ISSN: 2688-9323

Analysis of Carbon Accounting Systems for Financial Institutions

Hang Shi

School of Economics and Management, Tongji University, Shanghai 200000, China

Abstract

Financial institutions are an important driving force for achieving the goals of "peak carbon" and "carbon neutrality", and carbon accounting is the foundation for the financial sector to realize green transformation. This paper takes financial institutions participating in climate and environmental information disclosure pilot projects as cases, analyzes the current status of carbon accounting of financial institutions through horizontal comparison and vertical tracking of 18 financial institutions, and puts forward suggestions to improve the carbon emission accounting system by taking into account international experience and national characteristics.

Keywords

Carbon Accounting; Financial Institutions; Carbon Emissions; Carbon Neutrality.

1. Introduction

1.1. Background

As global warming and other environmental problems become more and more prominent, people's way of life and production are changing more and more, and many governments have put forward the goal of "zero carbon" or "carbon neutrality". On September 22, 2020, the Chinese government stated at the 75th session of the United Nations General Assembly that China will increase its national contribution and adopt more vigorous policies and measures to strive to peak carbon dioxide emissions by 2030 and achieve carbon neutrality by 2060, and that it will also strive to achieve carbon neutrality by 2060, with the aim of achieving carbon neutrality. Carbon neutrality refers to a period of time in which carbon dioxide generated by specific organizations or social activities as a whole is absorbed and offset by natural and man-made means, such as afforestation, ocean absorption, and engineering storage, so as to achieve a relative "zero emission" of carbon dioxide from human activities. As a developing country with the greatest potential in the world, China must vigorously promote the transformation and upgrading of traditional industries, accelerate the improvement of China's scientific and technological innovation system, and realize low carbon emissions in the acquisition, storage, transmission, use and transformation of energy, in order to accomplish the historic tasks of "carbon peaking" and "carbon neutrality", We must accelerate the improvement of China's scientific and technological innovation system to realize low loss, low pollution and low emission in all aspects of energy acquisition, storage, transmission, use and transformation. In this whole process, the financial industry will become an important tool for China to realize the goal of carbon neutrality [1].

Carbon accounting by financial institutions is one of the important ways to support the goal of carbon neutrality. For financial institutions themselves, their carbon emissions during development and operation are relatively small, while the real enterprises in which they invest may have a large amount of carbon emissions, but the lack of data on the carbon emissions of the real enterprises leads to greater difficulty in carbon accounting for financial institutions. Therefore, international financial institutions have been exploring the establishment of a carbon accounting standard system for financial institutions for many years, and the Global Standard for Global Greenhouse Gas Accounting and Disclosure for the Financial Sector issued by the PACF provides a clearer calculation method for financial institutions' carbon accounting. At the same time, China's financial institutions have explored carbon accounting standards that are more suitable for China's national conditions.2021 The People's Bank of China issued the Technical Guidelines on Carbon Accounting for Financial Institutions, which provides a pilot program for China's financial institutions on carbon accounting.

1.2. Research Significance

Based on the case studies in the Pilot Report on Climate and Environmental Disclosure by Financial Institutions in China and the United Kingdom, this paper explores how financial institutions can support the goal of carbon neutrality through carbon accounting. The research significance of this paper is to show the basic situation of carbon accounting carried out by the pilot financial institutions, evaluate the effect of carbon accounting carried out by the pilot financial institutions, put forward countermeasures and suggestions for improving the calculation method of carbon accounting by financial institutions, and form a virtuous circle of co-development between the financial institutions and the low-carbon real economy.

1.3. Research Ideas

This paper takes the context of carbon neutrality as an entry point to study the carbon accounting system of financial institutions in this context and to propose countermeasures. The specific research ideas of this paper are as follows:

The first part, introduction. Explain the background, purpose and significance of the study, clarify the line of thought and the framework of the article, and clarify the research methods used.

The second part, literature reference. Review the literature from the aspects of the current development of carbon accounting at home and abroad.

The third part, analysis of carbon accounting system of pilot financial institutions. Based on the Pilot Report on Climate and Environmental Disclosure by Financial Institutions in China and the United Kingdom issued by the People's Bank of China, a qualitative and quantitative analysis of 18 financial institutions is carried out, focusing on analyzing the progress of the carbon accounting work of the Chinese institutions.

In the fourth part, corresponding research conclusions are drawn based on the previous analysis results, and countermeasure suggestions are put forward on this basis.

1.4. Research Methodology

This paper mainly adopts inductive deduction method and empirical analysis method. Firstly, it summarizes the previous research results by reading the literature, reviews the definition, types, indicators and methods of carbon accounting, summarizes the experiences and cases of financial institutions at home and abroad in carrying out carbon accounting, and analyzes the impact of carbon accounting on the the own operation of financial institutions. Secondly, this paper hopes to explore the current situation and effect of carbon accounting carried out by financial institutions through a combination of qualitative and quantitative analysis.

2. Literature Reference

Compared with the international community, the development of China's carbon accounting system started late, and in recent years, many scholars have carried out research in the field of carbon accounting. X.F. Ge (2020) believes that carbon accounting in the financial sector helps financial institutions to optimize management, meet regulatory requirements and promote the green and low-carbon transformation of the economy, and that the current carbon accounting methods of domestic financial institutions are not perfect enough and need to continue to be improved in terms of perfecting the scope of carbon accounting in the financial sector [2]. Y. Lei

ISSN: 2688-9323

et al. (2021) focus on carbon emissions in the agricultural sector, based on China's institutional design put forward countermeasures in line with China's national conditions, to promote the innovative application of digital science and technology in the field of financial support for carbon emission reduction in agriculture [3]. T.Y. Sun and Y. Zhu (2021) believe that financial institutions will face the risk of climbing carbon prices and tightening carbon quotas in the future, and there is still room for improvement of domestic carbon accounting standards, methods and data [4]. S.L. Rao (2022) analyzes the carbon accounting standards and methods of foreign financial institutions, lists the channels for foreign financial institutions to obtain carbon data, and provides references for China's financial sector to promote carbon accounting work[5]. C.C. Xiong et al. (2022) sorted out the construction experience of carbon emission accounting system in the international financial sector, pointed out the challenges faced by China's financial sector in carrying out carbon emission accounting for investment and financing, and put forward feasible suggestions based on international experience and domestic practice [6].

Some scholars have launched focused research on the environmental information disclosure aspects of financial institutions. Y. Lei (2022) analyzed the disclosure of environmental information of financial institutions in China, and pointed out that financial institutions in China face the limitations of insufficient incentives for environmental information disclosure, capacity to be improved, and required methods and data to be perfected, and the disclosure capacity needs to be improved [7]. C.L. Wang (2022) takes the practice of environmental information disclosure of financial institutions in Jiangsu region as a case study, describes the challenges faced by financial institutions, and puts forward suggestions to improve the system of environmental information disclosure system in view of its problems [8]. D.N. Xie (2022), based on summarizing the disclosure practice in China, puts forward suggestions such as strengthening the policy design guidance, improving the basic data of environmental information, perfecting the carbon accounting standard and enriching the disclosure application scenarios [9].

Much of the literature on carbon accounting in China focuses on elaborating the international carbon accounting system, analyzing the status quo of domestic carbon accounting and putting forward relevant suggestions, but lacks research and analysis on carbon accounting of specific financial institutions. Therefore, this paper takes the Chinese institutions in the Pilot Report on Climate and Environmental Disclosure by Financial Institutions in China and the United Kingdom as the main research object, and analyzes the progress of carbon accounting work of different financial institutions.

3. Analysis of Carbon Accounting Systems in Financial Institutions

As an important force in promoting low-carbon transition, financial institutions need to improve their ability to cope with climate change risks and transition risks, and promote the realization of China's "dual-carbon" goal by changing investment strategies and asset allocation. In 2021, 18 pilot financial institutions in China and the UK conducted in-depth exchanges and discussions on carbon accounting, and this paper focuses on these 18 financial institutions as the main research object to explore the current status, effects and challenges of their carbon accounting systems.

In 2017, the 9th China-UK Financial Dialogue event encouraged financial institutions in both countries to pilot environmental disclosure work with reference to the recommendations of the Financial Stability Board's Task Force on Relevant Financial Disclosure (TCFD), and many countries have incorporated the TCFD recommendations into their regulatory frameworks, among which the top five countries in terms of the number of supporting organizations are shown in Figure 1.

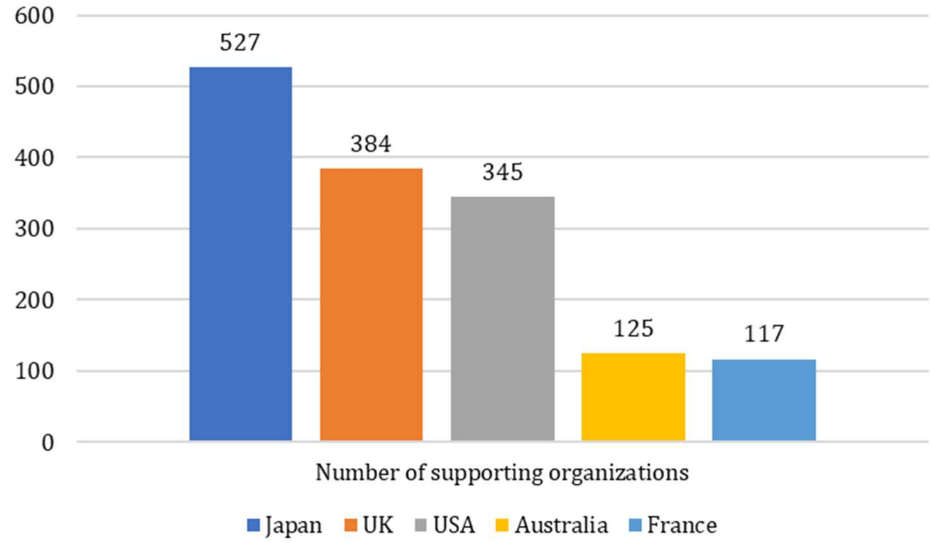

Figure 1. Number of supporting organizations

The pilot organizations involved in the case studies are shown in Table 1 and will be analyzed comparatively in this paper in terms of four dimensions: governance, strategy, risk management, and indicators and targets.

Table 1. Participating Pilot Organizations

Numble	Participating Pilot Organizations
1	Aviva Group
2	Brunel Pension Partnership
3	Federated Hermes Investment Management
4	HSBC
5	Industrial and Commercial Bank of China (ICBC)
6	Bank of China
7	China Construction Bank
8	Industrial Bank of China
9	Bank of Jiangsu
10	Huzhou Bank
11	Chongqing Rural Commercial Bank
12	Jiujiang Bank
13	Huaxia Fund
14	Yifangda Fund
15	Air China Trust
16	PICC Property & Casualty
17	Haitong International
18	Ping An Group

Aviva Group Board approved 2021-2023 business plan with climate targets and new climate change plan, participates in NZAOA targets, its TCFD report disclosed board responsibilities in climate work, personalized climate training for board and management. The AGM approved the TCFD report and the linking of the 10% incentive for senior management to, among other things,

ISSN: 2688-9323

the Group's climate change program. The Group's strategy maintained the alignment of the Group's business with the global 1.5°C warming target, while influencing others to do the same. The Group integrated climate-related risks into a unified risk management framework, identified potential exposure to climate-related risks and conducted analyses to produce a Climate Value at Risk (Climate VAR), which evaluated the Group's business in different climate environments. The Group has invested in industries and companies with lower carbon intensity to reduce emissions by 25% by 2025, and has used a portfolio warming potential indicator to assess whether the investment of shareholders' funds was in line with the Paris Agreement.

Brunel Pension Partnership's Board of Directors approved the Climate Change Strategy and Policy, which was shared by the Chief Executive Officer, Audit, Risk and Compliance Committees. The company published a Climate Change Policy, which guided the response to climate change around five areas: Policy, Products, Portfolio, Positive Impact and Conviction, and appointed managers to keep the management of the investments aligned with Brunel's climate change objectives. The firm used scenario analysis and due diligence management for risk assessment and management, and required metrics such as decarbonization of equity portfolios, fossil fuel revenues and exposures, and TPIs for long positions in companies.

Federated Hermes Investment Management has established a Due Diligence Management Team to engage portfolio companies on climate change issues and a formal Climate Change Working Group (CCWG) to assist in the development of climate change deepening strategies. The firm's strategy was designed to proactively understand and respond to potential risks and create performance for clients. Climate strategy included four key elements: awareness, integration, engagement, and advocacy The firm added tools and datasets to integrate climate risk management into all phases of investment, used proprietary carbon tools to monitor and measure climate change risks to public market portfolios, used third-party tools and data sources such as PACTA to examine the firm's capital expenditure plans and transformation risks, and published up-to-date, industry-oriented climate-related financial risk management guidance. "Carbon Footprint" was the company's core climate-related metric, and the firm incorporated carbon footprint data analysis into structured credit, real estate bonds and direct lending activities or fund structures.

HSBC's Board of Directors, HSBC Holdings plc Committee and Group Executive Committee were responsible for climate strategy and management. The bank tried to identify key climate risks in the short, medium and long term, and identified key risk types such as resilience risk, emphasized climate-related investment and financing, and adopted a multiple resilience analysis approach. The bank considered its own risk appetite and develops a risk management approach accordingly, developed a dedicated plan for climate risks and integrates climate risks into the Group's risk management. The bank has set new sustainable investment and financing targets and has included environmental indicators in the performance scorecard of the Executive Director and the Group Managing Director.

ICBC improved green financial governance, strengthened the leadership and supervision of the Board of Directors over green financial work, and coordinated and promoted green financial work in all business lines and organizations across the Group. ICBC has actively carried out green financial product innovation, fully implemented green classification and management of investment and financing, actively promoted the preparation of Guidelines on Environmental Information Disclosure for Financial Institutions, and strengthened international exchanges and cooperation. ICBC conducted a cooperative study with North China Electric Power University to quantify the future environmental risks faced by the coal power industry. ICBC quantified indicators such as green credit discounted emission reduction, green loans, green bonds, total green investment and financing, number/size of ESG thematic funds and ESG investment-related situations.

Bank of China has set up a leading group for green finance and industry planning and development, established a specialized department for green finance, and incorporated green development into the assessment system for relevant senior staff. It provided policy support for green finance, set clear quantitative growth targets for each business segment, and gave full play to its globalization and integrated operation advantages. Bank of China has incorporated environmental and climate risk management into its comprehensive risk management system and conducted environmental risk stress tests. It has also quantified carbon footprint indicators for the operating environment of its head office building.

CCB has strengthened top-level design at the corporate governance level, set up a Carbon Peak and Carbon Neutral Leading Group to coordinate and promote the "dual carbon" services and formulate action plans. Strategically, it has increased green credit investment, expanded green financial services, and promoted the development of green market to enhance environmental information disclosure and investor communication. It has incorporated environmental and social risks into the management process of pre-credit, credit and post-credit, actively study the technical methods of environmental and climate risk stress testing, and explored the establishment of a climate risk stress testing system. It also explicitly incorporated increasing the proportion of green credit into annual credit policies and quantified the amount of green credit investment.

Industrial Bank of China established a top-down and comprehensive environment-related governance structure and improved corporate governance. It formed a green financial service system with strong products, cultivated talents, specialized branches and multiple financing, and took the lead in exploring and disclosing the measurement and quantification of asset carbon footprint. It has incorporated ESG into its comprehensive risk management system, conducted climate risk stress tests, focused on exploring the prevention of transformation risks, explored the mapping of "carbon inventory", gradually reduced the proportion of high-carbon assets, and demonstrated carbon footprint measurement methods.

Bank of Jiangsu has made efforts to improve its green finance organization and structure system, incorporating "sustainable development" into the responsibilities of the Board of Directors' Strategy Committee, establishing a green finance working group led by the president, and setting up a green finance head office department. It has adjusted the bank's business development strategy to align with the United Nations Sustainable Development Goals and the Paris Agreement, strengthened the role of green finance in responding to the "transformation of old and new kinetic energies" and accelerating transformation and development, and taken the lead in releasing the "carbon-neutral" action plan for financial services. The bank actively harmonized the risk management of various business lines. It also has actively unified the risk appetite of each business line, strengthened the application of the Equator Principles, established an ESG rating system, promoted the application of ESG ratings in the internal credit ratings of customers, expanded the stress test for climate and environmental risks, and carried out climate sensitivity analysis of credit assets in the thermal power, iron and steel, and cement industries. It built a green financial system, developed an intelligent identification system for green loans and a module for measuring environmental benefit indicators, explored methods and paths for disclosure of brown assets, and planed to proactively disclose them in due course.

Bank of Huzhou continued to innovate and reform its strategy, adhering to the development strategy of "finance + green + technology + cooperation + risk control". In terms of risk management, the bank carried out environmental stress tests for the textile printing and dyeing industry, which was a key industry in the region, created an ESG evaluation model for customers, and adhered to the "credit risk" management orientation.

Chongqing Rural Commercial Bank has set up a "1+3+22+N" group-wide green development structure, innovated green financial products, broadened green financing channels, improved the system, strengthened assessment measures, and cultivated a green culture.

ISSN: 2688-9323

Jiujiang Bank has set up the first "Green Finance Division" in Jiangxi Province to optimize the organizational structure of green finance from top to bottom. It actively enhanced its external influence, improved its internal green credit system, formulated green financial policies, and actively carried out environmental information disclosure. The bank has established an environmental risk management system, set up a corporate environmental risk rating list system, continuously strengthened its monitoring of environmental risks. It also quantified the balance of green credit, the amount of green bills accepted and discounted.

Huaxia Fund actively responded to the disclosure requirements of the EU SFDR and formulated the "Investment System for the Responsible Person of Huaxia Fund Management Co., Ltd" and "ESG Communication System of Huaxia Fund Management Co., Ltd". The Company took the lead in launching the carbon neutral program and formulated and implemented a complete carbon neutral implementation plan. The Company planed to complete the baseline measurement and target setting of portfolio carbon emissions by 2025, and mainly calculated CO_2 emissions.

Efunds has formulated a Statement of Responsible Investment and a Statement of Active Ownership to guide the company's approach to and specific practices of responsible investment from the top down, and set up an independent ESG management committee and ESG work team. The Company strategically focused on green product innovation, continued to launch investment strategies and funded products that took environmental factors into account, and communicated with portfolio companies to facilitate their transformation. The company identified transformation risk and physical risk as the main sources of risk, used artificial intelligence and big data technology to make timely risk warnings, and fine-tunes its internal risk control to strengthen the management of its own risks. In addition, it utilized weighted average intensity (WACI), total carbon emissions, carbon over income intensity, carbon over investment value and carbon emissions to calculate different carbon footprint-related indicators.

AVIC Trust carried out the strategy of "three excellences", i.e. excellence in environmental ecology, social responsibility and corporate governance, innovatively conducted green trust research, innovated green trust products and services, and actively practiced ESG disclosure. It measured the greenhouse gas emissions of the Aviation Trust Building as an assessment indicator.

PICC promoteed the publicity of green finance and environmental information disclosure, issued sustainable related recommendations and expanded the social influence of green insurance. It explored new paths for green investment in order to achieve green operation goals, used basic research as a carrier to strengthen the foundation of serving green development, and used innovation drive as the kernel to explore the mechanism of serving green development. The company also settled claims for catastrophe risks caused by climate change and helped other enterprises to carry out environmental risk management.

Haitong International Disclosure of carbon emission information in "the ESG Report" for public scrutiny. The company has formulated a carbon neutral "three-step" program to reduce its own carbon emissions, used renewable energy and purchased carbon credits. It accounted for the company's carbon emissions and estimated the cost of carbon neutrality in order to quantify the assessment indicators.

Ping An Group has established a governance mechanism for climate-related matters at all levels of the Group, clarifying authority and responsibility, carried out stage-by-stage assessments of climate-related work, and strengthened internal capacity building and external exchanges. The Group has implemented a sustainable insurance strategy and developed sustainability-related insurance products, actively implemented a responsible investment strategy, carried out low-carbon investments, proposed a near-zero development strategy and expanded its actions on green and zero-talk assets. The Group actively identified risks related to climate change and conducted scenario analysis on different types of risks. The Group endeavored to promote carbon neutrality in its own operations, quantify the carbon emissions of different types of emissions, such as natural gas and fuel oil. It calculated the percentage of carbon emissions corresponding to the scale of investments and loans in different industries.

From a governance perspective, 13 financial institutions, including Efunds and Ping An Group, emphasized the need to strengthen top-level design and optimize the financial organizational structure from the top down in the process of promoting carbon accounting. Among Chinese financial institutions, four financial institutions, including Industrial and Commercial Bank of China (ICBC) and Bank of China (BOC), announced their support for climate-related financial disclosure (TCFD). In terms of risk management, 14 financial institutions have proposed management measures for climate change-related risks, and some banks have incorporated ESG into their comprehensive risk management systems. Most of the pilot financial institutions reflected the extent of their own contribution to carbon emission reduction by publicizing their ESG investments, green loans, green bonds and other discounted carbon emission reductions. Among them, some institutions have disclosed the carbon emissions of their own operations, such as AVIC Trust, which has published the greenhouse gas emissions of the Aviation Trust Building, and Bank of China, which has measured the carbon footprint of the operating environment of its head office building.

Figure 2 shows that 86% of China's pilot institutions have assets of more than $100 billion, and 29% have assets of more than $10 trillion. It can be seen that larger financial institutions have assumed an important role in carbon accounting and have set an example and contributed to the promotion of green finance.

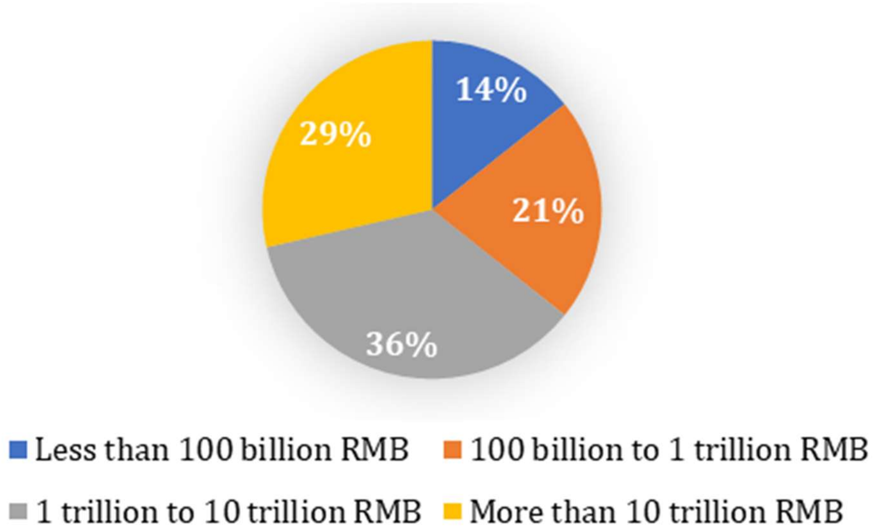

Figure 2. Percentage of institutions with different asset sizes

As can be seen from Table 2, most of the banks participating in the pilot belong to national banks or city commercial banks distributed in developed regions such as Jiangsu and Zhejiang. The active participation of national banks in carbon accounting can play a more exemplary role in the industry, and most of the city commercial banks are concentrated in more developed areas, which can provide pilot experience to other local financial institutions and promote the transformation and upgrading of regional characteristic industries.

Table 2. Regional distribution of participating pilot banks

Banks participating in the pilot	Regional Distribution
Industrial and Commercial Bank of China	National
Bank of China	National
China Construction Bank	National
Industrial Bank of China	National
Bank of Jiangsu	Jiangsu
Huzhou Bank	Zhejiang
Chongqing Rural Commercial Bank	Chongqing
Jiujiang Bank	Jiangxi

4. Conclusions of the Study and Recommendations for Countermeasures

4.1. Conclusions of the Study

On the one hand, the pilot carbon accounting for financial institutions has made good progress. The disclosure forms of the pilot institutions have gradually diversified, and all four British institutions have released independent TCFD reports, disclosing the effectiveness of the company's carbon accounting work in more detail. ICBC, as a representative of the Chinese institutions, disclosed the Green Finance Special Report and indexed the TCFD recommendations in the form of an appendix. Meanwhile, the Chinese institutions continued to strengthen strategic leadership and top-level design, continuously improve the environmental risk management policy and process system, innovate green investment and financing products, and improve the construction of science and technology systems by utilizing AI and big data technologies.

On the other hand, the financial institutions participating in the pilot program on the Chinese side are distributed in various fields such as banking, securities, insurance, trust and so on, and most of them have huge assets, and most of them belong to national banks or city commercial banks in developed regions, with high systemic importance, so they are actively exploring the study of carbon accounting and carbon neutrality paths, which can set an example for other financial institutions in different fields of the country, and push forward the in-depth and long-term development of China's carbon accounting work. It can set an example for other financial institutions in different fields in China and promote the in-depth and long-term development of China's carbon accounting.

4.2. Suggestions for Countermeasures

First, all four British institutions have issued independent TCFD reports, but only ICBC among the Chinese institutions has issued a separate ESG thematic report. Therefore, the remaining pilot institutions can draw on the experience of the British institutions and ICBC to issue independent green finance thematic reports in stages to summarize the results of the pilot in order to better promote future development.

Second, only a dozen or so institutions in China have participated in the pilot, and the carbon accounting mechanism has not yet been popularized to all large, medium and small financial institutions. Therefore, it is possible to comprehensively strengthen the awareness of carbon accounting among financial institutions, encourage financial institutions to conduct green finance seminars, explore different carbon accounting methods, and strengthen cooperation and communication.

Third, in order to further enhance the carbon accounting efficiency of financial institutions, it is recommended that a cross-sectoral emission data sharing mechanism be established within the

ISSN: 2688-9323

institutions to facilitate the direct use of carbon accounting data by financial institutions, save accounting costs, and improve the accuracy and consistency of accounting.

Fourth, most financial institutions have realized the importance of strengthening top-level design and optimizing organizational structure, but the top-down implementation approach may lead to the problem of roughness in the transformation of financial institutions, and a bottom-up implementation approach can be adopted at the same time to promote the development of carbon accounting in the direction of refinement.

Acknowledgments

I would like to thank my parents for their support over the years on my journey of education. I would also like to express my heartfelt thanks to my friends and classmates, who gave me selfless help in the process of writing my dissertation, listened to me, helped me to solve my difficulties, and whose companionship brought me great spiritual strength.

References

[1] K.Y. Li: Exploring the Realization Path of Zero-Carbon Finance in the Context of Carbon Neutrality (Jiangnan Forum, China 2023), p.43-47. (In Chinese).

[2] X.F. Ge: Development Status of Carbon Accounting in Financial Sector and Related Suggestions (Financial Horizon, China 2020), p.54-60.

[3] Y. Lei, Y.B. Xiang, Z.Y. Yang, W. Zheng: Green finance responses to the problem of agricultural carbon emissions (Financial Horizon, China 2021), p.18-23.

[4] T.Y. Sun, Y. Zhu: Development Status and Suggestions on Carbon Accounting for Financial Institutions (Tsinghua Financial Review, China 2021), p.55-58.

[5] S.L. Rao: Experiences of Carbon Accounting by Foreign Financial Institutions (China Finance, China 2022), p.88-89.

[6] C.C. Xiong, Y. Liao, J.J. Zhao: Study on the Methodology of Carbon Emission Accounting System for the Financial Sector (China Finance, China 2022), p.69-70.

[7] Y. Lei: Enhancing the capacity of financial institutions to disclose environmental information (China Finance, China 2022), p.46-47.

[8] C.L. Wang: Jiangsu Practice and Suggestions on Environmental Information Disclosure by Financial Institutions (Financial Horizon, China 2022), p.27-33.

[9] D.N. Xie: Research on the Practice and Optimization of Environmental Information Disclosure of Financial Institutions in China (Finance Circle, China 2022), p.20-22.