

Research on the Relationship Between Fiscal Decentralization and Environmental Governance

Leshan Li

The Affiliated International School of Shenzhen University, Shenzhen 518000, China.

Abstract. The issue of fiscal decentralization and environmental governance is of great research significance, which can guide local governments to implement environmental governance policies in reality. Based on this, this study uses literature review and other methods to discuss the research in the fields of fiscal decentralization, local government governance behavior and environmental governance. The main findings are as follows: firstly, in terms of theoretical analysis, the existing literature studies from the aspects of environmental decentralization, local government competition and market segmentation, and there is still a lack of theoretical discussion on the characteristics of economies at different stages of development; In terms of empirical research, the existing literature explores the specific mechanism and spatial effect, and the inconsistency in variable measurement has a great impact on the results. Based on this study, the exploration of fiscal decentralization and environmental governance can give more consideration to the strategic game between different levels of government in the future, pay attention to the consideration of different stages of development, and obtain more practical research result.

Keywords: Fiscal decentralization; Environmental governance; Local government competition; Environmental decentralization.

1. Introduction

Fiscal decentralization and environmental governance belong to the research scope of environmental economics, finance and taxation, and the basic theories involved include externality theory, decentralization system theory and tax statutory theory. Existing studies have analyzed from the theoretical perspectives of environmental decentralization, local government competition and market segmentation, and empirical research has also been continuously developed, but the influence of insufficient exploration of the affected mechanism and large differences in variable measurement are affected.

The direct and indirect relationship of decentralization to the environment has been widely explored in academia today. Therefore, the literature review in this field also has important academic significance, first, it reveals a rich impact mechanism, second, further summarizes and analyzes the conclusions and mechanisms of existing empirical research, and thirdly, finds out the research gap, and provides empirical support for policy formulation.

Through the existing literature, this paper summarizes the impact and empirical analysis of the theoretical mechanism of fiscal decentralization system on environmental governance, sorts out and summarizes several existing views in academia, and explains some gaps and shortcomings in existing research, so as to provide solutions to achieve the goal of environmental governance.

2. Concept and Connotation

2.1 Fiscal decentralization

Fiscal decentralization means that the central government gives local governments a certain degree of autonomy in debt arrangement, tax management and budget implementation, and the state divides the production and provision of public goods that should be provided by governments at different levels or regions according to the scope of benefits of public goods, thus forming a relationship of mutual complementarity and mutual constraint between the central government and local

governments in the supply of public goods. There are certain differences in the academic community on whether the environmental governance model should be centralized or decentralized, environmental protection should be implemented by the central government or local governments, which party is more conducive to environmental governance, which is also the core issue discussed by environmental federalism, under centralized governance, the central government can form a highly unified governance standard throughout the country, reduce pollution spillover, and also prevent local governments from constantly lowering local environmental governance standards in order to attract polluting interest groups, and avoid self-interested behavior of local officials. Since decentralization can reveal local residents' true preferences by allowing them to freely flow water between jurisdictions through "voting with their feet", under decentralized governance, local governments can provide the public goods they need according to local residents' preferences, improve supply efficiency, and maximize social welfare.

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The first generation of fiscal decentralization theory, represented by Tiebout and Oates (1988)[1], stated that local government officials could maximize the needs of residents and provide local services according to local conditions, so the provision of public goods would be more efficient.

The second-generation fiscal decentralization theory, represented by Qian and Xu (1998)[2], argues that local governments will lower environmental governance standards and deregulate in pursuit of revenue maximization, resulting in "race to the bottom" for pollution emissions and insufficient provision of public services. Regarding fiscal decentralization, some scholars have also discussed it. For example, Oates (2002) [3] proposes to use centralized and decentralized governance methods according to the nature of environmental public goods. When environmental public goods are local, such as motor vehicle emissions, lake pollution and solid pollutants in the jurisdiction, they should be provided by local governments; For environmental public goods with significant cross-regional spillover effects and national environmental public goods, such as greenhouse gases and ozone layer destruction, the central government should provide them uniformly. In addition to discussing which level of government should bear environmental public goods, Banzhaf and Chupp (2012) [4] analyze the provision of environmental public goods from another perspective, taking air pollution in the United States as an example, from the impact of different shapes of marginal costs of environmental public goods supply on the supply subject, it is found that when the marginal cost curve of environmental public goods supply is more convex, the centralized governance of the central government can improve the overall welfare level; Conversely, if the marginal cost curve of environmental public goods supply is more concave, local government decentralization can improve the overall welfare level.

2.2 Local Government Environmental Governance Behavior

Local government environmental governance, as the name implies, means that local governments at all levels assume the responsibility for environmental governance. There are different relationships between local governments' environmental governance practices – synergy and competitiveness. Synergy refers to the coordinated governance of the regional environment, which refers to the government, enterprises, social organizations and the public within the region to jointly respond and cooperate to solve regional environmental public problems through functional integration, action coordination and resource complementarity in order to maintain and enhance the regional environmental public interests and achieve the regional environmental public goals. Competitiveness occurs when local governments at all levels lack overall regional awareness, for example, in order to attract capital and technology, local governments will lower local environmental standards and relax environmental regulations to enhance the attractiveness of enterprises, and neighboring governments will appear downward imitation competition behavior, thus forming the "race to the bottom"

environmental governance, resulting in increased pollution. However, if local governments pay attention to the welfare of residents or the cost of pollution is too high, and regard environmental quality improvement as an important investment to improve residents' living standards, local governments will achieve "race to the top" between local environments by raising local environmental standards and forcing polluting enterprises to move to other areas.

Regarding the competition mode of environmental governance behavior strategy of local governments, some scholars have conducted theoretical research. Oates and Schwab (1988) [5] constructed an inter-regional capital competition model, which proved that if local governments, as price recipients in the market, can effectively manage the environment and collect reasonable taxes, and there is no spillover of environmental regulation, the bottom-to-bottom competition between local governments will not occur, but can provide better environmental governance, but if local governments impose positive distorting taxes on residents in their jurisdictions, and there is spillover of environmental regulation. Local governments will then lower environmental standards in order to get more foreign investment, resulting in a "race to the bottom" for environmental governance.

Ding et al. (2020) [6] pointed out by establishing a central-local game model that when central decision-making is transmitted downward, central decision-making tends to deviate, and local governments have bargaining phenomena in environmental governance, so there are implementation problems in central decision-making, and there is a large gap between the implementation effect and expectations. In this game, the central government will implement strong supervision or weak supervision, local governments will choose to pay attention to the environment or economy under the premise of considering central decision-making, so as to maximize regional interests, the strength of central supervision is the fundamental reason for choosing the game balance route, the central government can enhance the game power through political incentives, financial incentives and institutional incentives, local governments will use social stability, information advantages and informal relationships to enhance their game power, when the central game is strong, The level of environmental pollution will decrease, and when the local game is stronger, the level of environmental pollution will increase.

3. Analysis of the Theoretical Mechanism of Decentralization of Environmental Governance

3.1 Environmental Decentralization

Environmental decentralization refers to the assumption of environmental governance functions and the formulation of environmental systems by local governments, rather than the central government formulating a highly unified environmental governance structure. Research in favor of decentralization argues that decentralization can provide maximum social welfare, can serve local conditions according to local conditions, and can provide environmental governance based on regional heterogeneity, so Breton and Scott (1978) [7], Inman and Rubinfeld (1997) [8] point out that local governments assume responsibility for environmental governance is the institutional structure that best meets the goal of environmental governance efficiency. Because local governments have discretion over fiscal revenues and expenditures under a decentralized system and local governments have more influential environmental policies, they focus on economic development rather than environmental regulation, leading to increased pollution.

In coastal areas with high economic development levels, fiscal decentralization will enhance the government's environmental preference, but in inland areas with low economic development level, fiscal decentralization will inhibit the government's environmental preference. Qi et al. (2014) [9] verified the relationship between environmental decentralization and pollution by constructing environmental decentralization indicators, and found that there was a significant and stable positive relationship between all environmental decentralization and environmental pollution, and environmental decentralization exacerbated the insufficient incentives for environmental protection by fiscal decentralization. When environmental decentralization is implemented, the responsibility

for environmental governance is vested in the local government, and theoretically the "polluter responsibility" should be used to divide the governance power. However, in reality, due to the existence of pollution spillovers, especially air pollutants have diffusion effects, pollutants such as sulfur dioxide and hydrocarbons in one area will affect other adjacent areas, and local governments' environmental governance behavior will have a "free rider" effect, according to data from 501 water quality monitoring sites in the United States, Sigman (2004) [10] found that due to the "free rider" transfer of pollution from upstream jurisdictions to downstream jurisdictions, the water quality index of downstream states fell by 4%.

3.2 Local Government Competition

As a result of fiscal decentralization, local governments chase tax sources, investment, and labor, thereby competing for economic development and reputation. Early research on local government competition in developed countries began with the "Voting with Feet" hypothesis. This hypothesis suggests that local governments will compete by providing better public services to attract residents, and that local governments will also use environmental regulation as a means of competition, which is divided into "race to the bottom" and "race to the top".

The former often arises from local governments constantly lowering local environmental governance standards in order to attract working capital and polluting interest groups or promote the competitiveness of product exports, resulting in pollution aggravating environmental degradation. Fredriksson and Millimet (2002) [11] and Woods (2006) [12] point out that U.S. states reduce production costs in order to attract more companies, resulting in "Inferior competition" in environmental governance. In the latter, when local governments pay attention to the welfare of residents or the cost of pollution is too high, they regard environmental quality improvement as an important investment to improve the living standards of residents, and local governments will force polluting enterprises to move to other areas by raising local environmental standards, resulting in the "NIMBYism" effect. Some studies have pointed out that local government officials are more concerned about their own careers than local interests, so promotion tournaments have become an effective incentive mechanism, in this governance model, the higher level government based on certain indicators, for the chief executive of multiple lower government departments to design promotion competitions, Zhou (2007) [13] believes that promotion tournaments will lead to the neglect of environmental, educational, medical and other issues of urgent concern to the public but not directly related to economic development, resulting in increased environmental pollution.

3.3 Market Segmentation

In recent years, some scholars have begun to pay attention to the important role of market segmentation, a regional economic phenomenon, in the environmental governance behavior of local governments. Market segmentation refers to a series of measures taken by local governments to protect local interests by restricting the free movement of goods and labor between regions and the process of market integration. The market segmentation caused by fiscal decentralization mainly belongs to a kind of "market segmentation in the unnatural sense" caused by the behavioral alienation of the regional administrative function subject, that is, the government under distortion and incentive (Bian, 2019) [14]. Under the decentralized system, market segmentation is mainly formed by fiscal outsourcing, excessive competition by local governments, and the strategy of "fragmentation" between regions to obtain benefits. The market segmentation environmental governance mechanism is divided into scale change mechanism and technological progress mechanism, the former refers to the fact that enterprises in the state of uneconomical production, will tend not to use environmental protection technology, and in order to pursue low cost and neglect to deal with pollutants, resulting in aggravated pollution and environmental level decline. The latter refers to the lack of technological innovation of enterprises due to the market protection of local governments under the market segmentation system, resulting in low pollutant treatment efficiency. Lu and Chen (2009) [15] found

that local protection and market segmentation help protect emerging firms in the short term, but in the long run they limit access to information and hinder their progress.

3.4 New Structural Economics Perspective

The environmental governance behavior of local governments is not fixed, but changes with economic and social development and changes in the fiscal and taxation system. The research from this perspective is represented by Lin. The new structural economics constructed by Lin et al. (2021) [16] pointed out that economies at different stages of development have different optimal production structures, so their pollution emissions are different, so the methods of environmental control and pollution control in these economies should also be determined according to their actual conditions. In the early stage of development, because agriculture is the main development industry, its pollution emissions are small, and its impact on the environment is small, so local governments do not need to bear greater environmental governance responsibilities, so the relationship between fiscal decentralization and environmental regulation is weak. In the middle of development, the largest proportion of the industry has become heavy industry, its pollution emissions are more, will cause serious environmental pollution, then local governments will take some environmental governance measures, but because the biggest purpose of local governments is still to develop the economy and the total amount of pollution is small, so the level of environmental governance is not high, so this stage of fiscal decentralization is not conducive to environmental control. However, when the degree of economic development is high, people's living standards and incomes increase, in order to meet the expanding needs of residents, the service industry has become the most important industry, although its pollution emissions are small, but due to the surplus of heavy industry pollution in the previous stage and the improvement of economic development level, local governments will pay more attention to environmental governance.

In summary, there is a correlation between fiscal decentralization and local governments' environmental governance behavior, which is established through factors such as environmental decentralization system, local government competition incentives, and market segmentation. At the same time, this relationship is also affected by different stages of development, showing heterogeneity. The theoretical mechanism of fiscal decentralization and local government environmental governance behavior is shown in the figure below:

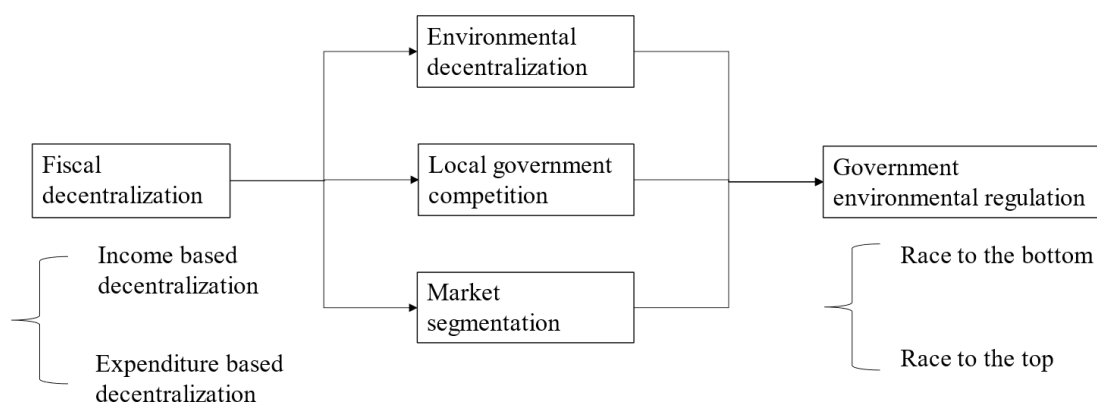


Fig.1 Theoretical mechanism

4. Empirical Analysis of Decentralization of Environmental Governance

For the fiscal decentralization system, some early studies pointed out that local governments have more information advantages, which can improve the efficiency of providing public goods, and central environmental control will ignore regional heterogeneity and fail to provide environmental public goods according to local conditions, which is not conducive to environmental quality improvement, while environmental governance by local governments can improve social welfare.

Ogawa and Wildasin (2009) [17] use models to show that even if there are significant spillover effects between regions, environmental decentralization can still produce effective resource allocation, because the government has complete information and only cares about the environmental impact of the region. Hayek (1945) [18] and Silva (1997) [19] found that local governments have advantages in accessing information and understanding residents' preferences and needs, and that local environmental policies are therefore more conducive to improving environmental quality.

In recent years, the empirical research of most scholars has pointed out that the decentralization system is not conducive to the environmental governance effect of local governments, Sun et al. (2019) [20] calculated the air pollution control efficiency of some key environmental protection cities in China, and verified the impact of fiscal decentralization and policy coordination on the efficiency of air pollution control by constructing a Tobit model, and they concluded that fiscal decentralization has obvious negative effects on air pollution control efficiency, and the regression coefficient of policy coordination intensity and air pollution control efficiency is positive but not significant. Yu (2013) [21] empirical research on the relationship between fiscal decentralization and environmental quality and regional characteristics found that in addition to the increase in environmental pollution level caused by the increase of fiscal decentralization, there are obvious regional differences in the impact of fiscal decentralization on environmental quality. Zhang (2014) [22] examined the impact of fiscal decentralization on three industrial wastes based on provincial panel data from 2003 to 2010, and the results show that there is a significant positive relationship between the degree of fiscal decentralization and the degree of three industrial wastes pollution, which means that the higher the degree of fiscal decentralization, the more serious the environmental pollution. Li (2009) [23] estimates the feedback mechanism between per capita local financial capacity and industrial sulfur dioxide and chemical oxygen demand by applying the simultaneous equation, and proposes that under the fiscal decentralization system, there is a significant inverted U-shaped curve relationship between China's environmental pollution degree and per capita local financial capacity, and almost all provinces are at the left end of the inverted U-shaped curve at this stage, indicating that fiscal decentralization will still lead to increased pollution under today's development.

Among them, some scholars have focused on the specific mechanism by which the decentralization system affects the environmental governance behavior of local governments, resulting in environmental pollution. Zeng et al. (2020) [24] found that fiscal decentralization in China provides incentives for local governments to develop highly polluting industries and large state-owned enterprises, which is detrimental to the improvement of environmental quality. A series of studies by Zhao (2014) [25], Zhang (2016) [26], and Bo (2018) [27] have confirmed that local governments in China have typical environmental strategy interactions, which eventually lead to the formation and solidification of "bottom-up" strategies. This has become the most direct way for fiscal decentralization to reduce the level of environmental governance by intensifying local government competition. Guo et al. (2013) [28] empirically tested the impact of fiscal decentralization and political promotion on environmental pollution by using the environmental pollution panel data of 30 provinces in China from 1997 to 2010 as a sample. The results show that the higher the degree of fiscal decentralization, the more revenue local governments enjoy from economic growth, and the greater the emissions of three industrial wastes.

Local government decentralization can be divided into revenue decentralization, expenditure decentralization, and fiscal freedom, and different types of measures have different impacts on the empirical results. Wang and Li (2021) [29] tested panel data from 2006 to 2017 in China and concluded that the two decentralization models have significant direct effects on environmental pollution, and also have significant indirect impacts on environmental pollution through spatial spillover effects. From the perspective of fiscal revenue decentralization, improving the degree of decentralization of local government fiscal revenue is conducive to reducing pollution emissions in various provinces, and plays a positive role in the improvement of environmental quality and ecological environment in various places, and the improvement of decentralization makes local fiscal revenue autonomy expand, local governments can more effectively achieve long-term economic

growth, which contributes to the increase of fiscal revenue, so the ability of local governments to provide public goods and services is improved, thereby increasing the intensity of environmental governance and improving regional environmental standards, thereby reducing pollution emissions. Moreover, it will not only inhibit pollution in the region, but also inhibit pollution in other provinces. From the perspective of decentralization of fiscal expenditure, the increase of the degree of decentralization of fiscal expenditure has a restraining effect on pollution emissions in the province. The central government continues to increase the weight of indicators such as ecological environmental protection in the assessment mechanism, so that local governments continue to improve environmental standards, resulting in a decrease in pollution emissions, but due to the increase in the cost of polluting enterprises in the province, enterprises will move out to neighboring provinces or other areas, resulting in an increase in pollution emissions in neighboring provinces, which will lead to pollution spillover to some extent. However, on the whole, the improvement of the decentralization of fiscal expenditure is generally conducive to the improvement of environmental quality.

A smaller number of empirical studies have found that decentralization will help improve environmental quality, and most of these conclusions are drawn from data from developed countries. Khan et al. (2020) [30] studied the impact of fiscal decentralization on CO₂ emissions by using a balanced panel dataset from seven OECD countries and showed that fiscal decentralization improves environmental quality. According to the theory of decentralization, Tiebout (1956) [31] and Stigler (1957) [32] argued that the government assumes responsibility for environmental protection, and in order to attract residents and resources into its jurisdiction, fiscal decentralization can effectively incentivize local governments to provide a high level of environmental quality and other public service expenditures, therefore, fiscal decentralization is conducive to improving environmental quality. Glazer (1999) [33] and Levinson (2003) [34] argued that decentralization has a direct impact on the environment, and they found that fiscal decentralization improves environmental quality. When local governments realize that improving environmental quality is an important part of residents' welfare, local governments can adopt stricter environmental standards to promote the progress of local environmental quality while promoting regional economic development

In addition, the decentralization system and the behavior of local government environmental governance can also be studied from a spatial perspective, because environmental pollution has spillover effect, the degree of impact of pollutants on the ecological environment usually has the characteristics of cross-regional impact, under the decentralized system, local governments may transfer pollutants to neighboring areas through "free riding", especially waste gas and wastewater, because it will spread to other areas through air and rivers, which makes the government where the source of pollution does not have to bear all environmental costs and pollution losses. This will reduce the willingness of local governments to control pollutants with pollution spillover characteristics and corresponding treatment investment. Sigman (2004) [35] regarded the Clean Water Act as a decentralized experiment to examine changes in water pollution control, and found that under environmental decentralization, the water quality of downstream rivers decreased significantly, indicating that local governments have transferred environmental costs through pollution spillover. He (2015) [36] argues that local governments will concentrate polluting enterprises on jurisdictional boundaries, thereby transferring pollutants to adjacent areas through pollution spillovers, which makes decentralization lead to the emergence of local government environmental opportunism (Gill et al., 2018) [37]. Gray and Shadbegian (2004) [38], Helland and Whitford (2003) [39] found that the spillover effect of environmental pollution has an impact on the competition of intergovernmental environmental governance, and they believe that the existence of spillover effect makes cross-administrative pollution more serious, and governments often adopt a free-rider strategy in cross-border pollution control.

5. Summary

5.1 Conclusions

This paper is a review-type study on fiscal decentralization and local government environmental governance behavior. Firstly, this study analyzes the controversy over the concept and connotation of core terms, the theoretical mechanism, and the empirical research made by relevant scholars.

From the theoretical research, the first theoretical perspective that existing research focuses on is environmental decentralization. Existing studies have found that environmental decentralization will aggravate the problem of insufficient incentives for environmental protection by fiscal decentralization, which will lead to a decline in the enthusiasm of local governments for environmental governance. The second theoretical perspective is local government competition, and existing research has found that local governments tend to focus on issues directly related to economic development, and reduce the intensity of environmental regulation in order to attract working capital. Research in recent years has opened up a third theoretical perspective, namely market segmentation. The study found that market segmentation leads to excessive competition by local governments and increased environmental pollution. In addition, there are studies that analyze from the perspective of different stages of development. The enthusiasm of local governments for environmental governance will increase with the development of the economy. Some scholars use data from developing countries as a model to conclude that fiscal decentralization is not conducive to environmental governance and will lead to increased pollution, while others use data from developed countries as a sample to point out that fiscal decentralization is beneficial to environmental governance, because the economic development stage they refer to is different, so the conclusions reached are controversial, but both conclusions are reasonable in stages. Moreover, in the early, middle and high stages of economic development, the government's environmental governance behavior and local industrial structure are different, so the main effect of fiscal decentralization on environmental governance is different.

From the empirical research, most scholars use the panel data analysis of countries at different stages of development to conclude that the decentralized system is not conducive to environmental governance. The impact mechanism mainly lies in the bottom-by-bottom strategy of local government environmental governance caused by fiscal decentralization. The results of the empirical study are influenced by the variable measures used by the researchers. The researchers used weighted measures such as revenue decentralization, expenditure decentralization, and fiscal freedom. A smaller number of scholars believe that local governments under a decentralized system have more information on how to improve environmental governance. Local governments adopt stricter environmental standards when they realize that improving environmental quality is an important part of the welfare of their residents and include environmental performance indicators in performance reviews.

In addition, spatial econometric models have been widely used in the field of economics in recent years. Fiscal decentralization itself has the nature of strategic interactions between local governments. Researchers also explore the issue of decentralization and local government environmental governance from a spatial perspective. The main conclusion is that the existence of environmental pollution spillover effect makes cross-administrative pollution more serious.

5.2 Limitations and Future Research

Firstly, the existing research has not explored the theoretical mechanism enough. Most of the research analyzes from the perspective of local government competition, and rarely explores the role mechanism of the decentralization system at the micro level of enterprises. Under the decentralized system, enterprises are subject to tax incentives and industrial policies, which will affect their investment, production, migration and other behaviors, and then there is a game with local governments on environmental governance strategies. The extensive production methods adopted by some industrial enterprises will lead to waste of resources and pollution emissions in the production process. At the same time, the profitability of enterprises leads to not actively investing in source

treatment technology, and will ignore the treatment of pollutants in order to reduce costs. Therefore, in the future, research on pollution control decision-making when enterprises face a fiscal decentralization system can be carried out.

Secondly, the variable measures vary widely, which affects the generalizability of the results. The existing measurement indicators include fiscal decentralization revenue index, expenditure index and autonomy index, because the mechanism of action of different fiscal decentralization indicators and the results obtained are different, and the existing research is greatly affected by different measurement indicators adopted by the decentralization system, resulting in controversial results. There are actually uncertainties in the measurement of local governments' environmental governance behaviors and environmental governance effects. For example, research on the use of environmental regulation intensity, total pollutant emission reduction targets, etc. Therefore, future empirical research should consider the selection of variable measurement indicators that are more appropriate to theoretical analysis to enhance the generalizability of conclusions.

Thirdly, existing research lacks a differential analysis of this issue in economies at different stages of development. The difference between developing countries and developed countries lies in the different types of environmental regulation tools adopted, and developing countries still mainly use command-and-control tools, which belong to sports environmental governance. Local governments will have a game of environmental regulation intensity aimed at economic development. Therefore, based on the characteristics of economies at different stages of development, future research can establish theoretical models that can consider the characteristics of economies at different stages of development, and fully reflect the different characteristics of the decentralization system and the environmental governance behavior of local governments.

5.3 Policy Recommendations

For the central government, the top-level design of the environmental supervision system should be strengthened, and the positive incentives of the decentralization system for local governments' environmental governance behaviors should be given full play to ensure that the initiative is gained in the environmental governance game of the central government. Positive incentives include: first, strengthening the construction of the environmental exit audit system, and second, using GEP measurement and its assessment performance as one of the official assessment standards.

Regarding the relationship between decentralization and environmental governance, we should strengthen the study of the game between the central government, local governments and enterprises in environmental governance objectives and environmental governance decision-making. According to the level of local economic development, design an institutional mechanism that better meets the compatibility of incentives, and choose a path that can achieve the balance of the game between the central and local governments, so as to achieve the goal of environmental governance.

References

- [1] Oates Wallace E., Schwab Robert M, Economic competition among jurisdictions: efficiency enhancing or distortion inducing? *Journal of Public Economics*.Vol.35 (1988) No. 3, p. 333-354.
- [2] Qian Y, Roland G. Federalism and the Soft Budget Constraint. *The American Economic Review*. Vol. 88 (1998) No. 5, p. 1143-1162.
- [3] Oates W E. A reconsideration of environmental federalism. *Recent advances in environmental economics*, Cheltenham, UK and Northampton, MA, USA. 2002
- [4] Banzhaf S H, Chupp A B. Fiscal federalism and interjurisdictional externalities: New results and an application to US Air pollution. *Journal of Public Economics*, Vol. 96 (2012) No. 5-6 p. 449-464.
- [5] Oates Wallace E., Schwab Robert M. Economic competition among jurisdictions: efficiency enhancing or distortion inducing?. *Journal of Public Economics*, Vol. 35 (1988) No. 3 p. 333-354.

- [6] Ding Hai, Shi Daqian, Zhang Weidong. Who is in charge of environmental governance: Central or local? — based on the calculation and analysis of the comparison of the central and local games. Southern Economy, 2020.
- [7] Albert B, Anthony S. Economic Constitution of Federal States. University of Toronto Press; University of Toronto Press, Scholarly Publishing Division, 2015.
- [8] Emma Galli. D.C. Mueller (ed.), Perspectives on Public Choice. A Handbook. Bristol University Press, 1997.
- [9] Qi Yu, Lu Hongyou, Xu Yankun. Research on the Reform of China's Environmental Decentralization System: Institutional Change, Quantitative Estimation and Effect Evaluation. China Industrial Economics (2014) No. 1, p. 31-43.
- [10] Sigman H. Transboundary spillovers and decentralization of environmental policies. Journal of Environmental Economics and Management Vol. 50 (2004) No. 1, p. 82-101.
- [11] Fredriksson G P, Millimet L D. Strategic Interaction and the Determination of Environmental Policy across U.S. States. Journal of Urban Economics Vol. 51 (2002) No. 1, p. 101-122.
- [12] Woods D N. Interstate Competition and Environmental Regulation: A Test of the Race-to-the-Bottom Thesis. Social Science Quarterly Vol. 87 (2006) No. 1, p. 174-189.
- [13] Zhou Li'an. A Study on the Promotion Championship Model of Local Officials in China. Economic Research (2006) No. 7, p. 36-50.
- [14] Bian Yuanchao: Research on the Environmental Pollution Effect of Market Segmentation (Ph.D., Southeast University, China, 2019).p.210
- [15] Lu Ming, Chen Zhao. Segmented market economic growth – why economic openness may exacerbate local protections? . Economic Research Vol. 44 (2009) No. 3, p. 42-52.
- [16] Lin Yifu, Fu Caihui, ZHENG Jie. A Preliminary Study on New Structural Environmental Economics: Theory, Empirical Evidence and Policy. Peking University Press, 2021.
- [17] Ogawa H, Wildasin E D. Think Locally, Act Locally: Spillovers, Spillbacks, and Efficient Decentralized Policymaking. The American Economic Review Vol. 99 (2009) No. 4, p. 1206-1217.
- [18] Hayek A F. The Use of Knowledge in Society. The American Economic Review Vol. 35 (1945) No. 4, p. 519-530.
- [19] Silva C E, Caplan J A. Transboundary Pollution Control in Federal Systems. Journal of Environmental Economics and Management Vol. 34 (1997) No. 2, p. 173-186.21
- [20] SUN Jing, MA Haitao, Wang Hongmei. Fiscal Decentralization, Policy Coordination and Air Pollution Control Efficiency: Based on panel data analysis of urban agglomerations in Beijing-Tianjin-Hebei and surrounding areas. China Soft Science (2019) No. 8, p. 154-165.
- [21] Yu Yaqiao. Analysis of the relationship between fiscal decentralization and environmental quality and its regional characteristics in China. The Economist (2013) No. 9, p. 60-67.
- [22] Zhang Xinyi: Research on Government Behavior and Environmental Pollution under Fiscal Decentralization (Ph.D., Institute of Fiscal Science, Ministry of Finance, China, 2014.). p.197
- [23] Li Meng. Fiscal Decentralization and Environmental Pollution: A Revision of the Environmental Kuznets Hypothesis. Economic Review (2009) No. 5, p. 54-59.
- [24] Zeng S, Gao L, Shen R, et al. Fiscal Decentralization, Pollution and China's Tourism Revenue. Sustainability Vol. 12 (2020) No. 5, p. 1925.
- [25] Zhao Xiaowei. Local Intergovernmental Environmental Regulation Competition Strategy and Its Regional Growth Effect: Empirical Data from Urban Panels Above Prefecture-level City. Finance and Trade Economics (2014) No. 10, p. 105-113.
- [26] 26. Zhang Hua. Strategic Interaction of Regional Environmental Regulation: An Explanation of the Non-Complete Implementation of Environmental Regulation. China Industrial Economics (2016) No. 7, p. 74-90.
- [27] Bo Wenguang, Xu Wei, Wang Junfeng. Local Government Competition and Environmental Regulation Heterogeneity: Bottom-to-Bottom Competition or Top-Race Competition. China Soft Science (2018) No. 11, p. 76-93.

- [28] Guo Zhiyi, ZHENG Zhousheng. Financial Decentralization, Promotion Incentives and Environmental Pollution: Based on Provincial Panel Data Analysis from 1997~2010. *Journal of Southwest University for Nationalities (Humanities and Social Sciences Edition)* Vol. 34 (2013) No. 3, p. 103-107.
- [29] Wang Dong, Li Jinye. Spatial effects of fiscal decentralization on environmental pollution. *Chinese, Resources and Environment* Vol. 31 (2021) No. 2, p. 44-51.
- [30] Zeeshan K, Shahid A, Kangyin D, et al. How does fiscal decentralization affect CO2 emissions? The roles of institutions and human capital. *Energy Economics* Vol. 94 (2021) No. prepublish, p. 105060-.
- [31] Tiebout M C. A Pure Theory of Local Expenditures. *Journal of Political Economy* Vol. 64 (1956) No.5, p. 416-424.
- [32] Stigler J G. Perfect Competition, Historically Contemplated. *Journal of Political Economy* Vol. 65 (1957) No.1, p. 1-17.
- [33] Amihai G. Local regulation may be excessively stringent. *Regional Science and Urban Economics* Vol. 29 (1999) No.5, p. 553-558.
- [34] Levinson A. Environmental Regulatory Competition: A Status Report and Some New Evidence. *National Tax Journal* Vol. 56 (2003) No.1, p. 91-106.
- [35] Sigman H. Letting States Do the Dirty Work: State Responsibility for Federal Environmental Regulation. *National Tax Journal* Vol. 56 (2003) No.1, p. 107-122.
- [36] He Q. Fiscal decentralization and environmental pollution: Evidence from Chinese panel data. *China Economic Review* Vol. 36 (2015) p. 86-100.
- [37] Gill R A, Viswanathan K K, Hassan S. The Environmental Kuznets Curve (EKC) and the environmental problem of the day. *Renewable and Sustainable Energy Reviews* Vol. 81 (2018) p. 1636-1642.
- [38] Gray B W, Shadbegian J R. 'Optimal' pollution abatement—whose benefits matter, and how much?. *Journal of Environmental Economics and Management* Vol. 47 (2003) No.3, p. 510-534.
- [39] Helland E, Whitford B A. Pollution incidence and political jurisdiction: evidence from the TRI. *Journal of Environmental Economics and Management* Vol. 46 (2003) No.3, p. 403-424.