Review on the Research of Emissions Trading of Major Pollutants*

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Abstract: Using deductive and inductive research methods, the paper made a systematic review on domestic and international literatures about emissions trading of major pollutants. The study found that the focus of international research varied to the domestic ones. Foreign research mainly focused on the compare of the advantages and disadvantages of the pollution control measures, based on above research, probed the emissions trading system building, but domestic research is focused on the actual emissions trading operational problems. Overall, the consensus of domestic and foreign research is that: to introduce the system of transferable emissions permit, to establish the emissions trading platform, and to implement the emissions trading. However, whether domestic or foreign, the research to the emissions trading platforms, in particular to the regional emissions trading platform is very weak, which is the key to the development of emissions trading, therefore, the paper argued that the issue of emissions trading follow-up studies should focus on emissions trading platform.
Key words: Major pollutants; Emissions rights; Trading platform; Pollution control

1 Introduction

In recent years, the rapid development of economy and science has brought great pressure on environment, and with the propelling of energy saving and pollution remediation, the appropriate environmental policy must be improved with the times. The systems such as total control and corresponding pollution permits, as well as emissions trading and compensation for the use, are increasingly widespread concern and attention.

Among the main control measures of Pollution, the idea of emissions trading has become the most important pollutant control measure, and it is increasingly emphasized by political and academic circles. However, it must be noted that although the political and academic circles holding great esteems, the actual emissions trading isn't active, and the emission transaction amounts almost every subject is generally small, what's more, almost all of the successful cases of emissions trading are essentially the results of administrative match, instead of dealing completely through the market mechanism, which showed that the implementations of the system of emissions trading are still faced with serious obstacles in practice. The corresponding academic research must create the conditions and point out the right direction to break through these barriers, thus, to do systematic review on the issue of emissions trading is advisable, because it is the premise and foundation to solve these problems, to explore the follow-up research direction, as well as to promote emissions trading.

2 Describes of the Foreign Research on Emissions Trading

Foreign literatures had made a lot of researches on the issues of emissions and their trading, and the relevant research achievements are rich. The corresponding research in abroad are mainly performed from the following three angles.

2.1 Research on the economics basic of emissions trading

In the early 20th century, Pigu, the professor in University of Cambridge, discovered the existence of externalities in economic life during his research on welfare economics. Then, Baumol, the famous economists, proposed the Pa Pareto criterion of optimal resources allocation. He believed that due to the existence of externalities, sewage companies can not achieve Pareto optimal allocation of resources, and they in general in a state of excess supply. Hardin's model of *tragedy of the commons* is creative, on the one hand, it does full inference to the consequences of sewage, and on the other hand, it also provides a preliminary evidence for the conduct of interference the emission. The direct economic basis of emissions trading due to the arising of the modern property rights theory, whose representative is Coase (Ronald Coase, 1960). Its theoretical core is to be clearly defined property rights, and to legally protect

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the property rights transfer, certainly, emission rights is also a property. Under the circumstance of the emission rights being clearly defined and the property rights trading market being complete, the externalities of the behavior of sewage can be internalized technologically, and the resource allocation can also be automatically adjusted to the efficient state. It sharply is the property rights concept of sewage and the emissions trading characteristics of property rights, which propelled the rise of pollution control measures and the building of the emissions trading system.

2.2 Research on the means of control the discharge of major pollutants

Professor Pigu has argued that, because the acts of the sewage generally produce the externalities, the main economic principals are lack of self-incentives to reduce emission (Samuelson, 2004). The research provides a theoretical basis for the conduct of emission control, and through with this idea, Richard (1978) proposed the standard law to control pollution emission. Which legally limit the number of discharge pollutants to different vendors, that is to set emission standards, and if the company exceeds the standard, it would be faced with economic and even criminal penalties. Subsequently, William and Wallace (1979) proposed the idea for charging, because the defect has a high degree of fit with the ideas of Pigu to solve the problems of externalities, so the charging to emission is also known as the Pigu tax. Almost at the same period, Maloney and Bruce (1980) proposed a transferable emissions permit system, under which, each vendor must obtain permits to discharge, which are distributed to different vendors according to some kind of regional regulations, and they can be exchanged among different companies. For above three emission control methods, Pindyck and Rubinfeld (1995) made a systematic comparison to them. They found that when the marginal social cost curve is steeper than the marginal abatement cost curve relatively, the emission standards is better than the emissions charges, on the contrary, the emission charges are superior to the emissions standards, while because the system of transferable discharge permits possesses the advantages of both emission standards and emission charges, therefore, transferable discharge permit system is the most effective emissions control system.

2.3 Research on the emissions trading system construction

In the United States, the "Clean Air Act" (CAAA) adopted in 1970 has proposed the principles of total pollutant control, but until Maloney and Bruce put forward transferable emissions permit system in 1980, the constructions of the emissions trading system run on the right track. After lasting six years exploration, the Reagan administration signed the final report of emissions trading policy in 1986. In the “Clean Air Act” signed in 1990, the legal status and specific implementation requirements of the emissions trading system were formally established. The systems are composed of the compensation policy, the bubble policy, the net gain policy and the sewage banks policy, which marked the formation of the relatively complete system of emissions trading. The main targets of emissions trading initially were SO2 and COD. In recent years, Gregg and Eric (2009), Charles (2010) and other scholars made much more systematic study to the feasibility of performing carbon emissions trading, and many of their ideas were quickly got the adoption and use by government departments, so that the emissions trading targets of the major pollutants had been largely expanded.

3 Describes of Foreign Research on Emissions Trading

Domestic literatures had made some researches to the emission reduction and emissions trading issues on some degree. The corresponding research can be summarized into the following two aspects.

3.1 Research on the emissions control mechanisms of major pollutants

In China, the research on the emissions control of major pollutants began from the promulgation of “Environmental Protection Law (Trial Implementation)” in 1979, and it developed in the late 1980s (Wu, 2005). The salient features of China's emissions controlling model of pollutants are mainly the total volume control (He, 1999). In March 1988, State Environmental Protection Administration issued the “Interim Measures of water pollutant discharge permits”, whose provisions of Article 21 of Chapter IV are as following: “it must implement a strict responsibility system to achieve the objectives of Water pollutant emission control”. In 1989, the State Environmental Protection Council promulgated the “Water Pollution Control Act Implementation Rules”, its Article 9 also states: “Those enterprises whose total pollutant discharge is more than the limit of the state regulation institutions must correct on deadline so as to achieve the targets of both the engineering emission reduction and the structural emission reduction”. After the World Conference on Environment and Development held by Rio de Janeiro of Brazil in 1992, in particularly with the putting forward of the concept of sustainable development, the measures to control emissions of major pollutants of our government constantly changes from administrative reduction to the fundamental economic reduction (Li, 2004). In 1992, the

State Council approved the “Ten Countermeasures on Environment and Development in China”, which stressed the importance of management emissions (Song, 2000). In 1993, the State Council further approved the “Action Plan for Environmental Protection in China (1991-2000)”, which stressed the need to develop specific policies on emissions trading. In 1995, National People’s Congress amended and promulgated the “Air Pollution Control Act”, whose Article 27 states the basic principle to plan and give acid rain or SO_2 control areas which are so called two control zones. From then on, to perform emissions trading of SO_2 has considered legal basis.

3.2 Research on the emissions trading system construction

Back in 1987, Minhang District of Shanghai had tried the emissions trading just liking the beginning trying of food Crab, which created a precedent for China's emissions trading practice (Lin, 2007). National Environmental Protection Bureau (NEPB) had selected 16 cities as pilot projects of atmospheric pollutant emissions permit system in 1991, and had selected 6 cities as pilot projects of atmospheric emissions trading system in 1994, which not only opened the big screen of our country’s emissions trading practices, but also provides the living materials for the construction of China's emissions trading system. In 1997, Beijing Environment and Development Institution (BEDI) launched a joint research project of emissions trading with Environmental Protection Agency of USA (Ma et. al., 1999). In 2001, the Asian Development Bank and Shanxi provincial government launched "Emissions Trading Mechanism" project which were jointly implemented by the Future Resources Research Institute (FRRI) of USA and Chinese Environment Science Research Institute. The project clearly aimed at the emissions problems of SO2, and developed a more complete emissions trading scheme of SO2, which included the allocation of emission rights within 5 years, business account, the transaction program, quota tracking verification, storage, discharge monitoring report, fines and other transaction documents required for a full set of management (Li, 2003). On the march 2002, NEPB issued “notice about launching the demonstration of to implement the research project to promote the total emissions control and the implementation of the policy of emission rights”, which started the largest demonstration of emissions trading in history of our country (Wu, 2005). Based on above research, Shi (2005) conducted a feasibility study on the construction of the emissions trading market in Zhejiang province, Zhou (2006) demonstrated the feasibility of our implementation of the emissions trading system from six levels including the timing, the technology etc. However, Li (2001), Li (2003) believed that China's emissions trading market system possessing some serious problems, for example, the supporting mechanism not being perfect, unfair distribution of emission quotas, the total amount of emissions not being scientific, trading market failure and so on. Xu (2008) have developed appropriate policy recommendations to above problems, but all of them are just an overall guiding vision.

4 Evaluation to the Domestic and International Studies

4.1 Research level of the present studies

From the above overview of the domestic and international research profiles, it’s easy to see that the relevant results are rich. Many scholars made fruitful research from different angles. From the aspect of the research level concerning, the foreign researches attached great importance to the combination of theory and practice, and made deep comparisons in theory to the advantages and disadvantages among various pollution control measures. After laid a solid basis of economic theory for emissions trading, the academic researches further solved the problems of emissions trading system building. On contrary, the domestic researches seemed to neglect the basic theory research, instead of to focus on the problem of practical operational level. However, as for the historical process of the practice itself, whether in the emissions trading system development, system design, or software development, and still or the cultivation of the market participation awareness, the domestic studies are still in the state to introduce, digest, absorb and innovative the foreign research results, and the original research is scarce. In this respect, the domestic study has a certain degree of lag to the foreign one.

4.2 Research trends and limitations of the present studies

The common research trend both domestic and abroad is to advocate the transferable emission permits system, to establish and to improve the emissions trading platforms, as well as to implement emissions trading. However, whether domestic or foreign study, the present researches to the platform for emissions trading are not deep enough, especially lacking the specialized studies to the regional trading platform. The construction of good regional emissions is the basis to ensure the sound operation of the entire emissions trading system platform, from this perspective, to do in-depth research to the regional emissions trading system platform is no doubt to be the basic engineering to reduce pollutant

emission.

5 Conclusion

According to above studies, The paper made the following conclusions: (1) Both domestic and international researches jointly show that to perform emissions trading is the most scientific and effective measure to control the conduct of pollutants emissions, as well as to achieve the targets of emission reduction; (2) The studies focus of domestic and foreign about emissions trading are varies, and the foreign research is based on the economics of emissions trading, and focuses on building the system of emissions trading, while the domestic research focuses on the practical scheme of emissions trading. Overall, the domestic research lags behind that of the foreign country; (3) The bottleneck problem of the emissions trading studies is the construction of the emissions trading platform, especially the lack of the research to the regional emissions trading platform, thus, the paper believes that to perform the research on the emissions trading platform is the key issue to active the emissions trading.

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