

Research on the Construction of China's Emission Trading System from the Perspective of Transaction Cost Theory

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Abstract—China's pollutant discharge management is based on the current government-led administrative approval system. Although some regions have carried out the pilot work of emission trading, they have not formed a legal basis and a system of standardization and haven't been promoted. The purpose of this paper is to analyze the causes and design and construct the framework of China's emissions trading system. Firstly, the resource allocation efficiency of emission trading is analyzed from the micro-economic point of view, and the total transaction cost is analyzed by the dynamic analysis method. Then the obstacle principle of system implementation is found. Although the establishment of a market with clear property rights contributes to the reduction of total transaction costs, the rapid increase of government transaction costs in the short term has affected the implementation of the system. The conclusion is that the government should bear the short-term cost, and use the electronic trading system and establish a broad market with a wide range of participants to reduce the operating cost of the system, so as to achieve the promotion and effective operation of the emission trading system.

Keywords—*transaction cost theory; emission trading; system construction*

I. INTRODUCTION

Emission trading refers to the adjustment of pollutant discharge volume by voluntary trading of pollutant discharge enterprises in a certain area under the premise that the total amount of pollutant discharge does not exceed the allowable total amount of pollutant discharge, so as to achieve the emission control of pollutants. China's emission permit system began in the 1980s. After practice and exploration, it has formed a "total amount control as the goal, comprehensive management of multiple pollutants" emission permit system. In January 2018, the Ministry of Environmental Protection issued the Measures for the Administration of Pollution Discharge Permits (Trial Implementation). In November 2018, the Ministry of Ecology published the Regulations on the Administration of Pollution Discharge Permits (Draft for Comments). The main focus of both is on the application, issuance, execution, supervision and punishment of emission permits. There is no specific arrangement for emission trading. However, in the Draft Regulations on the Administration of

Pollution Discharge Licensing (Draft for Comments), local governments are allowed to attempt emission trading according to local conditions, and it is stipulated that "the allowable emission amount in the emission permit can be used as the basis for confirming the right of emission trading". The research on emission trading in China includes its general framework, data logical framework, design of emission trading management information system, economic analysis, and research on the function and value of emission trading in sustainable development. In a word, most of the studies based on emission trading can improve the control efficiency of the total amount of pollutant discharge in the whole society. Based on this, some specific practical mechanisms and trading systems are designed. As a public policy, the emission trading system has not been incorporated into the overall planning of the national environmental protection system, reflecting that there are still obstacles to clarify and solve in the practice and implementation of this policy. This paper can supplement the lack of research in this area.

II. EFFECTIVENESS ANALYSIS OF RESOURCE ALLOCATION IN EMISSION TRADING

Compared with the emission permit system under the traditional government control, the emission trading mechanism enables the allocation of total pollutant emissions under the environmental capacity limitation among traders to achieve the maximum effectiveness. As a manifestation of "externality" in the production process of enterprises[1], pollutants can be treated in two ways: one is that the environmental protection department levies a part of pollution tax on enterprises by means of emission permits. This way of transferring social costs to private costs through taxation is regarded as a method of government intervention. Another is to use the method of defining property rights to "internalize" the beneficial or damaged effects caused by "externalities", to treat environmental capacity as scarce resources, to define emission rights as property rights, to trade in market mechanism, to allow such rights to be bought and sold like commodities, and to control pollution discharge by price competition mechanism, to achieve Pareto optimum state of pollution emissions and economic benefits in market mechanism. The Edgeworth box is used to analyze the Pareto improvement brought about by the

Supported by the Fundamental research funds for the Central Universities of Northwest Minzu University (Grand No. 31920180063, 31920170102)

exchange of emission permits.[2] As shown in the figure below, the main participants in emission trading are Enterprise A and Enterprise B. There are two kinds of elements to be allocated between the two enterprises, namely, currency and emission. It is assumed that the monetary amount is regarded as the equivalent substitution of other non-pollutant emission factors. For A, the isoline is shown as L1, L2, L3, and for B, the isoline is shown as C1, C2 and C3. If you choose a point a in the Edgeworth box, you can see that A is not the best point, because without affecting the output of A, C1 can be moved to C2, so that the output of Enterprise B is increased, while Enterprise A is not affected. By analogy, it can be concluded that A and B must have an optimal transaction volume between the same amount of money and sewage discharge, that is, at the tangent point of the equal production lines of A and B, the trajectories of all the equal production lines constitute curves OA and OB, which represent the optimal allocation between the two sewage discharge enterprises. Through emission trading, A and B can tradeoff between effective money and emission. If the technological progress adopted by Enterprise A reduces or effectively treats the emission of pollutants, the amount of emission required by Enterprise A will be reduced. It can exchange more money through market trading.[3] As shown in the figure, the optimal allocation of resources through emission trading is effective.

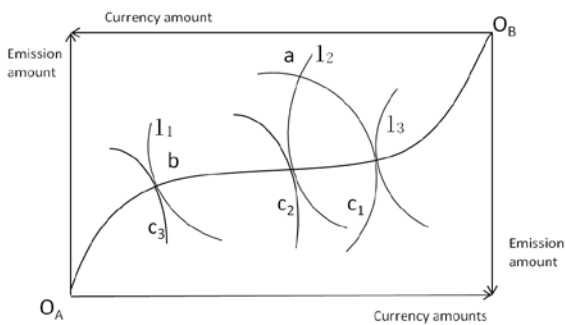


Fig. 1. Edgeworth Box for Emission Trading

III. ANALYSIS OF OBSTACLES TO ESTABLISHMENT OF EMISSION TRADING SYSTEM

As mentioned above, emission trading overcomes the shortcomings of inefficient access to market information and inadequate flow of resources by introducing market mechanism. But at present, China has not yet established and promoted the emission trading system effectively. This paper analyses the main cost structure of emission trading from a static point of view and the transaction cost trend in different time periods from a dynamic point of view.

A. Transaction Cost Structure of Emission Trading

Transaction costs are the costs of completing a market exchange. They can be defined as costs related to the transfer, acquisition and protection of property rights.[4] Although the successful implementation of the policy can improve social welfare in general, due to the different transaction costs borne by different subjects, it often leads to the main body with high cost and investment can not be effectively compensated, which

makes the willingness to improve the system weak. The establishment of emission trading system can introduce market competition mechanism. The new system can improve efficiency and reduce transaction costs. In fact, this change is very difficult because the change of property right system itself sometimes results in high costs. Although this process is sometimes temporary, this part of transaction costs is often hindered by the lack of the main body to bear. Because of the lack of information and executive ability, private enterprises and enterprises can not bear the extra cost of institutional change, which is partly borne by the government as the main body. Therefore, the total transaction cost of society is composed of government transaction cost and enterprise transaction cost. In terms of time, government transaction cost often occurs before and market transaction cost after. From the function point of view, government transaction costs are used for system operation, while enterprise transaction costs are generated from market transactions.

B. Analysis on the Causes of Obstacles in Implementing Emission Trading

Distinguishing the transaction cost structure is helpful to investigate the barrier mechanism of emission trading system. Although the establishment of a new system with Pareto improvement effect will improve the efficiency of resource allocation, it is very difficult to happen in the actual process. The following figure explains: Curve B represents the transaction cost of the government, which is mainly used to maintain the operation of the system; Curve C represents the transaction cost of the market. Before t₁, the old system should be maintained, and the government transaction costs and market transaction costs are at the normal level. If the new system is to be established, the transaction costs of the government will increase because of the information collection, environmental analysis, agenda setting, policy operation, platform construction, policy debugging, supervision and management, etc. This transaction cost reaches its peak in T₁ to t₂, at which time the total transaction cost of society is also the largest. If the new policy is established and operates smoothly, it can be seen that after t₂, the transaction cost of the market obviously decreases because of the clarity of the property right system, and the transaction cost of the government also decreases with the intervention of administrative means.

The establishment of emission trading system will be hindered if there are high transaction cost barriers in the process of its establishment. Once the government decides to implement the system, it means that the government will increase the cost of implementation and maintenance in the short term, including coordination cost, information cost and anti-corruption cost. On the other hand, if the reduction of market transaction costs is less than the increase of government transaction costs, the long-term total transaction costs will still rise, and the economic benefits of the new policy implementation are lower than expected.

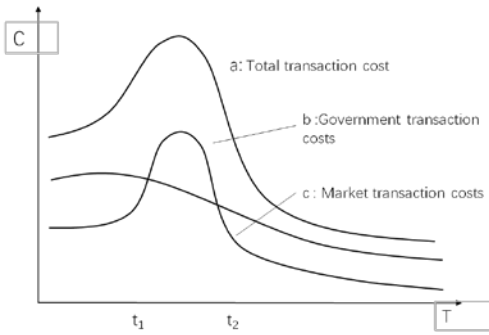


Fig. 2. Time Trend Chart of Transaction Costs

IV. CONSTRUCTION OF EMISSION TRADING SYSTEM FROM THE PERSPECTIVE OF TRANSACTION COST

The main problems existing in China's emission trading system lie in the immaturity of the market, which leads to the inefficiency of the current policy implementation, and the high transaction costs and inconsistent responsibilities and benefits caused by the government's abdication to the market in the short term. The following will be from the perspective of the establishment of property rights market, combined with China's actual construction of emission trading system.

A. Government Role and Initial Allocation of Emission Rights

Emission trading depends on two conditions: one is to have a clear definition of property rights; the other is to have a place for trading - property rights market. The roles and functions of the government are mainly manifested in two aspects: one is to make property rights clear; the other is to take appropriate intervention measures to solve the difficulties of market information communication when property rights are not clear.

1) *To define the emission right legally and improve the clarity of property rights.* Emission of appropriate amount of pollutants to the environment is an indispensable basic condition for units and individuals to maintain their survival and development. Therefore, emission right can be understood as an element of environmental right, and should be recognized and protected by law.[5] Emission trading is essentially a transaction of property rights. Therefore, in order to establish the emission trading system and the emission trading market, we must first recognize the free transfer and transaction of emission rights from the legal point of view. Therefore, it is necessary to transform the pollution discharge license issued by China's national environmental protection department, which does not have the nature of private property rights, into an independent property right that can be freely traded and transferred, so as to make its property rights clear, full responsibility clear and protected by law.

2) *Establish a property rights trading market to solve the difficulties of market information communication.* In the process of controlling environmental pollution, the main responsibility of government environmental management department is to formulate management rules and implement management according to law. In the process of controlling

environmental pollution, the main responsibility of government environmental management department is to formulate management rules and implement management according to law. In the process of allocating emission trading under market mechanism, on the one hand, because of the difficulty of obtaining information, on the other hand, because of the restriction of legal permission and the pursuit of short-term interests, it is impossible for enterprises to take measures to build a trading platform of property rights market through trade associations or self-disciplined actions. Therefore, the government should assume the responsibility of establishing the property right market, bear the transaction costs of institutional changes in the process of establishing the property right market, and build a platform for free and convenient circulation of information for the market.

B. System Construction of Secondary Trading Market

After the initial emission permit is obtained in the primary distribution market, on the one hand, it can be used for production, on the other hand, in the secondary trading market, each enterprise can list and sell the surplus emission permit, and other enterprises with insufficient emission permit can purchase surplus emission permit through the secondary trading market. If there is a shortage of emission permits in the secondary market, the competition mechanism will lead to a rise in prices. At this time, some enterprises can be encouraged to reduce the actual emission permits by technical means, and sell the remaining amount, thus gaining certain economic benefits. The emission trading system can be divided into primary distribution market and secondary trading market. The primary distribution market is dominated by the government to auction the total amount of sewage under the environmental capacity, while the secondary market is listed under the market mechanism. As shown in the following figure:

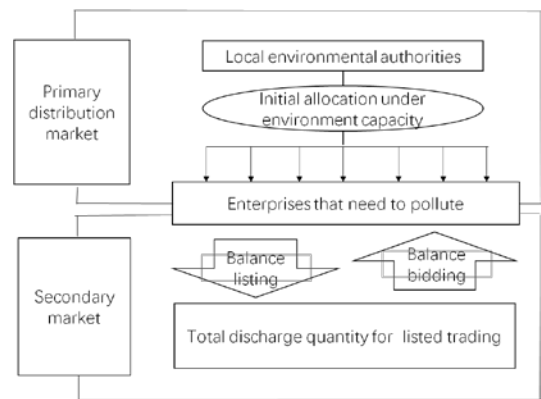


Fig. 3. Schematic Diagram of Emission Trading Mechanism

V. CONCLUSIONS AND RECOMMENDATIONS

The core of emission trading system is to establish a market mechanism, so that the government-led public rights relationship is replaced by the market trading relationship of pollution rights. If this system is established, enterprises control the cost of pollution through technological progress and competition, while the government is responsible for playing

the role of standard-setter and supervisor, providing a feasible institutional framework and formulating scientific monitoring standards, it will not only reduce the government's expenditure on environmental management, but also help to improve the unfair and self-interested behavior in the process of government resource allocation, and reduce rent-seeking opportunities.[6] The establishment of emission trading system is helpful to optimize resource allocation in the long run, but in the short run, the soaring transaction cost of the government makes the government less willing to implement policies under the background of fewer participants. This study suggests that the government should take into account the long-term efficiency of resource allocation and total transaction costs, bear short-term costs, and promote the establishment of emission trading system through the following ways.

1) *Strengthen the responsibilities of the government and standardize the initial allocation mechanism of emission trading.* The purpose of establishing emission trading mechanism is to reduce the cost of governance externalities through internal constraints and technological reforms. The government should take the initiative to bear the cost of policy formulation and trading platform construction, and determine the total local emissions in the comprehensive assessment of environmental capacity and local development needs. The enterprises participating in the initial allocation by bidding shall be examined for their qualifications so as to prevent unrelated trading entities and capital entry. In addition, the pricing of primary distribution market should consider the cost of government management and pollution control, so that it can be compensated in the bidding revenue.

2) *Use online electronic transactions to standardize and simplify the transaction process.* The network can provide sufficient information, which can greatly reduce the search cost, negotiation cost and contract cost in the transaction process. Considering the different characteristics of solid pollutants, atmospheric pollutants and water pollutants, the corresponding rules should be formed for emission trading. It stipulates the main body, type, quantity, time limit and place of discharge of pollutants, and forms a standardized contract form. In order to avoid individual enterprises hoarding quotas

in the initial distribution market and making improper profits in the secondary market, the upper limit of emission permits should also be stipulated according to the production scale of enterprises.

3) *Establish a wide range of participants.* If there are few participants in emission trading, the market will be dominated by a few people and the operation will fail. Therefore, to establish an effective trading mechanism for pollutant discharge rights, we should expand the trading subject, let more pollutant discharge enterprises participate in it, and prevent a few large enterprises from forming oligopoly. Therefore, we should expand the regional trading market as much as possible and establish a national trading market to effectively prevent market failure caused by a few transactions.

4) *Improve the supervision mechanism to prevent excessive speculation.* The emission trading market is complex, the cross-regional circulation is difficult, and the procedures of emission trading are different among different regions. There is no effective punishment basis for the illegal and irregular acts in the trading. Therefore, we should improve the restraint and supervision mechanism, protect the fairness and fairness of emissions trading, and prevent emissions trading from becoming the object of financial speculation and capital speculation.

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