

Financial Matching of Beijing-Tianjin-Hebei Coordinated Governance of Haze under the Background of Big Data

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Abstract. This paper focuses on the financial system reform in the vertical and horizontal coordinated governance of haze under the background of big data. Under the framework of federalism theory of big data background environment, this paper explores how to use information resources to reasonably divide central and local, local and local affairs powers and expenditure responsibilities, how to construct financial information evaluation indicators that match the affairs powers and expenditure responsibilities, to promote Beijing-Tianjin-Hebei coordinated governance of haze under the background of big data.

Keywords: Big data, Beijing-Tianjin-Hebei, haze governance, financial relationship.

1. Introduction

In October 2012, the Ministry of Environmental Protection, the National Development and Reform Commission and the Ministry of Finance jointly issued the “Twelfth Five-Year Plan for Air Pollution Prevention and Control in Key Areas”, in September 2014, the State Council issued the “Air Pollution Prevention and Control Action Plan”, and in July 2016, the Ministry of Environmental Protection, Beijing, Tianjin and Hebei Province jointly issued the “Beijing-Tianjin-Hebei Intensive Measures for Prevention and Control of Atmospheric Pollution (2016-2017)”, trying to use strict administrative orders to control pollution. The use of administrative orders to control pollution can achieve certain results in the short term, but it cannot guarantee the long-term effective operation of the haze coordinated governance mechanism. The “APEC Blue” and the “Belt and Road Blue” fully illustrate this point. Air pollution should establish a coordinated governance mechanism based on market incentives, and the construction of an air pollution system governance mechanism based on market incentives must break through the existing financial system barriers in China and solve the mismatch of affairs powers and expenditure responsibility between the central and local, local and local governments, and the mismatch between the financial powers and affairs powers, as well as design how to transfer payments between central and local governments. These issues are particularly prominent in the process of the Beijing-Tianjin-Hebei regional coordinated governance of haze under the background of big data.

2. Academic review under the background of big data

Relevant researches on the division of government power and financial allocation in the coordinated governance of air pollution is generally carried out within the framework of environmental federalism theory. As a branch of financial federalism theory, environmental federalism mainly focuses on the issues of centralization and decentralization of environmental management. The literature on environmental federalism is quite rich. However, whether a country’s environmental control should adopt the centralized or decentralized approach, the existing researches have great differences in both theory and empirical aspects.

The literature supporting environmental decentralization can be traced back to the classic article of Tiebout (1956). The Tiebout model emphasizes the positive role of financial decentralization. Under the seven strict assumptions, it can be deduced that local competition under decentralization can realize the local supply’s Pareto Optimality. Based on Tiebout’s (1956) financial decentralization theory model, Oates and Schwab (1988) developed a framework for local competition, arguing that decentralized environmental governance may also be efficient, the local governments aiming at maximizing residents’ welfare will provide an optimal

environment quality. Subsequent researches also proved the rationality of decentralization from the perspective of local competition, and believed that local competition will lead to environmental race to the top, which is benefit for environmental protection (Wellisch, 1995). Another type of literature supporting environmental decentralization started from the heterogeneity of the localities. Due to the different preferences of the regions for environmental quality, the central government's formulation of uniform environmental control standards will result in welfare losses, and because local governments have information advantages, the local governments set pollution emission standards and control efforts to be more efficient system arrangement.

The literature supporting environmental centralization also proved the necessity of centralization from the perspective of local competition. The results of the Oates and Schwab (1988) model rely on a series of strict assumptions, the model assumes that: (1) all the residents in the jurisdiction are homogeneous and can not migrate; (2) capital flows freely within the jurisdiction; (3) capital has all relevant information about the jurisdiction; (4) there are a large number of local governments; (5) there is no regional externality; (6) local governments maximize social welfare. The theoretical model supporting environmental centralization drew different conclusions by relaxing the relevant assumptions of the Oates and Schwab models. It believed that under the environmental control decentralization framework, local government competition will lead to inefficient environmental control standards. The initial researches focused on the externalities of environmental pollution. For transboundary pollution, researches shown that local governments will ignore the impact of local environmental policies on the utility of residents in neighboring areas, leading to inefficient behavior. Compared to central government decisions, local government choices may result in higher levels of transboundary pollution.

3. Research dynamics of big data background

Foreign researches on environmental federalism have been deepened, and relevant research results provide theoretical and methodological support for this research. There are few literature on China's special research on the matching mechanism of air pollution control affairs powers and financial powers. Only Cui Jing and Sun Wei (2014) have studied the division of air pollution control affairs powers between central and local governments from the perspective of public product attributes. Therefore, research in this field needs to continue to enrich and improve in combination with the characteristics of Chinese-style financial decentralization and China's environmental affairs related institutional arrangements:

(1) Further enrich the connotation of the division of affairs powers in air pollution control. Foreign countries have achieved relatively fruitful results in the study of centralization and decentralization of air pollution, but they are less involved in

other aspects of the division of affairs powers. They are not involved in the division of affairs powers and expenditure responsibilities proposed by the Third Plenary Session of the 18th Central Committee of China.

(2) Performance evaluation and system design of financial transfer payment for air pollution control. Some foreign empirical literature has examined the performance of environmental financial transfer payments. China's research in this area is still relatively lacking, and it is necessary to strengthen the theoretical and empirical research on the financial transfer payment system for air pollution control.

(3) Empirical test of the role of central and local taxation on the control of atmospheric pollution and related institutional arrangements. In addition to environmental taxes, other taxes (such as consumption tax, resource tax) will also affect the performance of atmospheric governance, and these types of tax intergovernmental distribution will also produce different air pollution control effects. At present, there are few studies related to it, which need to be further enriched and improved.

3.1. Research on the division of air pollution affairs powers.

The affairs powers involved in environmental pollution control include standard setting, environmental pollution measurement, environmental law enforcement, scientific research and so on. Most of the researches related to the division of air pollution control affairs powers is carried out from the perspective of which level of government the air quality standard should be set by. Air pollution is a typical transboundary pollution. It is generally considered that the establishment of regulatory standards by local governments is inefficient (Oates, 1972; Silva and Caplan, 1997) because local governments cannot fully internalize the externalities brought by transboundary pollution, it requires the intervention by the central government (Engel, 1997; Sigman, 2003; Adler, 2005; Hall, 2008; Dijkstra and Fredriksson, 2010). Banzhaf and Chupp (2015) analyzed emissions of nitrogen oxides and sulfur dioxide in the US power industry. Empirical results showed that uniform emission standards result in less social welfare losses compared with decentralized emission standards (0.2% vs. 31.5%). The reason for this is that the externalities of transboundary pollution are more important than regional heterogeneity.

3.2. Research on the incentive mechanism of atmospheric pollution financial powers.

Since air pollution is a kind of transboundary pollution, its governance will inevitably produce the asymmetric problem of cost and benefit. This asymmetry is reflected in two aspects. One is the spillover of income, that is, the local bears the cost of all pollution governance, but cannot get all the benefits, so there will be free-riding behavior; Second, the spillover of cost, that is, the place where the pollution

occurs does not bear the full cost of governance. Both of these asymmetries will create a mismatch between affairs powers and financial powers. To solve the problem of transboundary pollution cost and income asymmetry, we cannot simply rely on the division of affairs powers. Because reasonable division of affairs powers cannot internalize all costs and benefits, we should rely on financial incentives to compensate local governments for environmental protection efforts.

4. Review of big data background research

This paper focuses on the financial system reform in the vertical and horizontal coordinated governance of haze under the background of big data. Under the framework of environmental federalism, it is necessary to explore how to rationally divide the central and local affairs powers and expenditure responsibilities, how to construct a financial mechanism that matches the power of affairs and expenditure, to promote the vertical and horizontal coordinated governance of haze in China.

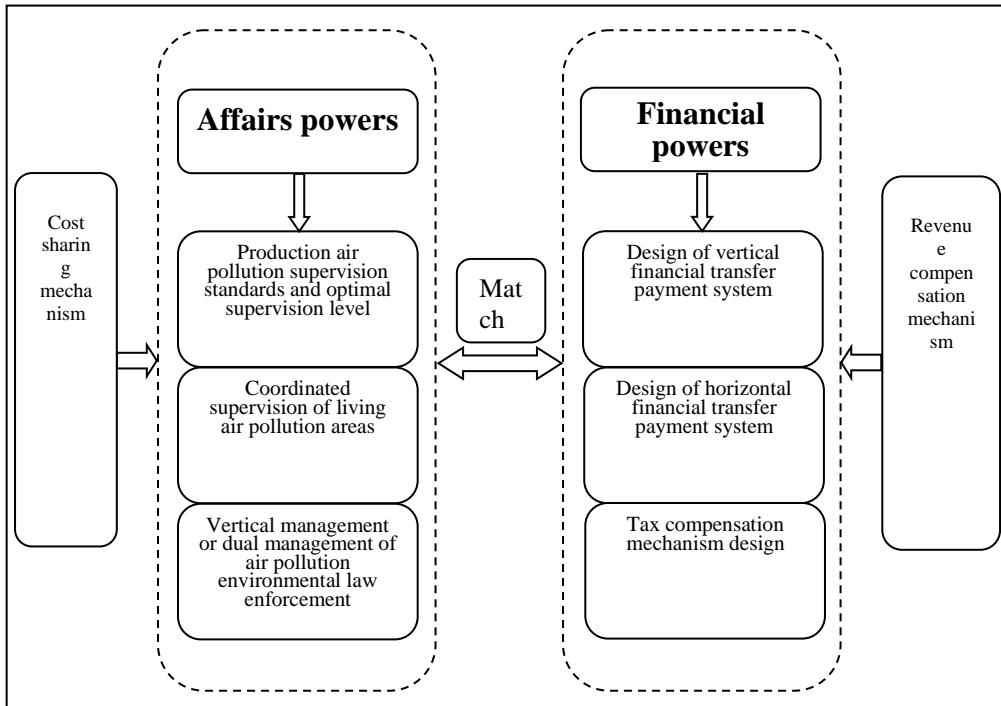


Fig 1: Overall framework of research

4.1. Production air pollution supervision standards and optimal supervision level.

Air pollution can be further divided into production and living air pollution. For such pollution, theoretical analysis shows that a unified standard should be established by the central government. Based on the Oates and Schwab (1988) and

Williams III (2012) models, this study adds the typical characteristics of Chinese-style financial decentralization and the assumptions of official promotion incentives, and analyzes China's production air pollution supervision standards and corresponding division of standards development rights.

4.2. Coordinated supervision of living air pollution areas.

Living air pollution refers to pollution caused by the continuous improvement of urbanization level, the most typical of which is urban automobile emission pollution. There is no regional capital competition in the treatment of living air pollution. Therefore, its supervision standards can be set by the local authorities. However, the spillover of living atmospheric pollution also determines that regional collaboration is required for the governance of such pollution. From the perspective of urban agglomerations, this topic explores how to break through administrative barriers and construct a coordinated governance mechanism for living air pollution areas by designing reasonable supervision rights.

4.3. Vertical management or dual management of air pollution environmental law enforcement.

In addition to the set of supervision standards, environmental enforcement is another factor that affects the performance of air pollution governance. China's current environmental law enforcement adopts a dual management model, mainly uses local management. Whether the management model is conducive to alleviating haze, it requires empirical testing. If the test results are negatively correlated, should vertical management be implemented?

4.4. Design of vertical financial transfer payment system.

Due to the different stages of economic development and industrial structure in various regions of China, the unified production air pollution control standards set by the central government will result in different costs (including various direct or indirect costs). This requires the central government to targeted design the corresponding vertical financial transfer payment system. Is it a general transfer payment or a special transfer payment? Is transfer payment focused on fairness or efficiency? Which factors should be included in the calculation formula for transfer payment?

5. Innovation suggestions under the background of big data

The haze problem of Beijing-Tianjin-Hebei has become increasingly prominent. There are many literature on the analysis of the causes and solutions of haze from the perspective of technology. However, there is still a lack of in-depth analysis of the causes and solutions of haze formation. The Third Plenary Session of the 18th CPC Central Committee proposed to reform the ecological environmental protection management system. To solve the problem of haze, we must make a

breakthrough in the system. This requires us to explore and solve some basic problems: how to clarify the central and local environmental protection rights? How to divide the central and local expenditure responsibilities?

Domestic researches on the coordinated governance of haze is mostly carried out from the perspective of technology or regional administrative cooperation. We believe that an important factor hindering the formation of a long-term mechanism for the coordinated governance of haze in China is China's current and unreasonable financial management system. The financial management system formed by the tax-sharing reform in 1994 caused the mismatch between local affairs and financial resources, which led to the inferior competition of environmental pollution in China.

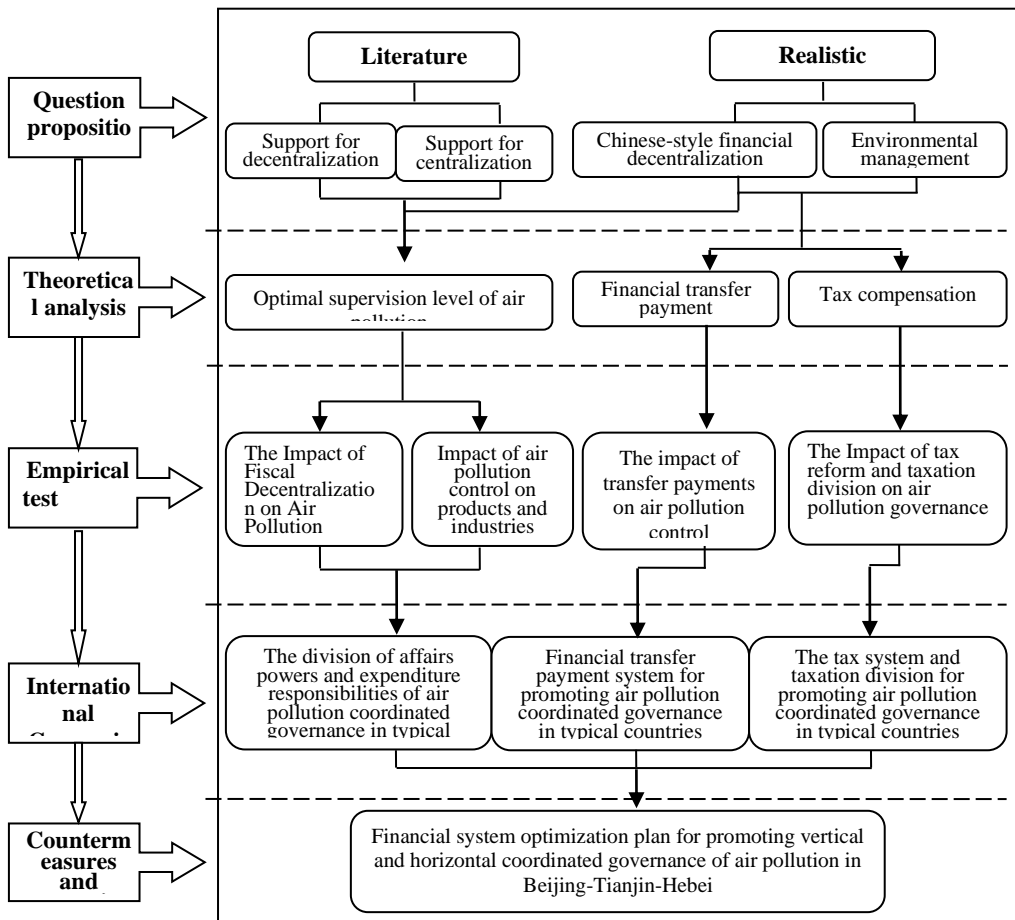


Fig 2: The basic idea of research

Existing researches have studied air pollution as a whole. We believe that air pollution can be further subdivided into two types: the type of production and the

type of life. The formation mechanisms of these two types of air pollution are different, and the degrees of spillover are also different. Therefore, the corresponding division of affairs powers and expenditure responsibilities and financial compensation mechanisms are also different.

The basic model of this research comes from the theory of environmental federalism, which mainly studies the division of affairs powers and financial allocation in the coordinated governance of air pollution from the perspective of efficiency. Considering that environmental systems, environmental management systems, and environmental laws also affect efficiency, it is necessary to conduct multidisciplinary research in the research to absorb the viewpoints and contents of institutional economics, management and organizational economics, and environmental federalist legal theory.

Based on the existing empirical researches, this research attempts to carry out more detailed empirical research and expand its scope. Specifically, the first is to further investigate the scientific nature of financial decentralization indicators, and carry out in-depth research by using the existing researches on financial decentralization indicators to investigate the relationship between the division of affairs powers and expenditure responsibilities and air quality. The second is to investigate the impact of financial transfer payments, tax reform and tax division on air quality, which is less involved in the existing empirical literature.

6. Acknowledgement

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