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Progress in Research on Green Bonds Boosting the Double Carbon Goal

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Abstract: *With the proposal of China's new development concept, green finance continues to play its role in resource allocation in the capital market, and bonds, as medium and long-term financing tools, are one of the main means of direct financing for real enterprises, and the birth of green bonds gives bonds a more powerful service function and creates new opportunities for green development. As an important part of green finance, green bonds have injected strong momentum into China's economic development. By combing and discussing the existing green bond literature, this paper has a relatively mature research and development, not only from the macro and micro perspectives, but also can adjust the industrial structure, force enterprises to carry out green transformation, improve the return on net assets of enterprises, and bring "green benefits" when green bonds are issued. Moreover, the long-term social value it brings can promote the high-quality development of China's economy and promote the realization of the "dual carbon" goal.*

Keywords: *Green Bond; "Double carbon" target; Economic development*

1. Introduction

The global climate problems left over from the 20th century have attracted great attention from governments, multinational financial institutions and people around the world, and the first "climate awareness bond" came into being in 2007, which is known as the beginning of the international green bond market, and two years later the Climate Bond Initiative (CBI) was established in the UK, leading the development of the international green bond market. Since then, green bonds have gradually become popular, and countries around the world have strengthened their research and development of green bonds. In the past, China's economic development relied on fossil energy, and thermal power generation is still the "leading geese", and it is urgent to change the mode of economic development. With the introduction of the new development concept in 2015, China's green bond market began to take off, promoting the transformation of the financial system from traditional capital to low-carbon economy, and China's economic development ushered in a new situation. Green development is deeply rooted in the hearts of the people, and the call for carbon reduction or even zero carbon is increasing, and the "3060" carbon peak and carbon neutrality goals are China's solemn commitment to the people of the world in response to global climate change, aiming to reduce global carbon dioxide content and reduce the greenhouse effect. The development of the green bond market can not only effectively protect the ecological environment, but also promote the realization of the "dual carbon" goal, which is an indispensable part of China's economic transformation, so the research and development of green bonds is particularly important.

From the perspective of literature research, policy banks, commercial banks and state-owned enterprises were the main institutions for the development of the green bond market in China in the early days, but China lacked unified green bond market standards and recognition standards (Wang, 2016),[1] In order to maximize profits, the market "greenwashing" and "pseudo-green" phenomena grew. From the perspective of the importance and development quality of green bond information disclosure, information disclosure is an important cornerstone for the sustainable development of the green bond market, and problems such as insufficient depth of information disclosure and insufficient credibility will affect the development of the green bond market (Liao, 2019). [2] Taking the Sino-US market before and after the pandemic as an example, the Copula function has verified that green bonds have a significant hedging effect, and it is even wiser for institutional investors to hold green bonds for a long time (Guo, 2021). [3] At the same time, empirical tests show that the issuance of green bonds in China can trigger a positive response from the market, but the "dual carbon" goal does not highlight the policy incentive effect (Chen, 2022),[4] which brings certain challenges to the development of China's green bond market. After that, an in-depth analysis of the development of China's green bond market is carried out, and in addition to the shortcomings of green bonds in previous literature, it is further pointed out that China's green bond market lacks a sound incentive mechanism and lack of climate risk analysis capabilities, and will not be able to meet the realization of the "dual carbon" goal (Wei, 2022). [5] The cost of green bond information disclosure and the reputation constraint mechanism are also the main reasons restricting the issuance of green bonds by enterprises (Chen, 2022). [6] Through the combing of relevant literature at home and abroad, it is found that the issuance of green bonds by enterprises can send positive signals to the outside world, increase the value of the company, and the role of value enhancement is more significant, but its impact on stock prices has not yet been unanimously concluded in the academic community (Wang, 2022).[7] The existing literature proves the obstacles to the development of China's green bond market from many aspects, but few literature systematically sorts out the research progress of the entire green bond market to promote the "dual carbon" goal. Based on the foregoing, this paper will focus on the research progress of green bonds in China, point out the current difficulties, help many investors have a deeper and more comprehensive understanding of green bonds, provide path choices for green bonds to promote the "dual carbon" goal, and broaden the new ideas of subsequent scholars.

2. The concept and classification of green bonds

2.1. The concept of green bonds

In early research, green bonds were still in their infancy, and "green bonds" are a financial instrument for financing climate-friendly projects, but it mainly focuses on wind farms, water purification systems, etc. With energy conservation, environmental protection and greenhouse gas emission control becoming important tasks in the 12th Five-Year Plan, the first green bond closely related to energy conservation and emission reduction in China, the carbon revenue medium-term note, was successfully launched in 2014, which is an innovative form of China's green bond, which has promoted the development of a low-carbon economy in China (Lin, 2014),[8] which means that green bonds have diversified and sustainable characteristics. Green bonds first contain the basic functions of bonds, and then have "green benefits" (Wang, 2015),[9] bonds have lower issuance costs, less investment risks, and also have certain tax deduction effects, which are more attractive to investors. "Green benefits" are certain regulations on the investment of green bonds, and the funds raised must be concentrated in renewable fields or green projects related to climate change adaptation. In order to make green bonds more credible and attractive, the common practice internationally is for issuers to engage independent professional institutions to issue "second opinions" or "third-party certification" (Wang, 2016),[10] and the addition of third parties greatly enhances the credibility of green bonds and ensures that funds flow to projects that generate "green benefits". At the same time, the biggest difference between green bonds and general bonds is that the funds raised are used for projects with environmental benefits, and the issuance of green bonds can bring good economic benefits to listed companies and significantly increase the return on net assets of listed companies (Zheng, 2020). [11]

In summary, since the income of bonds is fixed, the main difference between green bonds and general bonds is "green", and "green" is synonymous with sustainable development in today's society, and it can be seen that green bonds are a financial instrument oriented to green development and obtaining fixed income.

2.2. Classification of green bonds

From the classification of general bonds, it can be divided into financial bonds, corporate bonds, corporate bonds, debt financing instruments (such as short-term financing bonds, medium-term notes), structural financing tools, etc., while green bonds are added to the "green" title on the basis of general bonds, managed with reference to the variety of bonds, and the raised funds are all flowing to green projects.

As we can see from Table 1, green bonds are mainly issued and regulated by four major departments, most of which adopt the principle of "who issues and supervises". However, the classification of green bonds is much more than the above, and the carbon bonds and blue bonds that have emerged in recent years are also sub-varieties of green bonds, carbon bonds are bonds issued by various entities such as governments and enterprises to invest in carbon emission reduction projects, and blue bonds refer to the funds raised by them to develop a sustainable marine economy.

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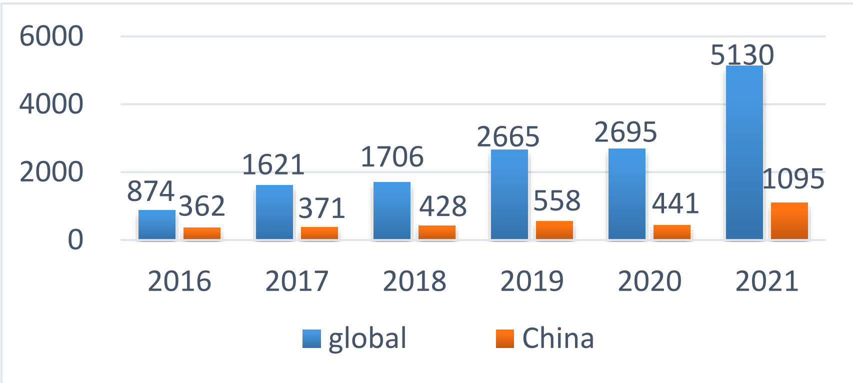
Table 1: Classification of green bonds, approved issuance and regulatory units

	Approved issuing unit	supervisory unit
Green financial debt	People's Bank of China	People's Bank of China
Green corporate debt	National Development and Reform Commission	National Development and Reform Commission
Green corporate bonds	Exchange or China Securities Regulatory Commission	China Securities Regulatory Commission
Green debt, green structure financing tools	China Interbank Market Dealers Association	China Interbank Market Dealers Association

3. Difficulties Facing the Development of Green Bonds

China's green bond issuance scale has grown rapidly since 2016, and in 2021 it exceeded the US$100 billion mark, reaching US$109.5 billion, doubling from 2020, achieving a leap in current volume and qualitative improvement, accounting for an average of about one-quarter of the global proportion in six years (see Figure 1), constantly advancing to the forefront of the world, and ranking third in the world in the scale of green bonds in 2021, greatly changing the development pattern of the global green bond market. China's green bond issuance is huge in scale and has unlimited potential, and its development resistance is increasing. Positive externalities and uneven development are two major challenges facing China's green bond market (Zhang Yuyang, 2022). [12] Under the background of the "dual carbon" goal, the development of green bonds needs to be solved urgently, so as to more effectively promote the realization of the "dual carbon" goal and lead the global economic development.



Source: The author compiled according to the 2016-2021 China Green Bond Market Report released by CBI and the 2021 Green Bond Operation Report of United Credit Credit.

Figure 1: Global and Chinese issuance from 2016 to 2021 (US$ billion)

3.1. Issuer information disclosure is not perfect, breeding market chaos

As we all know, information disclosure can alleviate the problem of information asymmetry and help investors increase their trust in green bonds. However, in terms of information disclosure requirements, in addition to quarterly disclosure of green financial bonds and semi-annual disclosure of the whereabouts of funds raised by green debt financing instruments, there is no specific frequency requirement for green corporate bonds and green structured financing instruments (such as green asset-backed securities), which leaves room for some speculators, coupled with the shortcomings of the long cycle of green bonds, the profit-seeking motivation of enterprises encourages them to whitewash non-green projects into green projects to obtain financing, and then deviate the originally raised funds from the "green" direction to obtain other benefits. And to apply for the issuance of green bonds, you must pay a qualification threshold fee, as well as third-party certification fees, credit rating fees and other intermediate fees, which increases the cost of issuers. In order to strongly support the issuance of green bonds, local governments have adopted price subsidies, loan discounts, green municipal bonds and other methods to continuously promote the development of the national green economy, and the government subsidies are much greater than their costs, resulting in the continuous occurrence of market "greenwashing" and "pseudo-green" phenomena, disrupting the order of the green bond market, and not conducive to the high-quality development of China's economy in the long run.

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3.2. State-owned enterprises are still the main issuers, reducing market vitality

The issuers of green bonds in China are highly concentrated, with state-owned enterprises dominating the main position, and private enterprises being constrained by insufficient credit ratings, and the limited investment amount of green bonds, which also exposes that "difficult and expensive financing" of private enterprises has always been a persistent problem hindering China's economic development.

Table 2: Comparison of green bonds issued by Chinese state-owned and private enterprises (CBI standards) in 2020 and 2021

	2020			2021		
	Issuer	Issue size (100 million yuan)	Number of issues	Issuer	Issue size (100 million yuan)	Number of issues
State-owned enterprise	153	1728	179	235	4726	391
Private enterprise	4	27	5	6	33	6

Data source: The author compiled it according to the 2021 green bond operation report of Lianhe Credit Credit.

According to the data in Table 2, in 2020 and 2021, state-owned enterprises were much higher than private enterprises in terms of the number of issuers, issuance scale and issuance period, and the issuance scale of state-owned enterprises in 2021 increased by 173.5% compared with 2020, accounting for 97.5% of the total scale, and the issuance scale of private enterprises was less than 3%; The number of issues issued by state-owned enterprises increased by 118.4% year-on-year, while the number of issuers and periods of private enterprises increased by only 2 and 1 respectively compared with 2020, indicating that the issuance of green bonds in China has not yet formed a group influence on private enterprises and reduced market vitality. As a financial promoter to achieve the "dual carbon" goal, most of the development of green industries comes from the rise of private enterprises, and private enterprises account for a small proportion of the green bond market, which is not conducive to the realization of the "dual carbon" goal, and the breadth of participants needs to be improved.

3.3. Uneven distribution of distribution industry and geographical distribution, narrowing market scope

According to China's national economic industry classification, in 2021, the proportion of green bond issuance in China was mainly concentrated in the electricity, heat, gas and water production and supply industries, and the financial industry, which accounted for more than 60% of the total amount (see Figure 2), and the total number of issuances exceeded 100%. The construction industry and manufacturing industry account for only 10% in total, of which manufacturing, as the lifeblood of the real economy, is the ballast stone of China's economic development, accounting for only 1%, which is seriously low, and the imbalance of the industry is prominent. The high-quality development of manufacturing industry contains "green", and the two are indispensable. As the pillar industry of China's economy, with the continuous advancement of supply-side structural reform, "green building" can save resources to the greatest extent and provide people with healthy and comfortable use space, and its importance cannot be ignored. From the perspective of issuance area, Beijing, as a city with a high concentration of production factors such as capital, talents, and technology in China, accounts for more than 40% of the issuance amount, and only one-fifth of the issuance. However, the northeast region has a serious brain drain and a small number of enterprises, and the amount of green bonds issued in 2021 is less than 1 billion yuan, accounting for only 1%, which is seriously lagging behind economically developed provinces. At the same time, Heilongjiang, Qinghai, Ningxia and Tibet have not issued green bonds as of 2021, and regional development is uneven, and the scope of China's entire green bond market has shrunk, which will further reduce market demand, hinder the construction of a unified national market, and restrict green bonds from promoting the realization of the "dual carbon" goal.

Source: The author self-organized according to the Wind database.

Figure 2: Proportion of green bond issuance industry in China in 2021

4. Countermeasures for Green Bonds to Boost "Double Carbon" Targets

4.1. Make up for shortcomings, make concerted efforts, and solve market chaos in both directions

The motivation for the phenomenon of "greenwashing" and "pseudo-green" lies in the profit-seeking nature of capital, and in the face of this phenomenon, we can consider solving it from the following two aspects: First, the regulatory unit increases the intensity of punishment and builds an information sharing platform. The reason for the low cost of "greenwashing" violations is that the regulatory penalties are not strong, and once the "pseudo-green" phenomenon is found, it should be included in the blacklist of information sharing platforms to facilitate investors and the public to understand; Some intermediary service institutions have problems such as uneven assessment quality, and it is easy to collude with issuers to form "report green", and regulatory authorities should also punish third-party certification, underwriting and rating and other intermediary institutions, and give certain rewards to intermediary service institutions with a sense of responsibility and mission, and use existing financial technology means to achieve national information exchange and sharing, so as to prevent speculative enterprises from fraudulently obtaining "green" funds across provinces. Second, local governments adopt a "segmented" subsidy method to increase the enthusiasm of issuers to be "substantially green". In the past, for issuers of green bonds, local governments adopted the method of first rewarding and then verifying, and if subsidies and preferences were divided into three phases, "before, during and after", the issuer's costs could be increased, and enterprises that passed the acceptance test were commended to enhance their sense of honor, and "substantial green" was just around the corner.

4.2. Promote policies, issue benefits, and fill the market vitality in many ways

The difficulties faced by private enterprises in applying for green bond issuance mainly lie in the high intermediate costs and low credit ratings. State-owned enterprises are supported by state finance, while private enterprises do not have any guarantees. Local governments can implement positive incentive measures, introduce relevant policies, establish government green bond support funds, take the lead of the government, and jointly create "green bonds for small and medium-sized enterprises", and then bear part of the intermediate costs for private enterprises in advance in the form of "government procurement of services", and at the same time call on all issuers to reduce the fee standards for private enterprise members, and only collect the membership fee of the year of the bond issuance or waive the annual membership fee for the duration of the bond for private enterprises in difficulty, so as to stimulate the enthusiasm of private enterprises to issue green bonds.

4.3. Raise the position, focus on key points, and comprehensively promote market convergence

For underdeveloped provinces and industries with a serious lack of green bond issuance, it is first necessary for underdeveloped regions to recognize the importance of the "green economy" and "dual carbon" goals from the ideological point of view, and keep up with the pace of the times in light of reality. Developed regions can "support the strong and help the weak", send top financial talents to support the western region, and guide backward regions to issue green bonds according to local conditions. Secondly, local governments need to grasp the focus of local economic development, "green industry" is the demand of the times, especially "green manufacturing", not only can promote the development of local manufacturing, but also bring "green benefits" rising day by day. At the same time, cultivate national environmental awareness, encourage enterprises to incorporate environmental protection into business decisions, support consumers to purchase green energy-saving products, comprehensively promote the effective connection of the national market, and promote the benign development of the market.

5. Summary and Outlook

5.1. Summarize

After the official release of the new Catalogue of Green Bond-Supported Projects (2021), the new catalogue unifies the scope of various green bond-supported projects issued in China, covering six major areas: clean production, clean energy, energy conservation and environmental protection, ecological environment, green infrastructure upgrading and green services,[13] solving the problem of inconsistency in the 2015 classification standards, achieving convergence with international green bond standards, and is of great significance to the development of China's green bonds. However, with the rapid development of the green bond market, the phenomenon of "greenwashing" and "pseudo-green" has spread, the proportion of green bonds issued by private enterprises is relatively low, and the imbalance of issuing industries and regions is prominent, which has brought certain challenges to the future development of green bonds. The issuance of green bonds can promote the improvement of green innovation through resources and supervision effects,[14] providing a strong driving force for achieving the "dual carbon" goal. Green bonds attract financial institutions, entities, ESG investors, individual investors and governments to participate in investment,and market resources gradually flow to the field of green and low-carbon transformation, helping the country achieve green and low-carbon sustainable development goals. [15]

5.2. Outlook

Green bonds have become a new growth pole for the global bond market, and under the challenge of the global climate change crisis, the international community attaches great importance to the development of the "two Cs" - climate and China, indicating that there is still huge room for the development of China's green bond market. With the in-depth development of the green bond market, the emergence of green bond policy dividends from governments across China, and the gradual improvement of market supervision and services, more non-financial enterprises will promote sustainable development through green bond financing in the future, the number and scope of enterprises will be more and wider, and the green bond issuance area is expected to achieve full coverage. The broad development space of China's green bond market will attract more international capital to join, domestic and foreign issuers and investors, and the breadth and depth of green bond market services to the real economy will be further enhanced, promoting the realization of carbon peaking and carbon neutrality goals.

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