The Green Effect of Tax Reduction and Fee Reduction

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Abstract. At present, it is a critical period for China's green economy transformation. From the perspective of tax reduction and fee reduction, this article explores the impact of tax reduction and fee reduction on the green development of China's industries. A green development indicator system was constructed using the entropy weight method from three aspects: green emissions, green innovation, and resource utilization, to evaluate the green development situation of various provinces in China. Research has found that the greater the intensity of tax and fee reduction, the stronger the green effect it produces; Finally, policy recommendations were proposed based on the research findings.

Keywords: reduce taxes and fees; green development; fixed effect.

1   Introduction

Green development aims to promote economic growth and social development with efficiency, harmony, and sustainability. It is of great significance for achieving sustainable economic growth and is also an important indicator of high-quality economic development. In order to promote the green development level of industries, China has also implemented a series of policies, mainly divided into regulatory, incentive, and burden reduction types. Regulatory policies mainly manage and rectify industries that do not meet the requirements of green development, and impose certain punishments on those who violate green development regulations; Encouragement policies mainly provide financial support to encourage the development of green energy and green production; The burden reduction type is a measure that provides certain tax and fee benefits to the green industry, reducing its costs. The tax reduction and fee reduction policy implemented in our country is a burden reducing policy for green development. However, under the combination of multiple factors such as inertia growth of fiscal expenditure, rising government debt levels, and low efficiency of fiscal expenditure, the implementation of tax reduction and fee reduction policies may bring pressure to local finance, affect local governance environment, public service quality, etc., and thus pose challenges to the sustainable development of regional economy. In this context, studying the impact of tax reduction and fee reduction on green development from both theoretical and empirical perspectives is of great significance for implementing tax reduction and fee reduction policies more scientifically and accurately, and improving the quality of green development.

2　　　Article viewpoints

At present, China's manufacturing industry is in a critical period of green transformation, and the government's guidance on the industry will play a crucial role. Reducing taxes and fees is one of them, which can help accelerate the green transformation of enterprises and improve their green productivity. Therefore, this article verifies and explores the central viewpoint that reducing taxes and fees can effectively promote green development of industries.

3　　　Research design

3.1　　Modeling

In order to study the impact of tax reduction and fee reduction on China's industrial green manufacturing, this article constructs the following fixed effects model:

$$GD_{i,t} = \alpha_0 + \beta_0 jsjf_{i,t} + \Sigma\theta_{i,t}X_{i,t} + \lambda_i + \mu_t + \xi_{i,t} \tag{1}$$

Among them, $i,\ t$ represents each provincial administrative region and year, the explained variable $GD_{i,t}$ represents the Green Development Index, the explanatory variable $jsjf_{i,t}$ represents the degree of government tax and fee reduction, and the coefficient β_0 is used to measure the impact of tax and fee reduction on green development. $X_{i,t}$ represents a series of control variables that may have an impact on the green development of the industry. λ_i represents fixed effects for provinces, μ_t fixed effects for years, and $\xi_{i,t}$ is a random perturbation term.

3.2　　Variable Selection

3.2.1 Explained Variable

Industrial Green Development Index (GD).This article draws on the method of Li Zhipeng et al. and uses the entropy weight method to assign weights to indicators[1]. The specific steps for calculating China's industrial green development index using the entropy weight method are as follows.

The first step is data standardization. If the decision matrix has m evaluated objects, n evaluation indicators, and the observation $i \in \{1, \cdots, m\}$ value of the $j \in \{1, \cdots, n\}$ indicator of the tevaluated object is X_{ij}, then the standardization formula for the forward and reverse indicators is:

Positive indicators:

$$y_{ij} = (x_{ij} - min_{1\leq i\leq m}\{X_{ij}\})/(max_{1\leq i\leq m}\{X_{ij}\} - min_{1\leq i\leq m}\{X_{ij}\} \tag{2}$$

Reverse indicators:

$$y_{ij} = (max_{1\leq i\leq m}\{X_{ij}\} - x_{ij})/(max_{1\leq i\leq m}\{X_{ij}\} - min_{1\leq i\leq m}\{X_{ij}\}) \tag{3}$$

Among them, y_{ij} represents the standardized value of the j-th indicator of the i-th evaluated object. The standardized normalization matrix is:

$$y = (y_{ij}) = \begin{pmatrix} y_{11} & \cdots & y_{1n} \\ \vdots & \ddots & \vdots \\ y_{m1} & \cdots & y_{mn} \end{pmatrix} \quad (4)$$

The second step is to calculate the entropy value. The entropy value of the jth indicator E_j is:

$$E_j = -\sum_{i=1}^{m}[r_{ij}/\ln r_{ij}]/\ln m, i = 1,2,\cdots,m; j = 1,2,\cdots,n \quad (5)$$

Among them,r_{ij} is the characteristic proportion of the i-th evaluated object under the j-th indicator,$r_{ij} = y_{ij}/\sum_{i=1}^{m} y_{ij}$. If $r_{ij} = 0$, then define $\lim_{r_{ij}\to 0} \ln r_{ij} = 0$.

Step three, calculate the weights. The weight of the j-th indicator:

$$W_j = (1 - E_j)/\sum_{j=1}^{n}(1 - E_j), j = 1,2,\cdots,n \quad (6)$$

W=$(w_1, w_2, \cdots, w_n)$ is the normalized weight vector.
Step 4, calculate the final score using linear weighting method.

$$S_j = W_j \times y_{ij} \quad (7)$$

3.2.2 Core explanatory variables

Efforts to reduce taxes and fees. The policy of reducing taxes and fees implemented in our country can not only alleviate the tax burden on enterprises, but also alleviate their cost burden[2]. Therefore, the intensity of tax reduction and fee reduction can be measured by the level of taxes and fees. This article refers to the methods of Xu Guangjian, Shi Shaobin, and others, choosing the ratio of local government's general public budget revenue to regional GDP as the measurement indicator[3]. The smaller the ratio, the greater the government's efforts in reducing taxes and fees.

3.2.3 control variable

Referring to existing literature, this article selects the following variables as control variables for research: degree of technological investment, degree of openness to the outside world, level of human capital, and intensity of environmental regulations.

4   Empirical testing and result analysis

4.1   Benchmark regression

In order to control for the bias caused by time and individual factors in the regression results, following Zhang Bin's approach, the least squares dummy variable method (LSDV) was used for regression[4]. The regression results are shown in Table 1:

Table 1. Benchmark regression results of the impact of tax reduction and fee reduction on green development

Variable	(1)	(2)	(3)	(4)	(5)
General public budget revenue/GDP	-0.671*** (0.205)	-0.638*** (0.203)	-0.611*** (0.198)	-0.516** (0.199)	-0.520*** (0.199)
Technological investment intensity	——	1.135** (0.476)	1.090** (0.463)	1.177** (0.459)	1.190*** (0.459)
Extent of openness to the outside world	——	——	0.108*** (0.026)	0.064** (0.031)	0.066** (0.031)
Human capital level	——	——	——	5.631** (2.177)	5.562** (2.177)
Environmental regulation intensity	——	——	——	——	0.021 (0.019)
_cons	0.938*** (0.023)	0.911*** (0.025)	0.880*** (0.026)	0.767*** (0.051)	0.767*** (0.051)
N	300	300	300	300.000	300
r2	0.956	0.957	0.960	0.961	0.961

The regression results in column (1) indicate that when no control variables are added, the impact of tax and fee levels on the level of green development is significant and inversely proportional. The smaller the proportion of general public budget revenue to regional gross domestic product (GDP), the more conducive it is to improving the level of green development. Explanation: Reducing taxes and fees promotes green development of industries.

The regression results in column (5) show that, after adding various control variables, the regression results are still significant at the 1% level, confirming hypothesis 1: the government's implementation of tax and fee reduction has promoted the improvement of green development level, and for every 1% increase in tax and fee reduction level, the level of green development has increased by 0.52 percentage points, indicating a more significant promotion effect. The central hypothesis of this article has been validated.

4.2   Robust Test

4.2.1.Replace explanatory variables

This article will use the proportion of tax revenue/Gross Domestic Product (GDP) to replace the original core explanatory variable to represent the degree of government tax reduction for regression[5]. The regression results are shown in column (1) of Table 2. The coefficient of the replaced explanatory variable is significantly negative at the 1% level, which has passed the stability test and verified that tax reduction and fee reduction have a promoting effect on green development.

4.2.2 Shorten the lifespan

By shortening the research period from 2011-2020 to 2016-2020, the impact of tax reduction and fee reduction on the green development of industries in the short term was studied[6]. The regression results are shown in column (2) of Table 2. It was found that after shortening the period to 5 years, the regression coefficient of the original core explanatory variable remained significantly negative, passing the robustness test.

Table 2. Robustness Test Results

Variable	(1)	(2)
	Replace explanatory variables	Shorten the lifespan
tax reduction	-0.633***	——
	(0.233)	
Tax reduction and fee reduction	——	-0.713**
		(0.284)
The level of green development lags behind by one period	——	——
_cons	0.724***	0.767***
	(0.043)	(0.051)
N	300	150
r2	0.961	0.970

5   Conclusion and policy recommendations

5.1   Main research conclusions

This article is based on provincial panel data from 2011 to 2020, constructing indicators for tax reduction and fee reduction, as well as a comprehensive evaluation index system for industrial green development[7]. It macroscopically studies the effect of tax reduction and fee reduction on the green development of China's industries, and further discusses robustness and heterogeneity[8]. It analyzes the utility level of tax reduction and fee reduction on green development from different levels, And the threshold effect was utilized to discuss the moderating effect of the level of business environment on the relationship between tax reduction and fee reduction and green development[9]. The following conclusions can be drawn:

The greater the intensity of tax reduction and fee reduction, the stronger the green effect it produces, which is more conducive to improving the level of green development of the industry[10]. After conducting a robustness test on this conclusion, it still holds.

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