines and letters of credit) exceeded US$ 99 billion in 2018; at the end of 2019 — at least US$ 81 billion.

Direct green lending is carried out through the provision of funds by banks with state participation directly to green companies with a large volume of requested funds.[11] Commercial banks can also independently carry out direct lending, depending on the demand for bank financing of green projects of borrowers [52]. With direct lending, banks organize the issuance of a loan, control its repayment, and the fulfillment of the terms of the loan agreement by the borrower.

In green relending, public funds are channeled first to a financial company, such as the National Development Bank, and then to commercial banks that finance green companies.[12]

To provide green loans, banks can form syndicates [61].

Green loans improve the quality of the aggregate loan portfolio of banks [60, 36], help to reduce credit, reputational and legal risks of the creditor bank [64, 65], improve its image, increase its competitiveness [27, 64, 65].

According to Bloomberg data, green loan volumes (including guarantee lines and letters of credit) exceeded US$ 99 billion in 2018; at the end of 2019 — at least US$ 81 billion.[13]

Green loans are provided by banks in accordance with the developed and approved credit policy. A bank can offer green credit products with attractive terms for borrowers (including the type of loan, terms, interest rate, and amount), thereby stimulating the creation and development of environmentally friendly and energy-saving industries and enterprises, influencing the change in the structure of social production, the ratio of dirty and green business, contributing to the green growth. At the same time, banks can "punish" enterprises that violate the norms and laws on environmental protection or energy conservation, stop lending, refuse to lend to projects without a positive impact on the environment, thus controlling the adoption of environmental risks by borrowers [55, 63, 66].

Green credit policy can be developed and implemented not only by responsible banks but also by the state [67]. The green credit policy of the state determines the strategic sectors, priority sectors (for example, energy conservation, renewable energy sources,

[11] Ministry of Finance of the Russian Federation. Research Report "Practical Experience in Supporting Green Finance (Case Study of G20 Countries)". URL: https://investinfra.ru/frontend/images/PDF/minfin-green-docs/minfin-green-docs-04.pdf (accessed on 09.05.2020).

[12] Ministry of Finance of the Russian Federation. Research Report "Green Finance as a Mechanism for Financial Support of Investment Activities to Ensure Balanced and Sustainable Growth: Opportunities for Russia". URL: https://www.minfin.ru/common/upload/library/2018/06/main/2016_Final_report.pdf (accessed on 09.05.2020).

[13] Sustainable Finance. The rise of green loans and sustainability linked lending (2019). URL: https://lpscdn.linklaters.com/-/media/files/thoughtleadership/green-finance/sustainable_finance_green_and_sustainability_linked_lending_linklaters.ashx?rev=86ebcb26-c283–4e5b-be26-b065f08cc27e&extension=pdf&hash=CA71D33707F9F4DFA52FD53B02F56065 (accessed on 15.01.2020).

clean technologies), for the implementation of projects in which green loans should be provided by both commercial banks and development banks [68].

In addition to green loans, green financial instruments of green development banks and responsible banks rightfully include climate and green bonds,[14] which are debt securities, from the placement of which the proceeds are used to finance environmental and climate projects [15]. Banks can finance new and refinance existing environmental projects with funds raised by securitizing assets into green bonds and then placing green bonds among third-party investors [69]. Bonds collateralized by commercial mortgages of environmentally certified buildings command lower spreads than bonds collateralized by other comparable real assets [70]. As of the end of 2019, global financial institutions had issued approximately US$ 86 billion in green bonds,[15] of which approximately US$ 31 billion were issued by development banks and approximately US$ 55 billion by other banks.

In contrast to the green loan, which is a financial asset of the bank, transactions with green bonds form not only financial assets but also financial liabilities of banks, since banks act as both an issuer and an investor in the bond market. [17, 71, 72]. Placing funds by banks in green corporate bonds requires the formation of financial market structures that assess the environmental risks of issuers of green bonds by assigning appropriate ratings [73]. Encouraging banks to place funds in green bonds should be carried out simultaneously with stimulating businesses to invest in environmentally significant projects, including through the development and application of a green fiscal policy by the state [74], and the formation of an effective regulatory framework [75, 76].

The development of transactions with green bonds will contribute to the development of the financial market both in the world and in Russia, and will also increase investment activity in the economy [77, 78]. The Central Bank of the Russian Federation defines the banking sector as one of the main participants in the domestic green finance market since it is a bank that can have a stimulating effect on the formation and development of the green bond market.[16]

The green credit policy of the state determines the strategic sectors, priority sectors (for example, energy conservation, renewable energy sources, clean technologies), for the implementation of projects in which green loans should be provided by both commercial banks and development banks.

Such green financial instruments as green insurance, green leasing, green deposits are currently at the stage of formation, their use is being tested in banking practice, including in Russia. For example, on March 10, 2020, Center-invest Bank introduced the Green deposit,[17] which is unique for the Russian banking

[14] A green bond is a type of climate bond that is labeled green by the issuer, which means that the bond complies with the principles developed by the International Association of Capital Markets: use of funds, selection and evaluation of projects for financing, revenue management, and reporting.

[15] Green Bonds. Global State of the Market 2019 (2020). URL: https://www.climatebonds.net/files/reports/cbi_sotm_2019_vol1_04c_0.pdf (accessed on 01.07.2020).

[16] Diagnostic note. Green finance: an agenda for Russia.URL: https://www.cbr.ru/Content/Document/File/51270/diagnostic_note.pdf (accessed on 20.05.2020); TCFD. Recommendations of the Task Force on Climate-related Financial Disclosures. Final Report. (2017). URL: https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-2017-TCFD-Report-11052018.pdf (accessed on 10.04.2020).

[17] Center-invest Bank. URL: https://www.centrinvest.ru/ru/about/news/36257/?sphrase_id=454460 (accessed on 06.04.2020).

sector, with a rate of 4.6% per annum. The collected funds will be used to finance projects that contribute to the achievement of sustainable development goals and the implementation of strategic national objectives. The deposit is made in rubles for a period of 17 months, the minimum deposit amount is 100 thousand rubles. This bank was also the first bank to place green bonds on the Moscow Exchange in 2019.

Since 2019, the Central Bank of Russia has begun adopting regulations in the field of green finance, and by 2021 plans to develop national rules and standards for verifying green financial instruments.

Banks that are actively involved in shaping sustainable development and a green economy must be ready to accept the changes that will arise in their activities in connection with the change in the paradigm of economic development in general. At first glance, changes in the bank's activities towards responsible business conduct are associated with additional costs and risks, including the risks of organizational changes. However, once introduced, these changes will become the driving force behind the bank's development, ensure its attractiveness in the eyes of investors and clients, and open up new market opportunities.

Researchers agree that the development of green financial instruments of banks is extremely important, if not crucial, for the development of green technologies, financing of environmentally friendly production, creation of green jobs, ensuring the implementation of the Concept of Sustainable Development [52, 53, 63, 66, 79, 80]. In the existing economic realities, despite the presence in society of a fully formed understanding of the need for a responsible attitude to nature, the declaration by states of the goal of increasing the welfare of the population, a significant transformation of the entire system of social production is required. Some responsible participants of the green economy need government support, particularly fiscal policy that stimulates economic agents, and for the banking sector additionally and to the system of incentive banking regulation and supervision.

REGULATION OF GREEN BANKING

Banks operate in a regulatory environment, their activities, including green, are subject to regulation. In different countries, the function of banking regulation and supervision is entrusted to the central bank or a specially created body, and can also be carried out by them jointly. Banking regulators, with appropriate government policies, can facilitate the channeling of finance to environmental projects by regulating the activities of banks for which regulatory instruments can be applied.

Depending on the type of policy implemented by the financial mega-regulator in relation to responsible banking, independently or jointly by several financial regulators, all regulatory instruments can be divided into instruments of monetary policy and macroprudential policy.

Within the framework of monetary policy, differentiated parameters of instruments can be applied, such as operations on the open market, interest rates, direct quantitative restrictions, and mandatory reserve requirements.

In quantitative easing for green lending, the central bank uses banks' green financial assets in open market transactions and differentiates interest rates for transactions with responsible and other banks. The use of instruments is constrained by the

lack of labeled green bonds, the lack of an established practice of assessing the green financial assets of banks. However, the preliminary announcement of the regulator's intention to include the green requirements of banks in the composition of assets for which additional liquidity can be obtained will stimulate issuers to identify suitable assets and issue "new" green loans, which, in turn, can be refinanced through green bonds [81–83].

Direct quantitative restrictions as an instrument of monetary policy aimed at stimulating responsible banking activities can be implemented by introducing credit quotas or limits. Credit quotas are fixed requirements for the structure of a bank's loan portfolio, establishing the obligation of banks to form part of the portfolio with loans with specific characteristics, strategic industries, or borrowers from specific geographic regions. Minimum mandatory quotas can be set for green projects in the banking portfolio, and maximum possible limits for carbon-intensive projects. However, a mandatory strict quota could potentially cause serious market distortions, lead to a green credit bubble and threaten financial stability.[18]

The differentiation of the required reserves ratio is aimed at stimulating banks to issue green obligations. Reduced reserve requirements may be provided for issued green bonds and attracted green deposits [84].

In addition to monetary instruments, macroprudential policy instruments can be used to regulate responsible banking. However, the main goal of the regulator should remain the goal of ensuring financial stability. Macroprudential regulation of responsible banking is carried out in two directions: through the differentiation of prudential norms and through increasing information transparency of the market.

As a result of the development of the theory and practice of doing socially responsible business, the concept of sustainable banking was formalized by highlighting special principles and transformed into the concept of responsible banking.

The easiest tool to use is the norms for the formation of provisions for possible losses on credit claims or insurance reserves. The reduced rates of insurance reserves established by the regulator for banks' green claims are a way to stimulate green investments in comparison with traditional investments since they reduce the cost of reserves and have a positive effect on banks' profits.[19]

Requirements for bank capital and its sufficiency, as well as requirements for the formation of insurance reserves, can be differentiated depending on the type of bank and the characteristics of its

[18] Schoenmaker D., Van Tilburg R., Wijffels H. What Role for Financial Supervisors in Addressing Systemic Environmental Risks? Sustainable Finance Lab Working Paper, Utrecht: Sustainable Finance Lab (2015). URL: http://unepinquiry.org/wp-content/uploads/2016/02/Working-paper-15-april.pdf (accessed on 15.06.2019); Volz U. Fostering Green Finance for Sustainable Development in Asia. Bonn: German Development Institute (2016). URL: https://www.diegdi.de/uploads/media/Fostering_Green_Finance_in_Asia_Volz.pdf (accessed on 02.04.2020).

[19] IFS. Greening the Banking System — Experiences from the Sustainable Banking Network (SBN). Input Paper for the G20 Green Finance Study Group (2017). URL: https://www.ifc.org/wps/wcm/connect/5962a2da-1f59–4140-a09112bb7acef40f/SBN_PAPER_G20_02102017.pdf?MOD=AJPERES&C VID=lHehxyG (accessed on 11.04.2020); Mason A., Martindale W., Heath A., Chatterjee S. French Energy Transition Law: Global Investor Briefing. The Principles for Responsible Investment Initiative (2016). URL: https://www.unepfi.org/fileadmin/documents/PRI-FrenchEnergyTransitionLaw.pdf (accessed on 10.04.2020); Climate Bonds Initiative (CBI). Greening the financial system. Tilting the playing field. The role of central banks, (2019). URL: https://www.climatebonds.net/files/reports/cbi-greening-the-financial-sytem-20191016.pdf (accessed on 15.04.2020).

credit investments. The introduction of reduced risk ratios for green credit claims reduces the aggregate bank risk. As a result, green loans, investments in green bonds, investments in environmental projects will put less pressure on capital than alternative investments of the bank [85, 86].

Green macroprudential regulation in Brazil, China, India, Vietnam, Nigeria, Indonesia is mandatory; in Mexico, France, Belgium, Germany, Turkey, Japan, South Africa and a number of other countries — voluntary; in Russia, USA, Canada, Great Britain, Australia, Argentina, Saudi Arabia, a number of European countries — submitted by the regulator for discussion [81, 82, 86].

When implementing macroprudential policies, climate change and environmental risks should be considered as factors that can lead to financial instability. To eliminate the impact of systemic environmental risk on financial and banking stability, increased reserve requirements for bank credit requirements for "brown" enterprises and industries, environmental capital surcharges, and increased risk ratios for bank claims to carbon-intensive and related sectors can be established. Also, restrictions on the risk of concentration of green claims in the banking portfolio can be introduced for individual counterparties, certain industries, or geographic regions, and climate stress testing can be carried out[20] [85, 87].

Developing the practice of implementing the Basel II international capital agreement to ensure market discipline, following the recommendations of the Task Force on Climate-related Financial Disclosures (TSFD),[21] the regulator pays attention to the transparency of information on environmental financial risks accepted by banks [79], which provides a framework for green macroprudential regulation and stress testing.

Another incentive tool for regulating responsible banking is the guidelines on environmental lending. Despite the differences between countries, the guidelines usually include recommendations for assessing environmental risks as well as incentive schemes for green finance. The most famous of these is the Green Credit Guidelines issued in 2012 by the China Banking Regulatory Commission (CBRC) as part of the government's green credit policy. The guidelines recommend that banks include targets for green loans in their lending policies and adjust their terms and conditions. The experience of China has shown that in order to achieve a positive macroeconomic impact on the environment, advisory guidelines must be complemented by differentiation of prudential norms.[22]

Since 2019, the Central Bank of Russia has begun adopting regulations in the field of green finance, and by 2021 plans to develop national rules and standards for verifying green financial instruments.[22] The Bank of Russia has developed standards for issuing green and social bonds, which entered into force on May 11, 2020. The standards suggest that when issuing green and social bonds, the exact details of the projects for which the funds are raised must be specified. Projects must be checked for compliance with Russian and international standards for green and social projects. This approach will allow issuers to label bonds for investors as green or social. To check the green bonds, the Central Bank of Russia is creating a methodological center and a verification system, auditing companies will act as inspectors.[23]

[20] Bank of Russia. Impact of Climate Risks and Sustainable Development of the Financial Sector of the Russian Federation. Public Consultation Report. URL: http://www.cbr.ru/content/document/file/108263/consultation_paper_200608.pdf (accessed on 07.06.2020).

[21] Created in 2019 by the Financial Stability Board (FSB), the Bank for International Settlements, and the G20.

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The macroprudential regulator is working to foster a culture of responsible banking, including environmental and climate change issues on its agenda, signaling the importance of these issues, presenting the results of ongoing research on the green agenda for public comment, organizing educational workshops for bankers and investors, addressing the potential lack of knowledge about green finance, which has been found to be holding back the spread of risk management practices. Finally, the involvement of central banks in discussing standards and methods for interacting with public policies aimed at developing a green economy also plays an important role in the search for internationally-agreed approaches to greening the financial system.

Thus, banking regulators and supervisors, central banks have at their disposal a wide range of instruments to influence the decisions of banks to participate in financing the green economy, as well as to stimulate banks to create and use green financial instruments. However, at the moment it is too early to make a definite conclusion about which regulatory instruments or policies are most effective or appropriate, as this will depend on the specific situation in the country and specific instructions received from banking regulators, central banks, in accordance with government policy.

CONCLUSIONS

As a result of generalization, critical analysis, and systematization of the existing scientific literature, the demanded areas of research on the participation of banks in financing the green economy were identified, namely: the development of banking terminology in the context of greening the financial system, the formation of green financial instruments and their use in banking practices, as well as monetary and macroprudential green regulation of responsible banking.

It has been established that the concepts of "green", "sustainable", "responsible bank and banking" are united by the presence of an environmental component, the orientation of banks to financing environmentally friendly enterprises and industries. The term green bank is applied to state-owned green development banks and commercial banks. The terms sustainable" and "responsible bank and banking" apply to commercial banks, regardless of their capital ownership. A sustainable bank is a broader concept than a green commercial bank, as it focuses on achieving sustainable development goals not only in terms of environmental protection but also in terms of human welfare improvement. As a result of the development of the theory and practice of doing socially responsible business, the concept of sustainable banking was formalized by highlighting special principles and transformed into the concept of responsible banking.

The development of the practice of responsible banking follows the path of transformation of classic products and services into environmentally friendly and socially oriented ones, accompanied by the transformation of business processes, management culture, and the content of banking policy. Such green financial instruments of banks as green bonds, green loans in some countries, are receiving the greatest development. Green deposits, green leasing have been introduced into banking practice, and green insurance is applied. A responsible bank gains competitive advantages in the market, improves its image, acting as a conductor of the green policy of the state, contributing to the greening of the economy.

Regulating responsible banking through monetary and macroprudential policy instruments follows the path of stimulating the development of green financial instruments of banks and limiting activities that contribute to the financing

of "brown" industries. It turned out that informing the regulator of economic agents about the recognition of the importance of the sustainable development agenda can stimulate banking operations aimed at financing the green economy. Responsible banking ensures financial stability, but the regulator needs to use macroprudential instruments to timely identify a green credit bubble, the concentration of systemic environmental risks in the banking sector, including through the use of climate and environmental stress tests. Monetary and macroprudential green regulation is carried out in accordance with the state policy in the field of sustainable development in general.

In our opinion, further research on the role of banks in financing a green economy will be carried out in the following areas: green financial instruments and performance indicators of a responsible bank; government policy of green credit; regulation of responsible banking and financial stability.

The range of research issues of the first direction will include: the impact of green financial instruments in the banking portfolio on liquidity, capital, and capital adequacy, risks, insurance reserves, income, expenses, and profit of the bank; factors of improving the profile of "risk-return" of green financial instruments; assessment of the competitive advantages of a responsible bank in the market; the relationship between Environmental, Social and Corporate Governance (ESG) and bank value; transformation of business processes, the internal culture of management, including financial management. The study of the impact of responsible banking on the achievement of sustainable development goals will be aimed at assessing the contribution of the banking sector to changing the structure of social production, fighting poverty, creating green jobs, assessing the formation of a culture of responsible business through banks by other economic agents, searching for effective legal norms and forms government support for responsible banking.

Research on the regulation of responsible banking and financial stability will focus on setting targets for green lending policies; defining conditions that balance the objectives of monetary and macroprudential policy for responsible banking; modeling scenarios of climate shocks and mechanisms of transmission of these shocks to the economy through the financial system; mechanisms for the preventive detection of emerging green credit bubble; search for the most effective monetary and macroprudential tools, depending on specific conditions and government policies, to achieve sustainable development goals.

The development of the practice of responsible banking and its regulation will solve the problem of limited data for empirical assessment, will provide an opportunity to substantiate and unify the system of indicators for further research on the role of banks in financing the green economy.

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