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Applying Economic Principles to Improve the Quality of Forestry Carbon Sinks Trading in China

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Abstract: The issue of climate change has been continuously concerned by countries around the globe, and with the signing of a series of documents, such as the Paris Agreement, people are gradually realizing that the climate issue is not just an environmental issue, but is also gradually turning into a new way for developed countries to control the world. The core solution to climate warming is to reduce the amount of carbon dioxide in the air. Therefore, China's establishment of the carbon peak and carbon neutral targets shows the importance it attaches to the ecological environment, and at the same time, it also demonstrates the style of a great power and its responsibility. One of the ways to achieve the dual-carbon goal is to trade carbon sinks, especially forestry carbon sinks. By applying relevant economic principles such as externalities and the resource curse, raising the awareness of individual consumers about carbon sinks, allowing enterprises to contract their own forests for carbon compensation, and improving the relevant systems for forestry carbon trading, the quality of carbon trading can be improved and the major obstacles it faces can be overcome.

Keywords: Carbon sink trading; Externalities; Resource curse; Substitutes; Information asymmetry.

1. Introduction

Since the beginning of the twenty-first century, the rate of climate change has risen much faster than in recent centuries, and climate change has become a challenge that all countries have to face, and no country can get away with climate change. China, as one of the world's superpowers and the largest developing country, attaches great importance to the problem of ecological and environmental deterioration, and based on its responsibility to promote the building of a community of human destiny, it has been actively responding to climate change in various economic and political aspects, such as: carrying out supply-side structural reforms, de-capacitating production capacity, and promoting upgrading of the supply side, and signing the Paris Agreement in 2015; in September 2020, President Xi Jinping proposed that carbon dioxide emissions strive to peak by 2030 and work towards carbon neutrality by 2060. These series of measures have demonstrated to the world China's determination to improve the environment and the confidence of the Chinese people to fulfill their ecological requirements. Carbon is gradually becoming a hot topic as the world is committed to climate improvement. The most central way to address warming is to reduce the amount of carbon dioxide in the air and reduce carbon emissions. Related topics include the allocation of carbon emission rights, the development of clean energy, etc. An important way to reduce the amount of carbon in the air is carbon sequestration, which is the process of converting the carbon in carbon dioxide in the air into carbon in the components of the biological base. Carbon sinks, on the other hand, generally refer to the processes, activities, and mechanisms that remove carbon dioxide from the air, and the carbon trading established is also used to address carbon sequestration; carbon sinks are a way to achieve the goals of carbon peaking and carbon neutrality.

Many relevant scholars have analyzed the current situation of the forestry carbon sink market. The current situation of the forestry carbon market has been analyzed by many scholars, who have elaborated on the carbon trading system, the demand for carbon trading, and the trading cases and problems encountered in China's forestry carbon sinks. In terms of carbon trading system, the formation of global carbon trading system is summarized, and the experience is drawn from it to develop China's carbon trading[1] . In terms of carbon trading, some scholars have analyzed four aspects including national level, market level, industry level and micro level, and concluded that there is a huge demand for forestry carbon sinks in the world, and although forestry carbon sinks are actively traded in the carbon market, the total amount of carbon sinks accounted for a small proportion of carbon trading due to the existence of large market barriers. The problems encountered by China in the forestry carbon sinks market are summarized for China, including technical barriers and limitations of local laws and regulations[2-3] . Due to China's special national conditions, forestry carbon sink trading has also become one of the ways to promote farmers' income, and Tian Yong (2019) studied rural carbon trading in the context of rural revitalization. Although the recent trading cases of forestry carbon sinks in Chinese provinces have achieved great success, such as Heilongjiang Tianbao project area, Guangdong Changlong, etc., there are still many problems in China's forestry carbon sinks trading, such as: the existence of positive externality in the process of forest ecological benefit compensation makes the market malfunction, the lack of the system of carbon sinks related trading makes the curse of resources, the small proportion of forestry carbon sinks trading in the carbon trading, and the asymmetry of information makes the The information asymmetry makes the supply side of carbon sinks suffer. The correct use of economic principles can improve the quality of forestry carbon trading[4] .

2. Theoretical Foundation

2.1. Externalities and public goods

An externality is a phenomenon in which one or a group of

people change their behavior in order to maximize their own interests under pre-existing conditions, resulting in other people being affected, and it can be classified as a positive or negative externality based on the impact on other people. Negative externalities depict situations in which a change in behavior harms others or society, while positive externalities depict situations in which a change in action results in some benefit to others or society at no cost to them.

Public goods are goods that are non-competitive and non-exclusive, and are highly susceptible to positive externalities, because all people can enjoy public goods equally, and economically rational individuals are unwilling to pay for public goods, making their marginal returns less than the marginal returns of society; therefore, public goods are usually provided by the government or related institutions, and public goods are financed through taxes. There are three main solutions to externalities: first, the government compensates by increasing the private marginal revenue to equal the social marginal revenue, which moves the equilibrium point from E1 to E2, resulting in an increase in output; second, the Coase Theorem is applied to clarify the ownership of the assets, and the market determines the decision-making; and third, there is the merger of firms, which is "internalization of externality", which internalizes the externality generated. The third is business merger, i.e. "internalization of externalities", which takes the economic entity that generates externalities and the economic entity that is affected by the externalities as a whole, and considers the profit maximization of the whole, so as to avoid the externalities. In the process of forest ecological benefit compensation there is a positive externality economic phenomenon because of public goods. Because most forestry ecological products are public goods.

2.2. The resource curse and institutional change

The resource curse refers to the fact that an abundance of natural resources does not necessarily lead to economic growth, but is more like a curse on economic development. The definition of this phenomenon was first put forward by the American economist Richard M. Otti, because in most cases in real life, most of the world's natural resource-rich countries will have slower economic development than resource-poor countries. Foreign scholars Murshed that is too much resource-rich countries rely too much on natural resources, which leads to a single type of economy, a single type of economy makes the economic environment susceptible to the collapse of the external environment; scholars Wick and Bulte (2009) proposed that natural resource-rich countries or regions are more likely to produce the right to rent-seeking[5] . China's scholar Zhang Jinghua suggests that the impact of natural resources on the economy depends on the quality of the system[6] .

Forestry resources undoubtedly also belong to a kind of natural resources, and carbon trading related projects need to have more than 5,000 acres of large forests in the area, the forestry carbon sinks to provide the area also belongs to the forest resource-rich areas, although a large number of scholars believe that forestry carbon sinks provide a new way of thinking for the rural wealth, but in practice, farmers did not get too much benefit from the forestry carbon sinks, and there is a curse on the resources. Phenomenon.

2.3. Alternatives

Substitute is an economic concept, when two goods have the same efficacy or effect on consumers, and there is a competing sales relationship, the two goods are substitutes for each other. The existence of substitutes is one of the important factors affecting the demand for commodities, when the price of substitutes for a commodity is reduced to the product of the utility ratio of the two and the price of the commodity or more easily accessible, it will make the demand for this commodity is reduced, or even out of the market; on the contrary, when the price of substitutes for this commodity is increased to the product of the utility ratio of the two and the price of the commodity or more difficult to obtain, it will make the demand for this commodity rises. Therefore, when considering the sales volume of a commodity, in addition to analyzing the consumer utility of the commodity itself, it is necessary to pay attention to changes in the prices of its substitutes and the utility ratio of the two commodities.

2.4. Information asymmetry

Information asymmetry refers to the fact that buyers and sellers in a transaction have different information, and in trading activities, those who have more information are more likely to profit from the transaction. With the development of the economy, the structure of the product began to become complex, it is more and more difficult to only from the appearance of the product to identify its good or bad, so in most of today's economic activities, the seller has more information than the buyer. However, in the process of forestry carbon trading market, there often exists the phenomenon that the buyer holds more information. Information asymmetry will lead to moral hazard and adverse selection, and the market will not reach the Pareto optimal situation to maximize the welfare of both supply and demand.

3. Analysis of China's situation

3.1. Externalities of forest ecological benefits

Forest eco-efficiency, as the name suggests, refers to the public goods provided by forest ecosystems to maintain the environment, keep ecological balance and preserve biodiversity. Scholars Zhu Guangqin and Han Hao (2010) suggest that forest ecological benefits belong to public goods and have the typical characteristics of public goods, i.e., all members within its scope can enjoy the ecological services provided by the forest, such as oxygen, and the marginal cost of enjoyment for each additional person is almost zero[7] . Since all individuals can enjoy the ecological benefits of forests without having to pay for them. As a private seller of forestry ecological output, its marginal benefit is smaller than the marginal benefit obtained by the society in the process of enjoying ecological benefits, so the output of forestry ecological products by private individuals is smaller than the output expected by the society, and fails to reach the Pareto-optimal state.

3.2. Resource curse and institutional failures

The conditions for measuring forests that can be traded as forestry carbon sinks are more stringent, requiring contiguous forests and additionality, i.e., such emission reductions would not have been generated prior to the formulation of the carbon sink project, and the forestry carbon sinks traded would not be generated by destroying the forests that had already been formed before, but by newly planted or formed forest areas.

Therefore, forestry carbon sinks are generated in areas with abundant forest resources, but most of the areas with abundant forestry resources are also areas without booming economy, which is in line with the theory of "resource curse". Forestry resource-rich areas are more dependent on forestry resources and make their living by selling timber, and forestry carbon trading is actually a kind of market trading of natural resources such as trees as assets, but it has not been able to break the "resource curse" and solve the poverty situation of local farmers.

Scholar Yang Bowen (2021) proposed that the reason why forestry carbon trading lifts the "resource curse" is because of the lack of effectiveness of local laws and regulations, combining the theory of institutional change in economics with carbon trading, and arguing that the theory of institutional change is the basis for explaining the effectiveness of the supply of the forestry carbon trading system[8] . Institutional change theory is about the new system to generate, replace or change the old system related theory, put forward by the economist Douglas North, China's scholars Lin Yifu according to their own theories, formed the theory of supply mandatory institutional change. In it, system change emphasizes the importance of government system construction and property rights structure. When the transaction is marketized, the government's institutional construction is more important after applying the Coase theorem. Scholar Hou Chang (2019) proposed that the "resource curse" in areas with abundant forest resources is due to the lack of effectiveness of institutional supply, in which the disputes over farmers' forest ownership and irregularities in forestry carbon sinks trading are due to the lack of institutions. To guarantee the realization of the rights and implementation of the obligations of buyers and sellers of forestry carbon sinks[9] .

3.3. Alternatives to forestry carbon sinks

At the present stage, the main substitute for the existence of forestry carbon sinks is the trading of carbon emission right quotas, and the trading of carbon emission right is more convenient than the trading of carbon sinks, which leads to less demand for the trading of carbon sinks. China is now in the early stage of realizing the carbon peak, at this time have more carbon emission right quota, and China's rough economy has caused a large number of enterprises on the waste of resources, so the carbon emission right quota and carbon emission right trading can satisfy the daily needs of the enterprise carbon emissions.

Although forestry carbon trading is more risky and has greater market barriers than carbon credits, the global trend towards carbon neutrality will gradually reduce the number of carbon credits allocated by countries. However, with the promotion of the global carbon peak goal and the trend of global carbon neutrality, the carbon emission right quota allocated by each country will be gradually reduced, and the carbon emission right quota shared by enterprises will also be less and less. Although carbon sink trading and carbon emission right compete with each other, in order to achieve the goal of reaching the peak of the carbon goal faster by each government, more and more enterprises will choose carbon sink trading, and the demand for carbon sink trading will be gradually increased.

3.4. Information Asymmetry in China's Forestry Carbon Sinks Trading Markets

In carbon market transactions, information asymmetry occurs due to the large urban-rural differences in China, where the degree of development of cities is greater than that of rural areas in various aspects, including the level of education and the degree of acceptance of information. In forest-rich areas, most of which are less economically developed rural areas, the resident population has a lower level of literacy and is less likely to come into contact with specialized vocabulary such as forestry carbon sinks. Because of the low literacy level, farmers have less information than the local government and forestry carbon trading intermediaries. In the transaction, there is a phenomenon that the intermediary organization or village committee hides the use and real price of the land and forest from the farmers. Farmers, who have less information, are often at a disadvantage and receive far less income than they should. In China, where forestry carbon trading is used as a way to help reduce rural poverty and increase farmers' incomes, information asymmetry will have a negative impact on the promotion of forestry carbon trading for poverty alleviation.

4. Conclusions and Recommendations

4.1. Conclusions

First, the marketization of carbon trading in China is well accomplished, but it is still unable to completely avoid externalities. Because of the high difficulty of carbon sinks trading, and compared with the existing carbon sinks trading of corporate consumers, individual consumers, as carbon emitting individuals in their daily lives, have not yet been able to realize the need to compensate for their own carbon emission activities. Secondly, the system is unstable and the laws and regulations are unsound.In 2017, after China suddenly suspended the National Development and Reform Commission's suspension of CCER project filing applications, a large number of contracted carbon sinks transactions were forced to be suspended, and many enterprises suffered large-scale losses as a result. Third, at this stage, carbon emission rights have become the main substitute for carbon trading rights, but with the realization of the "dual carbon" goal, carbon trading will increasingly become the main transaction to compensate for the carbon emission activities of enterprises. Fourthly, in areas where there are sufficient forest carbon sinks for trading, village committees have organized lectures on the relevant knowledge and posted information on contracts with intermediaries on the bulletin boards of the village committees in a timely manner, clearly displaying the amounts and quantities of the transactions to the farmers, and paying the income from the contracts in real time to the farmers themselves.

4.2. Suggestions

Individual consumers should be made more aware of the need to compensate for their carbon emissions. Compared to corporate consumers in existing carbon trading, most individual consumers, as carbon emitting individuals in their daily lives, are not yet aware of the need to compensate for their own carbon emitting activities. Raising the awareness of carbon sinks among individual consumers can stimulate new demand in the carbon market, and thus stimulate the generation of a new supply of carbon sinks. Although the

demand for forestry carbon sinks in the individual consumer market is relatively small, but the current individual, corporate and social level of ecological construction of high enthusiasm, according to scholars Wang Shuhua and Shen Jiazhuang (2020), it can be known that only the ant forest platform for tree planting corporate donations up to more than a billion yuan, of course, can not be ignored ant forest corporate donations are due to the vast majority of consumers green carbon reduction behavior and generated , i.e. individual consumers' eagerness to protect the environment[10] . Just as the scholars Liu Min and Hu Angang (2022) proposed to create a carbon sink market where multiple consumers coexist, the key is to cultivate market demand, stimulate market supply, and overcome the externality problem of forest carbon sinks in the provision of public services through financial inputs[11] .

For enterprises, they can contract their own forests for carbon offsets. Internalization of externalities is also a way to address externalities, and it may be advisable for enterprises to contract forest areas belonging to their own enterprises for offsetting their own carbon emission activities. When enterprises consider maximizing their overall interests, they will include both the forest area and the enterprise's internal production activities in the scope of discretion, which is conducive to reducing the externality brought about by the forestry carbon exchange. At the same time as reducing carbon emissions, it also promotes enterprises to carry out corresponding innovative activities to reduce carbon emissions, and stimulates the innovative capacity of enterprises related to pollution reduction.

For the government, it is necessary to improve the relevant system of forestry carbon trading. The government plays an important role in institutional change and needs to formulate relevant laws and regulations to provide a stable institutional environment for forestry carbon trading. At the national level, a stable trading environment should be given to relevant practitioners to avoid terminating the certification of CCER projects, reduce the investment risk of investors, and stimulate the enthusiasm of investors to invest in forestry carbon trading; at the trading level, the realization of the rights and obligations of buyers and sellers should be guaranteed, and buyers are more likely to grasp more information in forestry carbon trading, especially in the areas of poverty alleviation by forestry carbon credits, and relevant laws and regulations should be improved. At the transaction level, the rights and obligations of buyers and sellers should be realized, and the buyers in forestry carbon trading should have more information, especially in the area of poverty alleviation through forestry carbon sinks, and the relevant laws and regulations should be improved, and the village committees should be prompted to disclose the contract information transparently to protect the rights of farmers, and to put the promotion of the farmers' income increase into practice.

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