Tax Competition, Foreign Direct Investment and Regional Scientific and Technological Innovation

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Abstract. This paper selects the panel data of 31 provincial-level cities from 2000 to 2020 as samples, and the results show that the total tax competition has a significant inhibitory effect on regional scientific and technological innovation, and foreign direct investment has a significant role in promoting regional scientific and technological innovation. Further research finds that corporate income tax competition has a significant role in promoting regional scientific and technological innovation, and can improve the level of regional scientific and technological innovation by promoting foreign direct investment.

Keywords: scientific and technological innovation, tax competition, foreign direct investment.

1 Introduction

Technological innovation can stimulate new industries, new models, and new driving forces, and is the core element for developing new quality productive forces. At the national level, the government has issued a series of policies to support technological innovation, adheres to opening up to the outside world, and strives to rank among the top innovative countries by 2030. At the local level, the government actively responds to the call of the central government, based on its own positioning, exploring regional advantages, and combining industrial development, formulating comprehensive and multi field financial and tax incentive policies, especially in terms of taxation, fully exerting its initiative, conducting tax competition to promote regional scientific and technological innovation, aiming to achieve regional economic growth and high-quality development.

Technological innovation is the core element for developing new quality productive forces and an important driving force for promoting economic development and social progress[1]. It has a leading role in the development of new quality productivity. Technological innovation is also a complex process of transforming input into output and ultimately achieving socio-economic benefits , requiring a large amount of stable funding supply and human capital[2]. The invisible hand of the market will allocate resources through price, supply and demand, and competition. However, relying solely on the spontaneous adjustment of the market can easily lead to market failure.

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Therefore, the government will implement macroeconomic regulation and play a leading role in finance and taxation[3] .

Tax competition is a game behavior in which local governments attract production factors and achieve regional development by lowering tax rates, providing tax refunds, and reducing tax collection and management efforts in order to obtain resources[4]. On the one hand, tax competition has a positive incentive effect on regional innovation, which can accelerate the merger and division of enterprises, promote the flow of innovation factors in the region, reduce research and development costs and risks by reducing enterprise tax burden, and thus enhance innovation capabilities, forming economies of scale[5]. On the other hand, tax competition will increase the financial pressure on local governments, reduce the supply of regional public goods, lead to insufficient basic environmental conditions for innovation, and hinder innovation efficiency[6].

Compared with the existing literature, the marginal contributions of this paper are as follows: first, this paper concretizes the new quality productivity and studies it with regional scientific and technological innovation as the representative of the new quality productivity; Second, this paper not only studies the impact of total tax competition on regional scientific and technological innovation, but also adds the research on the impact of tax competition by tax type on regional scientific and technological innovation, which is more in-depth and broad. Thirdly, this paper combines tax competition, foreign direct investment and regional scientific and technological innovation, which is helpful to regulate regional tax competition, attract high-quality foreign investment, and accelerate the formation of new quality productivity. This paper is a positive response of the academic community to Xi Jinping's socialist economic thought with Chinese characteristics for a new era, and is of great significance for promoting the high-quality development of China's economy.

2 Research Hypothesis

Since the implementation of the tax sharing system in our country, local governments have experienced a mismatch between their financial and administrative powers. In order to increase local financial resources, local governments have introduced policies such as tax reduction and fee reduction, tax refunds, etc., attempting to attract investment, expand the tax base, and promote economic development[7]. The competition for taxation in various regions has had an impact on the economy and also brought about a series of chain reactions. From a positive perspective, tax competition will attract the inflow of production factors from other regions, promoting and driving regional innovation. However, the positive incentive effect requires a long period of accumulation and precipitation, and it can lead to a decrease in tax rates, resulting in insufficient regional fiscal revenue, which cannot guarantee fiscal expenditure, reduce local government's financial incentives for enterprise research and development, and thus inhibit regional innovation. **Assumption 1: Total tax competition will suppress regional technological innovation, while corporate income tax competition will promote regional technological innovation.**

Foreign direct investment and regional technological innovation mutually influence and promote each other. Foreign direct investment often accompanies the transfer of technology, management experience, and professional knowledge. When foreign enterprises enter new markets, they usually introduce advanced production technologies and management models, which promotes the improvement of innovation capabilities of local enterprises and industries. This technology transfer and knowledge spillover can promote the improvement of local enterprises' learning and innovation capabilities. **Assumption 2: Foreign direct investment will promote the improvement of regional technological innovation level.**

Corporate income tax, as a signaling theory, affects the location selection of foreign direct investment and is the preferred factor for government policy adjustments. Therefore, the implementation of corporate income tax competition in China is more likely to attract foreign investment. Through the spillover effects and competitive effects generated by foreign investment, advanced theories and technologies are brought in, forming innovation clusters, promoting regional digital economy development, cluster networking, industrial chain optimization, and labor mobility, and promoting regional innovation and development in China. **Assumption 3: Tax competition promotes regional innovation and development by facilitating foreign direct investment.**

3 Research Design

Based on the above analysis, it can be concluded that total tax competition will have a negative inhibitory effect on regional innovation, while corporate income tax competition is likely to promote regional technological innovation. To test hypothesis 1, this article uses a two-way fixed effects model to explore the relationship between total tax competition, corporate income tax competition, value-added tax competition, and regional technological innovation:

$$Innovation_{it} = \alpha_0 + \beta Tax_{it} + \lambda_m control + \eta_t + u_i + \varepsilon_{it} \quad (1)$$

$$Innovation_{it} = \alpha_0 + \beta ComTax_{it} + \lambda_m control + \eta_t + u_i + \varepsilon_{it} \quad (2)$$

$$Innovation_{it} = \alpha_0 + \beta VatTax_{it} + \lambda_m control + \eta_t + u_i + \varepsilon_{it} \quad (3)$$

Innovation represents the dependent variable, indicating the level of technological innovation in the region; Tax, ComTax, and VatTax represent core explanatory variables, Tax represents total tax competition, ComTax represents corporate income tax competition, and VatTax represents value-added tax competition; λ _m is used to measure the impact of control variables on the level of regional technological innovation; Control represents the set of controlled variables; U_i represents individual fixed effects in region i; η _t represents the time fixed effect of period t; ε _it represents the random perturbation term.

Based on the above analysis, it can be concluded that foreign direct investment has a positive incentive effect on regional technological innovation, and corporate income tax competition is likely to promote regional technological innovation through promoting foreign direct investment. To test hypotheses 2 and 3, this section uses a mediation

effect model to explore the relationship between tax competition, foreign direct investment, and regional technological innovation level

$$Innovation_{it} = a_0 + aComTax_{it} + \gamma_m control + \eta_t + u_i + \varepsilon_{it} \quad (4)$$

$$FDI_{it} = b_0 + bComTax_{it} + \delta_m control + \eta_t + u_i + \varepsilon_{it} \quad (5)$$

$$Innovation_{it} = d_0 + dComTax_{it} + cFDI_{it} + \varphi_m control + \eta_t + u_i + \varepsilon_{it} \quad (6)$$

FDI represents foreign direct investment and is an intermediary variable; Parameter a represents the impact of corporate income tax competition on regional innovation; Parameter b represents the impact of corporate income tax competition on foreign direct investment; The parameter d represents the impact of corporate income tax competition on regional innovation after adding the mediating variable FDI; b*c represents the impact of corporate income tax competition on regional innovation through the mediating variable FDI. a_0, b_0, $d_0$represent constant terms respectively, while other parameters and variables are consistent with the previous representation.

Foreign Direct Investment (10 billion yuan) = Foreign direct investment (10 billion US dollars) * RMB exchange rate against US dollar (RMB)

The control variables include regional per capita gross domestic product (LNGDP), technology transaction activity (JS), deposit-loan ratio (CDB), marketization degree (SCHZS), per capita fiscal expenditure (LNRJCZZC), and population density (RKMD).

The data for 31 provinces in China from 2000 to 2020 were sourced from the China Statistical Yearbook, EPS Global Statistical Data Analysis Platform, and the National Bureau of Statistics.

4 Empirical Results and Analysis

Table 1 shows the baseline regression estimation results, which are consistent with existing research. Hypothesis 1 holds true. Table 2 shows the results of the mediation effect benchmark regression, and hypotheses 2 and 3 are valid.

Table 1. Baseline Regression Estimation Results

	(1) Innovation	(2) Innovation	(3) Innovation	(4) Innovation	(5) Innovation	(6) Innovation
Tax	-0.222* (0.120)	-0.251* (0.136)	—	—	—	—
ComTax	—	—	0.133*** (0.036)	0.123*** (0.041)	—	—
VatTax	—	—	—	—	-0.112 (0.088)	-0.114 (0.090)
js	—	1.662* (0.952)	—	1.359 (0.927)	—	1.469 (0.979)
lngdp	—	1.298***	—	0.737***	—	1.100***

		(0.330)		(0.254)		(0.278)
cdb	—	0.662*** (0.150)	—	0.608*** (0.176)	—	0.667*** (0.149)
schzs	—	0.117*** (0.021)	—	0.111*** (0.023)	—	0.122*** (0.020)
lnrjczzc	—	1.063*** (0.402)	—	1.780*** (0.324)	—	1.260*** (0.357)
_cons	9.117*** (0.129)	-1.221 (0.948)	8.689*** (0.053)	-1.417 (0.949)	9.003*** (0.099)	-1.153 (0.962)
N	651	651	651	651	651	651
Adj.R2	0.977	0.982	0.977	0.982	0.977	0.982

Table 2. Regression results of mediation effect

	(1)	(2)	(3)
	Innovation	FDI	Innovation
ComTax	0.123*** (0.041)	0.914*** (0.208)	0.101** (0.041)
FDI	—	—	0.024*** (0.007)
js	1.359 (0.927)	-6.184 (11.073)	1.507 (0.950)
lngdp	0.737*** (0.254)	-0.476 (1.950)	0.748*** (0.245)
cdb	0.608*** (0.176)	-5.394*** (0.972)	0.737*** (0.183)
schzs	0.111*** (0.023)	1.505*** (0.141)	0.075*** (0.025)
lnrjczzc	1.780*** (0.324)	9.705*** (2.468)	1.549*** (0.333)
_cons	-1.417 (0.949)	-31.399*** (7.953)	-0.668 (0.963)
N	651	651	651
Adj.R^2	0.982	0.842	0.982

5 Conclusions

Increase the implementation of fiscal subsidy policies and play a good role in the combination of fiscal and taxation policies. Local governments should reduce the competitiveness of total tax revenue, further strengthen fiscal support for scientific and technological innovation, increase fiscal subsidies, find the best fiscal and tax combination strategy, and accelerate the formation of a dual-chain model with fiscal policy as the main and tax policy as the supplement. At the same time, we will accurately help science and technology enterprises, do not make package transactions, continue to carry

out review and supervision, prevent fraud and subsidy incidents, ensure the implementation of policies, make joint efforts to promote regional scientific and technological innovation, accelerate the formation of new quality productivity, effectively curb vicious tax competition, and make the "tax depression" become a "tax blessed land".

Dynamically adjust the competitiveness of enterprise income tax in various regions according to local conditions. Comprehensive assessment of regional development status, accurate benchmarking, scientific positioning, clear inherent gaps between regions, the eastern region can change the concept of competition, improve service awareness, enhance tax transparency, government responsiveness and other soft indicators, the central and western regions can continue to maintain the existing competitiveness, strengthen the cultivation of the tax base, and then dynamically adjust the enterprise income tax competition according to the regional development situation.

Actively introduce foreign investment and promote high-level opening up with the power of taxation. We will continue to implement the policy of opening up to the outside world, promote the accelerated flow of innovation resources through the introduction of foreign investment, promote China's local enterprises to gain insight into the development trend of the industry, participate in the global division of labor and cooperation, give birth to new industries, new business forms, new models and specialized and special new enterprises, and promote the "introduction" and "going out" of scientific and technological products. At the same time, we should strengthen the concept of green development, recognizing that most of the foreign investors introduced in China are high-yield and high-polluting enterprises, which on the one hand promotes regional innovation and economic development, but on the other hand, it has an adverse impact on the local environment.

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