Original Research Article

Does fiscal decentralization promote corporate green technology innovation under comprehensive green transition?

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Abstract: Green innovation not only profoundly reflects the core concepts of green development and sustainable development but also closely meets the requirements of high-quality economic development in the current era. Using data from A-share listed companies, this paper constructs a two-way fixed effects model to explore the specific impact of fiscal decentralization on corporate green technology innovation. The results show that fiscal decentralization promotes corporate green technology innovation, which can affect the level of corporate innovation through two channels: foreign direct investment and local governments' energy conservation and environmental protection expenditures.

Keywords: fiscal decentralization; corporate green technology innovation; foreign direct investment; energy conservation and environmental protection expenditures

1. Introduction

The tax-sharing system reform implemented in 1994 not only significantly stimulated the management efficiency and vitality of local governments but also effectively promoted the steady growth of local economies. On one hand, as some local governments have gained greater autonomy in fiscal expenditure, this will effectively encourage them to engage in green technology innovation activities. On the other hand, facing the severe situation of economic growth assessment, some local governments may ignore the basic principles of environmental protection, turn to pursue rapid economic growth, and provide support to enterprises with remarkable performance but serious environmental pollution. In view of this, exploring the specific effects and mechanism of the fiscal decentralization policy implemented since 1994 on corporate green technology innovation has profound practical significance and academic value.

2. Theoretical analysis and hypotheses

2.1. Fiscal decentralization and corporate green technology innovation

As an important means of modern national governance, fiscal decentralization aims to stimulate the enthusiasm and creativity of local governments by rationally distributing fiscal power between the central and local governments [1]. On one hand, under the fiscal decentralization system, local governments have more autonomy to formulate environmental policies and increase environmental expenditures according to local actual conditions, thereby guiding enterprises to carry out green technology innovation. This "race to the top" mechanism encourages enterprises to actively invest in ecological technology innovation to reduce environmental governance costs, forming a virtuous cycle. On the other hand, fiscal decentralization may also lead to short-sighted behaviors of local governments that ignore green R&D. Driven by economic stimulus policies [2], local governments tend to focus on short-term economic growth while neglecting the long-term green development path. In addition, the impact of fiscal decentralization on green technology innovation varies in different periods and regions at different development stages. Based on this, the following hypotheses are proposed:

H1: Fiscal decentralization can promote corporate green technology innovation.

2.2. The mechanism of fiscal decentralization affecting corporate green technology innovation

Firstly, foreign direct investment not only represents the cross-border flow of capital but also involves the transfer and integration of various production factors including advanced management experience and cutting-edge technology on a global scale. Under reasonable environmental regulation conditions, foreign direct investment enterprises usually face more stringent environmental standards and supervision, which prompts them to adopt more environmentally friendly production technologies and processes to reduce environmental pollution and emissions [3].

Secondly, after the implementation of the fiscal decentralization policy, the central government delegates part of the fiscal power and responsibilities to local governments, allowing local governments to allocate fiscal funds according to local actual needs, including energy conservation and environmental protection expenditures. Under the fiscal decentralization system, local governments have greater fiscal decision-making autonomy and can more flexibly adjust the scale and direction of energy conservation and environmental protection expenditures to address local environmental pollution problems. Based on this, the following hypotheses are proposed:

H3: Fiscal decentralization promotes corporate green technology innovation by increasing foreign direct investment.

H4: Fiscal decentralization promotes corporate green technology innovation by increasing local governments' energy conservation and environmental protection expenditures.

3. Research design

3.1. Variable definition and indicator selection

Green Technology Innovation (GTI) is measured by taking the natural logarithm of the number of independent green utility model patents applied by listed companies in the current year plus 1.Fiscal revenue decentralization is measured by (per capita fiscal revenue of prefecture-level cities) / (per capita fiscal revenue of the central government + per capita fiscal revenue of prefecture-level cities). Similarly, fiscal expenditure decentralization is measured using the same method. Meanwhile, fiscal pressure of prefecture-level cities is expressed by (per capita fiscal revenue of prefecture-level cities) / (per capita fiscal expenditure of prefecture-level cities) .

3.2. Model setting

Based on the theoretical analysis of fiscal decentralization and corporate green technology innovation, a two-way fixed effects model is constructed.

4. Empirical analysis

4.1. Benchmark regression

Table 1. Benchmark regression results.

Variables	(1)	(2)	(3)
	GTI	GTI	GTI
Score	0.084***(4.187)	0.279***(2.705)	0.313***(3.004)
_cons	0.178***(12.805)	0.047(0.658)	-0.810(-1.397)
Individual and year fixed effects	NO	YES	YES
Controls	NO	NO	YES
N	24336	23915	23915
r2_a	0.001	0.618	0.619

Table 1 below shows the benchmark regression results of the impact of fiscal decentralization on corporate green technology innovation, indicating that fiscal decentralization can significantly improve the level of corporate green technology innovation.

4.2. Mechanism analysis

Foreign Direct Investment (FDI) is used as the mediating variable M1 to test the impact mechanism of fiscal decentralization on corporate green technology innovation. **Table 2** below shows the impact mechanism of foreign direct investment. The coefficient of Score in column (1) is positive and significant at the 1% level, indicating that fiscal decentralization significantly affects foreign direct investment FDI. The coefficient of M1 in column (2) is positive and significant at the 1% level, indicating that foreign direct investment changes in the same direction as corporate green technology innovation. In column (3), M1 is included in the main regression, and its coefficient is still significantly positive, while the coefficient of Score is also significantly positive. This indicates that fiscal decentralization promotes corporate green technology innovation by improving the scale of foreign direct investment, and thus Hypothesis H3 holds.

There are many literatures studying the relationship between government environmental expenditures and corporate green technology innovation. This part refers to Jiang Ting's two-step method [4] to test the impact of fiscal decentralization on local governments' environmental expenditures. The analysis based on the two-way fixed effects model constructed with data from listed companies reveals that local environmental expenditures have a positive promoting effect on corporate green technology innovation [5]. The increase in government environmental expenditures not only plays a demonstration and leading role in attracting social capital to flow into the green governance field but also encourages green R&D activities and green innovation practices of pollution control enterprises through environmental protection subsidy mechanisms [6]. In general, local governments' environmental investment can actively promote corporate green technology innovation activities. Therefore, we test the impact of fiscal decentralization on governments' energy conservation and environmental protection expenditures here. It can be seen from column (4) of **Table 2** below that a higher degree of fiscal decentralization will promote local governments' energy conservation and environmental protection expenditures, thereby exerting a promoting effect on corporate green technology innovation.

Table 2. Impact mechanism.

Variables	(1)	(2)	(3)	(4)
	M1	GTI	GTI	M2
Score	0.048***(13.506)		0.295***(2.720)	1.452*** (13.989)
M1		0.846*** (2.800)	0.708** (2.299)	
controls	YES	YES	YES	YES
_cons	-0.106*** (-6.437)	-0.484 (-0.783)	-0.369 (-0.602)	7.644*** (14.126)
Individual and year fixed effects	YES	YES	YES	YES
N	22849	22849	22849	20096
r2_a	0.624	0.696	0.624	0.934

5. Conclusions and recommendations

Foreign capital can introduce advanced technologies and management knowledge, promote technology transfer and spillover effects, thereby promoting the technological innovation and innovation capacity development of host country enterprises, and is conducive to the overall upgrading of the industrial chain. Local governments' energy conservation and environmental protection expenditures can provide necessary support for enterprises' green technology innovation.Firstly, local governments should formulate and implement policies conducive to the green development of enterprises, optimize the business environment, and provide tax incentives, fiscal subsidies and other measures. Secondly, establish a mechanism to cultivate and expand leading green technology enterprises, and encourage enterprises and consortia to take the lead in or participate in important national green technology R&D plans to give play to their core role in the field of green innovation. Secondly, introduce foreign capital oriented to green development goals. Strengthen ties with the international market to promote enterprises to carry out green technology innovation.Thirdly, scientifically give play to the supporting and guiding role of fiscal environmental protection expenditures. Local governments can provide necessary financial support for enterprises for the R&D of environmental protection technologies, equipment purchase and facility construction. These funds can help enterprises reduce the cost of green technology innovation and improve their economic benefits and social image.

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