Analysis of the Path to Achieve the Goal of "Double Carbon" Based on the Financial and Tax Incentive Model

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Abstract. Global climate change is unpredictable, environmental management is urgent, and China has clearly defined the strategic goal of "carbon peaking and carbon neutral" by 2021, but the foundation to achieve comprehensive green transformation is still weak. As an important means to promote green low-carbon development, fiscal policy plays the role of regulation, guarantee and guidance, and fiscal incentive policy is the key to green low-carbon development. However, there are still many problems in China's fiscal policy in promoting green low-carbon development, such as unreasonable financial subsidies, small total financial investment in low-carbon development, and unsound low-carbon taxation system. This paper analyzes the current situation and problems of fiscal policy in promoting green low-carbon development in China and constructs a fiscal incentive model with three northeastern provinces as an example, thus concluding that the government should play the regulatory role of fiscal policy, play the functional role of government public administration, strongly support the development of new energy industry and technological innovation, and at the same time improve the green tax system and implement tax incentives, so as to achieve the dual carbon goal and promote China's green low-carbon development.

Keywords: carbon peaking · carbon neutrality · green low carbon · fiscal policy · public management

1 Introduction

The global climate problem is a major problem facing the international economic development, and the climate response measures of countries around the world are constantly being improved and perfected, and it has become a general trend for countries to work together to cope with environmental degradation. 2003, the UK issued a white paper "Our Energy Future: Developing a Low Carbon Economy", in which it took the lead in realizing the importance of low carbon development and proposed to promote the development of low carbon economy, and then developed countries also successively Subsequently, the developed countries have also invested in the reform and development of low-carbon economy. As the largest developing country, China is also a major energy-consuming country, and the development of a low-carbon economy with "low emissions,

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low energy consumption and low pollution" is a matter of urgency. Low-carbon economy is an important part of China's high-quality development. The so-called "carbon peak" is China's carbon dioxide emissions at a certain point in time is no longer the trend of growth, but to reach a peak and then gradually fall back. China is committed to achieving a peak in greenhouse gas emissions from traditional fossil fuel activities, as well as from industrial processes and natural resource use, by 2030. "Carbon neutral" refers to the total amount of carbon dioxide or greenhouse gas emissions produced directly or indirectly by the state, enterprises and individuals within a certain period of time, which can be offset by afforestation, energy conservation and emission reduction to achieve positive and negative offset and achieve a relative "zero emission The "low-carbon" approach, as the name implies, is to offset carbon emissions by planting trees, saving energy and reducing emissions. As the name suggests, "low-carbon" means reducing the amount of carbon dioxide in the air and controlling its emissions, while low-carbon economy is to reduce the reliance on traditional fossil energy consumption and use modern technology to promote economic development while reducing air pollution. Fiscal policy is an important tool for the government to promote green and low-carbon development, playing the role of guidance, regulation and guarantee. At present, China's carbon emissions are still a long way from the "double carbon" target, and there is a market failure in low-carbon economic development, which may lead to uncontrollable market conditions due to the increase of low-carbon development costs such as upgrading low-carbon technology innovation and pollution emission control. Therefore, the government needs to use fiscal means to implement energy conservation and emission reduction, use clean energy, and optimize industrial restructuring; in order to promote green energy transformation and low-carbon technology innovation, China's governments at all levels can alleviate the pressure of low-carbon technology investment and environmental management costs through the guidance and incentive of fiscal policies to help achieve the goal of "double carbon". The government at all levels will help achieve the goal of "double carbon" through the guidance and incentive of fiscal policies to ease the pressure of low-carbon technology investment and environmental management cost [1].

2 Analysis of the Current Situation and Problems of Fiscal and Tax Policies for Promoting Green Low-Carbon Development in China

Fiscal and tax incentives to promote green low-carbon development mainly include fiscal environmental protection spending, fiscal subsidies, tax-based spending and tax incentives, government procurement and investment policies. In terms of fiscal expenditure and subsidies, according to the fiscal expenditure data of the past ten years from 2010 to 2019, the amount of China's fiscal expenditure on environmental protection has continued to rise, which shows that China gradually attaches importance to environmental issues, and environmental protection expenditure has been strengthened, as of 2019, fiscal expenditure on environmental protection accounted for 3.09% of general public expenditure, accounting for only 0.74% of GDP In 2019, the expenditure on fuel and sewage disposal fund is 0.65% of the national fund expenditure, which is still a small percentage. Remains relatively small. In terms of tax policies, the Environmental Protection Tax Law was introduced in 2018, formally legislating environmental protection tax. 2019

China's environmental protection tax revenue was 22.116 billion yuan, accounting for 0.14% of tax revenue; resource tax was changed from quantity-based to ad valorem, and tax measures such as value-added tax and consumption tax on exploration and exploitation of natural resources such as oil and natural gas with additional taxation on coal and oil The use of natural resources has played a restrictive role. However, the environmental protection tax only accounted for 0.14% of tax revenue in 2019, indicating that the role of environmental protection tax in the tax system is not significant, and the tax rate design also has unreasonable phenomena, such as low tax rates and unclear classification of tax items. There are still some problems with the tax incentives, such as the promotion of preferential policies is not comprehensive and implementation is not in place, so that enterprises do not know enough about the regulations of tax incentives, etc. In terms of government green procurement and investment, government procurement and investment as the development of green low-carbon government financial tools, government departments to environmental protection projects and low-carbon innovation technology procurement and special investment, the measure can guide and incentivize enterprises to actively environmental technology innovation. However, the government procurement system is not perfect, and the information asymmetry between the government and the market leads to the enterprises' inability to obtain accurate government public information and market data; at the same time, the green financial investment market mechanism is still immature, which leads to the lack of accurate green standards in the financial market such as carbon trading and carbon futures, and there are also problems with traditional financial transactions such as insufficient open and transparent information. Finally, due to the immaturity of low-carbon technology in China and the lack of environmental awareness of enterprises, the high cost of research and development technology for innovative green and low-carbon related products, the long return period and the lack of profit in a short period of time have led to the reluctance of enterprises to invest a large amount of capital, so the development of green industry is slow [2].

3 Construction of Financial Tax Incentive Model

3.1 Construction of the Model

At present, most of the domestic academic analysis on the structure of local fiscal expenditure in China is based on empirical analysis, and the data are mostly organized by using two statistical indicators: the proportion of fiscal revenue to GDP and the proportion of fiscal expenditure to GDP, while a few econometric papers still follow the classical econometric analysis method, which is relatively backward in terms of analysis methods. To this end, we use panel data combining temporal and cross-sectional data to analyze the impact of local tax revenue, fiscal expenditure and expenditure items such as investment and financing, tax-based expenditure on local economic growth under the current function of low carbon development in the three eastern provinces from the perspective of integration of fiscal revenue and expenditure [3]. The basic theoretical model is actually carried out by establishing a production function that can measure the contribution of regional fiscal revenue and expenditure scale and revenue and expenditure structure to the growth of regional GDP. Assuming that the flow of capital services

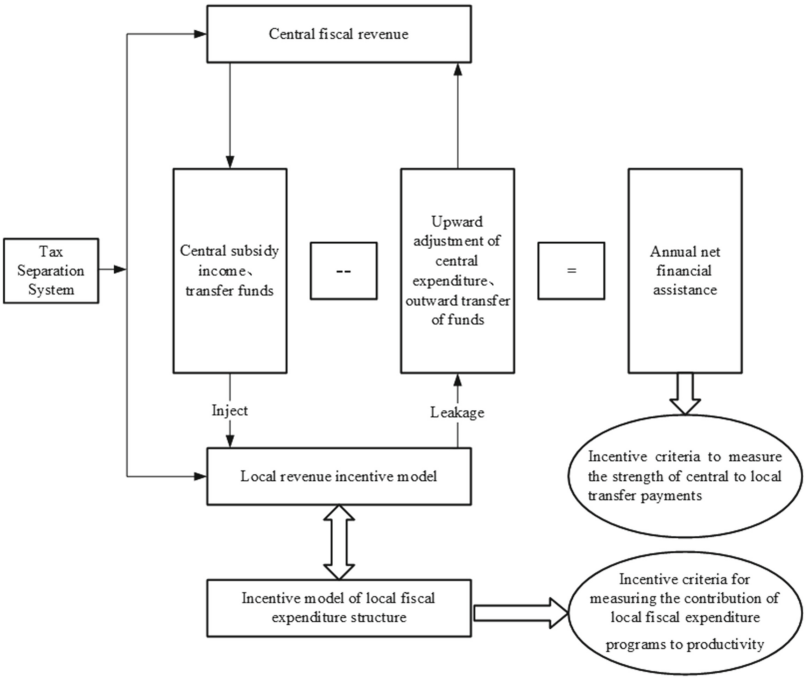

Fig. 1. Logic Of Fiscal Incentive Approach (Photo credit: Original)

is proportional to the capital stock, the production function of the regional economy can be set as follows (Fig. 1).

$$Y_{it} = A_{i0} K_{it}^{\alpha} L_{it}^{\beta} \ell^{\sum_{k=1}^{n} \gamma_{ik} \cdot \chi_{it} + \varepsilon_{it}}$$

The constant A_{i0} represents the initial technology level; K_{it} represents the annual capital stock, L_{it} represents the annual labor input, whereα andβ represent the output elasticity of capital and labor respectively; t = 1, 2…, T represents the time horizon, i = 1, 2…, N represents the number of cross sections; $\ell^{\sum_{k=1}^{n} \gamma_{ik} \cdot \chi_{it} + \varepsilon_{it}}$ represents the contribution of fiscal incentives to regional GDP, where k = 1, 2 … n denotes the number of constant terms, x_{it} denotes the panel data vector of fiscal and tax-related factors of regional economic development in the three eastern provinces, and ε_{it} denotes the random term. Both sides of the above equation are taken as natural logarithms i.e.

$$\ln Y_{it} = \ln A_{i0} + \alpha \ln K_{it} + \beta \ln L_{it} + \sum_{k=1}^{n} \gamma_{ik} \cdot \chi_{it} + \varepsilon_{it}$$

3.2 Validation of the Model

The following model was used in conducting parameter estimation to examine the influence of fiscal variables on regional GDP.

$$\ln Y_{it} = \ln A_{i0} + \alpha_i \ln K_{it} + \beta_i \ln L_{it} + \gamma_{i1} \cdot \chi_{1it}$$
$$+\gamma_{i2} \cdot \chi_{2it} + \gamma_{i3} \cdot \chi_{3it} + \gamma_{i4} \cdot \chi_{4it} + time + \varepsilon_{it}$$

where, χ_{1it} denotes the share of fiscal expenditure of each province in GDP of each province in Hei, Ji and Liaoning; χ_{2it} denotes the share of investment expenditure of each province in fiscal expenditure of each province; χ_{3it} denotes the share of tax-based expenditure of each province in fiscal expenditure of each province; χ_{4it} denotes the share of government green expenditure of each province in fiscal expenditure of each province; time is a dummy variable; χ_{5it} denotes the share of tax revenue of each province in fiscal revenue of each province. Due to the two-dimensional nature of panel data, the validity of parameter estimation is determined by the correctness of the model setting. Therefore, the first step is to test the form of the model setup, mainly to check whether the model parameters are identical constants at all cross-sectional sample points and times. We propose to apply the widely used covariance test to test the following hypothesis.

H_1: The intercept and slope are like the same for different cross sections and time sample points.

$$\ln Y_{it} = \ln A_0 + \alpha \ln K_{it} + \beta \ln L_{it} + \gamma_{i1} \cdot \chi_{1it}$$
$$+ \gamma_{i2} \cdot \chi_{2it} + \gamma_{i3} \cdot \chi_{3it} + \gamma_{i4} \cdot \chi_{4it} + \varepsilon_{it} \tag{1}$$

H_2: Slope is like the same at different cross sections and time sample points, but with different intercepts.

$$\ln Y_{it} = \ln A_{i0} + \alpha \ln K_{it} + \beta \ln L_{it} + \gamma_{i1} \cdot \chi_{1it}$$
$$+ \gamma_{i2} \cdot \chi_{2it} + \gamma_{i3} \cdot \chi_{3it} + \gamma_{i4} \cdot \chi_{4it} + \varepsilon_{it}$$

Obviously, if the hypothesis test H_1 is accepted, there is no need for the next test; if the hypothesis H_1 is rejected, the hypothesis H_2 should be tested; if the hypothesis test H_2 is rejected, then Eq. (1) should be chosen.

The test was performed by F-test, and the F-statistic of the test H_1 was

$$F = \frac{(S_3 - S_1)/[(n-1)(K+1)]}{S_1/[nT - n(K+1)]}$$

$$F[(n-1)(K+1), n(T-K-1)]$$

The F-statistic of the test H_2 is

$$F = \frac{(S_2 - S_1)/[(n-1)K]}{S_1/[nT - n(K+1)]}$$

$$F[(n-1)K, n(T-K-1)]$$

where: S_1, S_2, and S_3 are the residual sums of squares of the model obtained using the least squares method when the model is unconstrained, when H_1 holds, and when H_2 holds, respectively; k is the number of regression vectors.

After determining the model for the panel data, the coefficients of the capital input vector and the labor input vector in the production function are tested for Wald constraint. The assumption of constant returns to scale is: $\alpha + \beta = 1$. When the linear constraint is tested by the linear equation estimated by least squares, the results of the F-statistic are obtained.

4 Tax Incentives for Achieving the Goal of "Carbon Peaking and Carbon Neutrality"

4.1 Optimize the Green Tax System and Promote the Eecarbonization of the Tax System

Tax policy is a regulating means with guiding nature, under the existing tax structure, continue to deeply implement tax preferential policies in energy conservation and environmental protection, new energy, ecological construction and other related fields, establish a complete system of tax preferences, such as VAT and corporate income tax for environmental protection projects tax rate type preferences as well as tax amount type preferences, reduce the amount of tax, and guide enterprises to actively invest in environmental pollution control, environmental protection technology innovation, etc.. Secondly, increasing the resource tax rate and broadening the coal resource tax items can effectively control the utilization of coal resources and energy and promote energy conservation and emission reduction; the proportion of direct tax can be increased and economic agents such as enterprises can be guided to carry out low-carbon activities through consumption tax; strengthening the tax supervision system and improving enterprises' awareness of green taxation system can effectively prevent and control enterprises' pollution behaviors [4].

4.2 Sound Green Financial Revenue and Expenditure System to Guide Green and Low-Carbon Development

Government fiscal expenditures include financial subsidies, special fund expenditures, green procurement and investment [5]. Improve the reform of government fiscal structure, adjust the structure of government fiscal expenditure, and reasonably grasp the central and local fiscal authority. The main measures include giving financial subsidies to enterprises for low-carbon innovative technologies, reducing the cost pressure of low-carbon technological innovation, and providing more adequate economic support for patents with long payback periods for technological research and development; vigorously developing new industries such as green industries and high-tech industries, and increasing government procurement of green products and investment in new industries to actively guide the optimization of industrial structure and efficient development of green energy economy; and Use financial means to promote green production and consumption in society, and guide people to live and travel with low carbon; reasonably

divide the financial division of power between the central and local governments and related affairs, and drive the green and low-carbon development of each region from top to bottom.

4.3 The Establishment of Green Low-Carbon Development of the Relevant Supporting Measures, the Role of Market Mechanisms

In order to achieve the goal of "carbon peaking and carbon neutrality", it is necessary to strengthen the integration of multiple fields. Environmental regulations can limit the environmental damage caused by high pollution and energy-consuming enterprises through the collection of pollution fees and sewage charges. "Carbon trading is considered to be an effective tool to deal with climate change by market mechanism, and the object of the transaction is usually the emission quota of greenhouse gas CO_2. Carbon trading is considered to be an effective tool to combat climate change by market mechanism.

5 Conclusions

As a developing country, China is still in the stage of accelerating new industrialization, informationization, urbanization and agricultural modernization, and the foundation for comprehensive green transformation is still weak, and the pressure on ecological environmental protection has not yet been fundamentally relieved. China has a tight schedule and a heavy task to achieve carbon peaking and carbon neutrality, and the process of promoting the "double carbon" goal will bring certain challenges to the industrial structure, technological innovation requirements, and regional financial and taxation systems [6]. To meet these challenges, it is necessary to integrate carbon peaking and carbon neutrality into the overall layout of ecological civilization construction, focusing on building a higher quality, more open, inclusive and cohesive economic, political and social system, and the financial and tax incentives of government departments will be the key to building a greener and more efficient sustainable development model. Optimizing the green tax system, improving the green fiscal revenue and expenditure system, and establishing supporting measures for green and low-carbon development are all effective incentives to achieve "carbon peaking and carbon neutral".

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