The influencing factors and mechanisms of the willingness of enterprises to reduce the demand for carbon sequestration reduction by forestry carbon sinks under the "double carbon" goal

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Abstract. In the face of unprecedented emission reduction pressure, enterprises urgently need to find effective ways to reduce emissions, and the forestry carbon sink through the use of market mechanisms to control carbon emissions pilot model has been highly concerned by enterprises and academia.This paper takes a number of external factors that drive enterprises to choose forestry carbon sinks as the research object, deeply analyzes the interaction logic and mechanism of interaction between them, reveals the "black box" of enterprises to choose the driving mechanism of forestry carbon sink emission reduction, and puts forward relevant management suggestions for promoting enterprises to choose forestry carbon sink emission reduction and realize the value of forestry carbon sinks.

Keywords: Forestry carbon sinks, Carbon sink trading, Drive mechanism

1. Introduction

Since the 18th National Congress of the Communist Party of China, China has unshakable followed the path of ecological priority and green and low-carbon development, fully implemented the Paris Agreement, announced that it will strive to achieve carbon peak by 2030, carbon neutrality by 2060, and vigorously implement emission reduction commitments. This decision undoubtedly puts forward higher requirements for enterprises to reduce emissions, and enterprises are facing unprecedented pressure to reduce emissions. The choice of forestry carbon sinks for emission reduction has become an effective way, which has received great attention from the academic community in recent years.

Relative to active and mature carbon allowance market, forestry carbon sink trading volume for the CCER (Voluntary Emission Reduction Offset) project is significantly under-represented (less than 4% of the actual quota issued in 2021). Faced with market instability and low activity, in 2017, the National Development and Reform Commission suspended the application for the CCER (Voluntary Emission Reduction Offset) project and has not yet resumed. A well-paid occupation such as solid agriculture, forestry and rural household marshes are struggling because they lack suitable monetization options. Most of the existing research focuses on institutional construction, improvement of market trading mechanism and clarification of farmers' property rights from the perspective of supply-side farmers (Chunna Shi, 2016; Jiawei Hao, 2020; Bowen Yang, 2021) but, to a certain extent, it ignores the governance function and role of enterprises, the main body of demand for forestry carbon sinks. Scholars mainly explore the driving factors that influence corporate behavior choices based on concepts such as behavioral attitudes, subjective norms, and perceptual behavior control in planned behavior theory [1-3]. Roh. (2014), Chen Lirong et al. (2016) showed that the purchase of forestry carbon sinks by enterprises was affected by individual behavioral attitudes [4]; Huang Zaisheng and Chen Qin (2017) found that the willingness of enterprises to pay for forest carbon sinks is determined by the dual factors of "whether they are willing to pay" and "willing to pay" [5]. Most of the existing research has explored the influencing factors of the willingness of enterprises to demand for forestry carbon sinks from the basic indicators of internal planning behavior at the individual level, but the logic of the role between external influencing factors

has not been studied in depth, and the demand mechanism of enterprise forestry carbon sinks is still in the black surface enclosure. At the same time, the research on the governance countermeasures of the forestry carbon sink trading dilemma is mainly based on the government as the main body of governance, research on the governance countermeasures of the practical dilemma of forestry carbon sinks from the aspects of legal system (Hua Zhiqin, 2015; Liu Xianhui, 2016; Liu Xianhui, 2016; Tang Zhao, 2020), market construction (Zhang Dongmei and Deng Yafang, 2016; Deng Huibo and Long Fei, 2018; Wu Huijuan, 2020; Niu Ling, 2020) and policy support (Wang Hongwei and Li Shunlong, 2015; Cao Xianlei, 2017; Zhu Ailing, 2020) [6-12]. Hua Zhiqin (2015) put forward suggestions such as the market-oriented coordination of forest carbon sink ownership agents, the paid payment of forest carbon sink use rights, and the establishment of a forest carbon sink property rights market auxiliary system. Deng Huibo and Long Fei (2018) advocate mastering the phased characteristics of emission control enterprises, promoting the integration of forestry carbon sink projects into emission quota management through carbon trading system innovation, and stabilizing the income expectations of enterprises purchasing forestry carbon sinks. Wu Huijuan (2020) and Niu Ling (2020) propose that a carbon price stability mechanism should be established based on the price signal theory of the market mechanism, so as to promote market stability. The above research mostly discusses the activation countermeasures of forestry carbon sinks from a legal perspective, but ignores the role of relevant financial and fiscal policies. Therefore, on the theoretical basis of the above research results, this project takes a number of external factors that affect the selection of forestry carbon sinks by enterprises as the research object, and reveals the "black box" of the driving mechanism of enterprises to choose forestry carbon sink emission reduction by combing the external influencing factors and their role logic of enterprise selection of forestry carbon sink emission reduction.

2. Comparison of the main carbon emission reduction paths of enterprises

The more common carbon quotas and forestry carbon sink trading in the selection of carbon emission reduction paths for emission control enterprises can be roughly summarized as follows: Carbon trading markets purchase emission allowances (Lietal, 2015; Huang Xianglan et al., 2018) and emission reductions through the purchase of projects such as forestry carbon sinks (Khanal etc, 2017; Vass, 2018)[13].Carbon quotas and forestry carbon sink trading belong to the two types of carbon market trading machine mechanisms, of which carbon quota trading is the government to set carbon emission quotas for a certain period of time to allocate to emission control enterprises, and allow them to obtain or transfer quotas through bidding on the premise of ensuring performance (Larson, 1995; Halvor, 2006), with the comparative advantages of mature trading mechanism and short trading cycle (Li&Tang, 2006);Voluntary carbon trading is a 5%-10% offset ratio designed by each carbon market to control the carbon dioxide offset accounting of enterprises in the traded forestry carbon sinks (Ma, 2017; Zhang Weiwei, Gao Jinjie, 2019), which will help reduce the total cost for the whole society and is a deeper economic, social and ecological Pareto improvement (Liu Chuanming et al., 2019; Yang Changjin, 2021; Sun Yongping, 2021)[14-17].The research on existing emission reduction methods is still limited to the definition and comparison of different methods, and has not yet formed a universal and regular emission reduction path.

3. Factors that influence enterprises to choose forestry carbon sink trading

3.1. Fiscal and tax support policies

International experience shows that fiscal, tax, financial and other support policies play a great role in the financing of forestry carbon sink projects. As an important economic means of the government, fiscal and taxation policies have a unique guiding role in promoting green and low-carbon transformation and development, such as Japan's forestry subsidy policy, which is divided into subdivisions according to the cost of afforestation by foresters, land of general nature is

subsidized according to 40% of the standard, and relatively poor and water sources are subsidized according to the standard of 68%;The central government and local governments compensate for the ecological benefits of public welfare forests in a 2:1 ratio (Li Yanbai, 2022)[18].

Achieving "carbon peaking and carbon neutrality" is one of China's important strategic tasks at this stage. As the foundation and important pillar of national governance, finance has an unshirkable responsibility in China's process of promoting the "carbon peaking and carbon neutrality goals" (Huang Xiao, 2021)[19].Therefore, we should optimize the fiscal and taxation policy system and vigorously promote the reform of the fiscal and taxation system, so that the fiscal industry can play a more active role in promoting the process of carbon emission reduction.In addition, appropriately increasing the proportion of local governments benefiting from carbon emission reduction projects can effectively stimulate the enthusiasm of local governments for carbon emission reduction;On the other hand, in the governance of cross-regional and high-impact carbon emission issues, the common fiscal powers of the central and local governments should be clarified, and the scope of responsibility should be clearly divided to ensure the implementation of governance work (Duan Chen, 2021)[20].

The national carbon tax collection and mandatory emission reduction policy is the most effective measure (Bento et al., 2015), which promotes the demand for forest carbon sinks through carbon market trading, unifies forest carbon sink measurement standards, improves the regional forest ecological compensation system, encourages enterprises to encourage voluntary subscription to forestry carbon sinks, seeks cross-regional transactions, and standardizes the promotion of forest carbon sinks (Li Yanmei et al., 2017) [21].Local government interventions such as administrative organization, financial support, and policy preference have also played a positive role in improving the effectiveness of farmland management rights as collateral. The intervention of government administrative measures can not only achieve a rapid increase in the proportion of farmland circulation (Zhai Liming, et al., 2017), increase the frequency of transactions of farmland management rights, but also use administrative constraints to regulate the form of contracts (Wu Yiheng, 2020) [22-23]. Based on the above analysis, active fiscal and taxation support policies have a promoting effect on reducing the cost of forestry carbon sinks, thereby promoting enterprises to choose forestry carbon sinks to reduce emissions.

3.2. Media publicity

In the context of global efforts to carry out energy conservation and emission reduction, as a media, first, we can strengthen the publicity and interpretation of the central government's major policies on energy conservation and emission reduction; The second is to introduce more successful foreign experiences in energy saving; The third is to play a positive role in introducing the successful experience of some domestic enterprises and cities, conveying information and communicating experience (Xu Weiman, 2008)[24].

As a material medium for conveying information, the media plays an important role in both life and work and in the competitive market of enterprises. The news media use their own characteristics and advantages to deliver information to the public, saving the time cost and capital cost of information demand for information demanders, and making the information more open and transparent. Media and information disclosure, as the two mechanisms for governing enterprises, have different starting points and directions, media supervision is to transmit information from the outside in, and carbon information disclosure is transmitted from the inside to the outside, but both are based on the theory of signal transmission to eliminate the problem of information asymmetry in the market (Yang Xia, 2014)[25].

Media communication, through the use of a variety of media, so that the public more quickly, thoroughly, correctly understand the current direction of change in China's fiscal and taxation policy and the corresponding implementation measures. In a sense, the media plays the role of interpreter and feedback on the implementation of national fiscal policy. Driven by the media communication effect, the public can also put forward their own opinions and suggestions through the Internet, and these will also be summarized by the media and reported in the form of news, so as to better be solved

and the policy is further improved. Therefore, the media publicity by enhancing the effect of fiscal and taxation policies to support the reduction of the cost of forestry carbon sinks, so as to prompt enterprises to choose forestry carbon sinks to reduce emissions.

3.3. Forestry carbon sink futures

Forestry carbon sink futures can improve the problem of market information asymmetry. From the international market, in 2005, futures, forwards, options, EUA, CER and ERU were traded in the EU carbon market. In 2021, the unit price of carbon sequestration in Europe has exceeded 50 euros / ton, and more than 90% of the trading volume is contributed by futures (Li Yanbo, 2022).

On the one hand, the function of transferring and avoiding price risk is one of the basic functions of the futures market. With the development of market economy, commodity prices fluctuate under the influence of various factors. The price fluctuation brings great risks to commodity suppliers and demanders, which may make one party benefit while the other party suffer losses (Yang Yuchuan, 1998) [26]. In the futures market, traders make opposite direction and the same number of trading through the futures market and spot market, price fluctuations to traders losses can be caused by the futures market trading surplus offset, hedge price volatility losses, therefore, the function of avoiding price risk is also known as hedging effect which is the most basic function of futures trading (Li Yanbo, 2022). This function plays a very important role for those commodities with relatively large price fluctuations or high future price risks, such as agricultural commodities and international commodities.

On the other hand, because the trading system and rules in the futures market have been standardized, various transactions are carried out under the system norms. For example, the standard futures contract, the standard subject matter, and the rights and obligations of both parties are clearly stated, which can reduce the risk of default in the transaction on the basis of reducing the interests of both parties. Then help enterprises to avoid trading risks effectively and choose forestry carbon sink to reduce emissions.

3.4. Financial policy

International and domestic experience shows that financial support policies play an important role in financing forestry carbon sink projects.

On the one hand, in the domestic market, in order to promote the forestry carbon sink trading, the Chinese government departments have issued a series of financial support policies to guide and support the use of forest right mortgage loans for forestry financing, and to provide policy support for the development of forestry carbon sink. The Decision of the CPC Central Committee on Accelerating the Development of Forestry, issued in 2003, Carry out the reform of the forest tenure system nationwide; In 2008, The State Council issued the opinions on Comprehensively Promoting the reform of the Collective Forest Rights System, further promote the establishment and improvement of the forest right trading market; at the same time, actively encourage forest right mortgage loans to finance forestry projects. The introduction of a series of policies such as the Guiding Opinions on the reform of Collective Forest Right System and the Financial Services of Forestry Development, the opinions on the Guidance of Forest Right Mortgage Loan and the opinions on the Implementation of Forest Right Mortgage Loan have further expanded the financing mode of the development of forestry industry. It is the most direct financial support for the development of forestry carbon sequestration (Shen Hong, 2020) [27].

Secondly, from the perspective of the international market, the world's most influential carbon markets include: EU Emission Trading System (EU-ETS), New Zealand National Emission Trade Plan (NZETS), US California carbon market, and Australian carbon market (Zhou Rongwu et al., 2013). At the beginning of the forestry carbon sink transaction, the World Bank designed three carbon funds: the Prototype Carbon Fund (PCF), the Community Development Carbon Fund (CDCF), and the Biocarbon Fund (BIOCF). Support forestry carbon sink projects and promote the development of forestry carbon sink. In 2008, helps developing countries reduce carbon emissions due to

deforestation and forest degradation, the Forest Carbon Partnership Fund (FCPF) was established to strengthen forest operations and increase forestry carbon sinks (Li Yanbo, 2022). The Australian government has increased financial support and expanded the investment and financing mode of forestry carbon sink. Integration of forestry ecological construction funds form funds force into forestry carbon sink construction, the subsidy standard, discount ratio, subsidy fixed number of year clear support policy, and gradually open the forestry carbon sink futures market, under the orderly regulation of carbon sink futures, options and other financial derivatives design and application, and achieve good results. Based on the above domestic and foreign experience, it can be concluded that the government's financial policy support promotes the forestry carbon sink futures to effectively avoid trading risks, thus enhancing the confidence of enterprises in choosing the forestry carbon sink.

4. The relationship between forestry carbon sink capital, forestry carbon sink trading risk and the choice of forestry carbon sink by enterprises

Academia research based on the directional distance function calculated the Shanghai thermal power industry 19 companies include 589 unit samples for three consecutive years of average unit marginal reduction cost and based on the Benitez model calculated 20-year carbon sink project unit carbon cost, the study found that unit emission cost is higher than unit carbon cost nearly one hundred yuan, using forestry carbon sink offset enterprise carbon emission policy implementation space is very big, to reduce enterprises and forest carbon sink supply subject can bring huge economic benefits (dragon, 2020).

On one hand, forestry exchange increase is an important way to deal with global climate change, and it has obvious cost advantages. The Chinese government has taken forestry foreign exchange increase as an important strategic choice to deal with climate change, and has incorporated CCER projects including forestry carbon sink as the emission reduction offset mechanism into the carbon market trading system. With the gradual improvement of China's carbon market construction, the development of forestry carbon sink projects has attracted wide attention, and the development prospect is good, but it also faces many uncertainties and risks. How to effectively identify the risks of the forestry carbon sink projects, and conduct the overall measurement and comprehensive analysis of the risks, will not only have a direct impact on the investment decisions of enterprises, but also have a profound impact on the long-term development of the forestry carbon sink industry.

On the other hand, the risk assessment results of forestry carbon sink projects of Bayesian Network show that the overall risk level of CCER forestry carbon sink projects in China is medium. However, the policy risk and market risk are relatively high, and the main policy risk in the CCER forestry carbon sink project is due to the change in the rules of forestry carbon sink trading and national emission reduction policy; the main factors of higher market risk are rising labor price and land rent; technical wind means that the project is not issued and filed; and the main risk factors of natural risk are diseases and forest fires (Gao Qinyi, 2020) [28].

According to the above analysis, it can be seen that if transaction costs are reduced, systemic risks are avoided, and a national unified carbon market system is established, the possibility of enterprises to choose forestry carbon sink for emission reduction will be greatly promoted under the condition that both forestry carbon sink and trading risks are low.

5. Management suggestions

5.1. Formulate reasonable fiscal policies and give full play to their incentive and restraint role

At present, our country for forestry carbon sink trading fiscal and tax policy is still in the perfect stage, and fiscal and tax support policy in forestry carbon sink has a great role in project financing, which requires finance and taxation departments and ecological environment department to strengthen communication and cooperation, tracking research and study of forestry carbon sink trading patterns and trend, and According to the analysis of the research results, the tax-related

uncertainties are sorted out and solved, increasing tax certainty, filling the "gap" in policy, supporting to improve forestry carbon sink ability. At the same time, in terms of tax policy alone, it should directly and indirectly support the development of forestry carbon sink from both binding and incentive dimensions, form a green tax system, and play an incentive and restraint role in environmental protection and green development through different taxes and preferential tax policies. As far as fiscal policy is concerned, enrich the fiscal policy tools of forestry carbon sink, strengthen the supporting and guiding role of financial funds, promote the better combination of the government and the effective market, and provide important guidance and support for promoting the development of forestry carbon sink.

5.2. Actively guide media publicity to reduce information asymmetry

As a material medium for transmitting information, the media is playing an increasingly important role in today's competitive market of enterprises. With the characteristics and advantages of the news media, on the one hand, enterprises to pay attention to their economic responsibilities, urge them to actively fulfill their environmental responsibilities and form a good reputation; on the other hand, the media can convey the market and policy information related to forestry carbon sink on time, improve the cognitive ability and level of forestry carbon sink, help enterprises to save the time cost of information and capital cost, and make forestry carbon sink more open and transparent. At the same time, the media can also serve as an effective communication channel and link between enterprises and the government and forestry carbon sink providers, breaking the traditional communication methods. With the help of the "media mouth of the forestry carbon sink suppliers", the government can explain their own views, accelerate the flow of information, so that enterprises can realize the interests related to the national guidance and carbon sink suppliers on time, so as to help enterprises to make better trade-offs, and make the forestry carbon sink favored by enterprises.

5.3. Comprehensive development of various forestry carbon sink risk avoidance tools to improve the safety and standardization of the trading process

In the process of implementation, the forestry carbon sink project is affected by a variety of risks and uncertainties, which makes it more difficult to avoid the projects, and faces the problems more complex and severe. Therefore, forestry carbon sink risk avoidance tools play an increasingly important role in today's market environment. Forestry carbon sink risk avoidance tool is the inevitable product of the development of forestry carbon sink market to a certain stage, and also the inevitable trend of carbon sink system construction. In the international market, common, forestry carbon sink risk avoidance tools such as forestry carbon sink futures and insurance, not only can improve the market information asymmetry, reduce the price factors of carbon sink supply both sides, also can make the trade security, standardization, reduce the risk of default, guarantee the interests of both sides, and make more enterprises and individuals to participate in the carbon sink project. But these risk avoidance tools are restricted by some influencing factors at the same time, such as carbon product type single, promotion degree is not high enough, facing these problems, financial institutions should actively explore carbon futures trading, focus on carbon futures design, to design a better product and services, longitudinal improve the quality of product trading, power forestry carbon sink risk avoidance tools in the market, to promote the long-term healthy development of carbon trading market in China.

5.4. Improve financial policies to promote the development of the forestry carbon sink industry

In order to promote forestry carbon sink trading, the Chinese government has issued a series of financial policies, such as increasing the support of financial institutions for infrastructure construction and major projects, and improving the financial efficiency of the capital market. With the continuous optimization of the financial policy environment and the continuous growth of the equity market, the development of financial policies is also restricted by some influencing factors,

such as the inadequate role of the carbon market, the asymmetric information disclosure, and the imperfect relevant incentive policies. In the face of these problems, the government should constantly improve the framework of financial policies to improve the forestry carbon sink products and services and design level of financial institutions, and deepen the relevant policy guidance. In addition, in terms of financial policy alone, we can directly or indirectly support the overall development of forestry carbon sink industry from the perspective of developing financial products and intermediary services, solve its financing difficulties, and give full play to the economic value of forestry carbon sink right. Under the condition of continuous improvement, reasonable and effective market mechanism, more suitable new carbon sink products should be allocated to enterprises and individuals, and the types of products should be expanded, so that more people can recognize and use carbon sink finance, so as to further enhance the demand of enterprises for forestry carbon sink.

6. Epilogue

Under the background of the "double-carbon" target, the application and development of forestry carbon sink has relieved the pressure of emission reduction faced by enterprises and accelerated the pace of green development in China. Therefore, more and more enterprises choose forestry carbon sink as an effective way to reduce emissions. Compared with other emission reduction methods, forestry carbon sink has the advantages of low cost and trading risk, and relatively perfect market mechanism. However, enterprises' choice of forestry carbon sink mode is also affected by some factors, such as fiscal and tax support policies, media publicity, forestry carbon sink futures, financial policies and other aspects. At present, China's carbon trading market is in its early stage. Only by establishing a perfect carbon sink system as soon as possible, strengthening the application of forestry carbon sink mechanism, improving the carbon sink trading process, and putting carbon sink project management in an important position of enterprises, can the domestic forestry carbon sink market usher in new development in the world.

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