

Research Article

Spatial Econometric Analysis of China's Sports Capital Market

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The capital market provides important capital factor guarantee and supply-side support for the high-quality development of the sports industry, and the healthy development of the sports capital market, which is composed of securities market, loan market, trading derivative market, and physical market, plays a vital role in ensuring the smooth and efficient operation of the sports market economy mechanism. At the present stage, how to play the role of resource allocation in China's sports capital market and how to improve the quality and efficiency of the sports industry by the capital market have become the core issue of research and discussion. Taking A-share listed companies as the typical micro-market subjects, this paper analyzes the financing needs and behaviors of sports listed companies and the support degree of different types of capital markets; on the basis of traditional measurement methods, spatial econometric analysis is used to explore the effectiveness of capital market on the development of the sports industry.

1. Introduction

At present, China's economic development has shifted from the stage of rapid growth to the stage of high-quality development, and promoting high-quality development is an inevitable requirement for successfully crossing the middle-income trap. In this situation, as a rapidly emerging industry, the sports industry has maintained double-digit growth for more than 10 years and plays a more and more significant role in economic and social development and the construction of a sports power. It plays an irreplaceable role in meeting the growing needs of the people for a better life.

Promoting the high-quality development of the sports industry is a realistic requirement to promote the growth of the sports industry into a pillar industry of the national economy and to promote the construction of a sports power. The capital market provides an important capital factor guarantee and supply-side support for the high-quality development of the sports industry [1]. In the new development stage, developing the capital market and increasing the proportion of direct financing are the urgent needs of service innovation-driven development strategy, improving

the market-oriented allocation of factors, deepening financial supply-side structural reform, and so on [2]. From the point of view of the supply side of the sports industry, finance is an indispensable core element in the construction of the modern sports industry system. As China's sports industry enters a new stage of high-quality development, the development of the sports industry not only pursues the expansion of capital investment but also puts forward higher requirements for quality. The traditional means of capital supply, such as endogenous financing and bank loans, are becoming more and more difficult to meet the development needs of enterprises in the sports industry, while market subjects expect to achieve cooperation with capital in a wider field, at a deeper level, and in a larger space. The healthy development of the sports capital market, which is composed of securities market, loan market, trading derivative market, and physical market, plays a vital role in ensuring the smooth and efficient operation of sports market economy mechanism. At the present stage, how to play the role of resource allocation in China's sports capital market and how to improve the quality and efficiency of the sports industry by the capital market have become the core issue of research and discussion [1, 2].

Based on this, taking A-share listed companies as the typical micro-market subjects, this paper analyzes the financing needs and behaviors of sports listed companies and the degree of support of different types of capital markets, on the basis of traditional measurement methods. Spatial econometric analysis is used to explore the effectiveness of the capital market on the development of the sports industry.

2. Theoretical Traceability, Research Hypothesis, and Setting of Basic Model

A clear definition and connotation of the capital market is an important prerequisite for this section. As the core component of the modern financial system, the capital market plays the role of allocating resources. The capital investment and the improvement of capital allocation efficiency make the production scale expand continuously, which not only accords with Marx's conclusion that capital accumulation promotes industrial growth in the theory of social reproduction but also confirms that capital accumulation is used to expand the production scale of real industry and improve production efficiency in western economic theory so as to promote industrial growth. The outstanding characteristic of the capital market, which is different from the money market, is that the capital market refers to the market of capital lending and financing activities for more than one year. The stock market, bond market, and long-term credit market are the main components and typical forms of the capital market [3]. Bank credit financing is one of the important financing methods for the development of the sports industry. As an exogenous indirect financing channel, bank credit financing requires a higher credit level of enterprises and is more favored for large listed companies. Compared with the characteristics of the long financing cycle and span of the sports industry, the development of the sports industry still depends on bank credit financing. On the other hand, bank credit financing has a conservative preference and is inclined to large state-owned enterprises; both sides avoid risks, such as the central bank and the State Administration of Sports cooperate to expand the credit line of sports industry development funds. Local banks also cooperate with local sports industry groups to provide credit lines; the higher the efficiency of bank credit, the more conducive to industrial development [4]. Some studies have also shown that bank credit financing can promote the adjustment of industrial structure and occupy a dominant position [5]. To sum up, this section makes the following assumptions:

H1: bank credit financing (medium- and long-term loans) will play a positive role in promoting the development of the sports industry

Bond financing and equity financing are direct financing channels. For sports enterprises, bond financing and equity financing are more flexible, and the market mechanism of the bond market and the equity market is more active. The emerging sports industry is easy to get a place in order to effectively promote the development of the industry. The refinancing of sports listed companies gives priority to

equity financing, first, because the financing cost of equity financing is relatively low; equity financing is essential to increase capital by attracting new shareholders to join shares; if the company is in good condition, new and old shareholders will get income through dividends at the same time; and the source of equity financing also determines the diversity of the use of its funds. Compared with bond financing, equity financing does not need to pay interest and has lower financing constraints. In the more mature capital market, bond financing is more popular than equity financing. The tax shield, financial leverage, and asset structure optimization of bond financing make the corporate financing structure more reasonable. At the same time, there is no need to dilute the control of shareholders. The bond financing model of sports listed companies in developed countries is more mature, including issuing project development bonds and tax mortgage bonds, for example, sports clubs can use television broadcasting rights and advertising revenue as guarantees to issue bonds to raise funds [6]. In recent years, the number and scale of bonds issued by China's sports industry have been increasing, such as using the bond market to raise funds for sports infrastructure construction, issuing special bonds to develop sports industry bases, sports complexes, and other projects. The liquidity of bonds is increasing. The scale of equity financing expands with the continuous improvement of the public capital market [7]. A considerable number of sports enterprises carry out capital operations such as listing, refinancing, mergers, and acquisitions in the on- and off-site markets. For example, 359 investment and financing events occurred in China's sports industry in 2018, with a financing amount of 23 billion yuan, which shows that the sports capital market is very active and the industry has a good momentum of development. Some studies believe that bond financing can effectively solve the pain points of financing difficulties, high threshold, and urgent capital demand for emerging industries, and product innovation in the bond market can help emerging industries break the bottleneck [8]. The development of China's sports industry bond market will play a positive role in promoting the development of the sports industry [9]. This section makes the following assumptions:

H2: bond financing will play a positive role in promoting the development of the sports industry

H3: equity financing will play a positive role in promoting the development of the sports industry

Therefore, the basic model of the supporting effect of the capital market on the development of the sports industry is constructed according to the theoretical analysis, as shown in the following formula:

$$y = \alpha_0 t + \alpha X + \alpha^* Z + \varepsilon, \quad (1)$$

where y is the explained variable; t is the constant term; X and DZ are the core explanatory variable and control explanatory variable, respectively; α_0 , α , and α^* represent the parameter estimates of the constant term and explanatory variable; and ε represents the random disturbance term.

3. The Econometric Test of Capital Market Supporting the Development of Sports Industry Based on Traditional Multiple Regression Analysis

3.1. Variable Selection and Data Sources. The research object selected in this section is the A-share listed sports companies, and the company's main business covers all kinds of forms of sports industry (such as Table 1). The industry classification is based on Statistical Classification of Sports Industry (2019; Decree No. 26 of the National Bureau of Statistics). The specific company name is replaced by its pinyin initials, and the following company name issues will be dealt with in the same way. In order to analyze the degree of support of the capital market to the development of the sports industry, according to the research of Huang et al. [10], when taking the listed companies of strategic emerging industries in Jiangsu Province as an example, when conducting an empirical study on the financial support for the development of strategic emerging industries, the rate of return on net assets represents the explained variable, which represents not only the results of enterprise management and development but also the degree of development of strategic emerging industries. In addition, retained earnings financing, bank credit financing, equity financing, bond financing, and commercial credit financing are taken as explanatory variables to represent the most common financing channels for emerging industries. He Xiaosan's research proposes to take the sustainable development rate and return on equity as indicators to measure the growth of emerging industries and the stock market value, medium- and long-term bank loans, bond financing, and venture capital management funds as indicators to measure the degree of support of the capital market [11]. On the basis of their predecessors, Sun Xiangxiang and others included the industrial structure upgrading index when formulating indicators to measure the development of the capital market and the upgrading of the industrial structure. It also discusses the relationship between the upgrading of industrial structure and the development of capital market, stock market, bond market, and bank medium- and long-term credit market [3]. Based on this, the core and control variables of this section are determined by comprehensively considering the representativeness and availability of index data.

First of all, the return on net assets (Y) of listed sports companies is selected as the explained variable reflecting the development degree of the sports industry. The rate of return on net assets is one of the important financial indicators that represent the profitability of the company, and the profitability and growth of a company can directly reflect the development degree of the sports industry. Second, in order to test the supporting effects of bank credit, bond market, and equity investment on the development of sports industry, bank credit financing (x_1), bond financing (x_2), and equity financing (x_3) are selected as the core explanatory variables, which are characterized by financial indicators such as medium and long-term loans, bonds payable, the

sum of equity, and capital reserve. Third, in order to comprehensively consider various factors affecting the degree of capital support of listed sports companies, retained earnings financing (Z_1), commercial credit financing (Z_2), asset-liability ratio (Z_3), and short-term bank loan (Z_4) are selected as control variables. Retained earnings financing is represented by the sum of surplus reserve and undistributed profit. Commercial credit financing is represented by the sum of accounts payable, notes payable, and advances. Finally, in order to test the robustness of the model, return on total assets (Y_1) was adopted as the alternative explained variable of return on equity (Y ; Table 2). In order to ensure the reliability of the data, the financial indicators of A-share sports listed companies are obtained and sorted out by the company's public financial statements and Wind database, and the data span from 2009 to 2019.

3.2. Traditional Multiple Regression Analysis

3.2.1. Multiple Regression Model Setting. According to the research hypothesis and the setting of variables, formula (1) can be rewritten into a multiple linear regression model to investigate the degree of support of the capital market to the development of the sports industry. The expression of the model is shown in the following formula:

$$Y = \alpha_{01}t + \alpha_{11}X_1 + \alpha_{21}X_2 + \alpha_{31}X_3 + \alpha_{11}^*Z_1 + \alpha_{21}^*Z_2 + \alpha_{31}^*Z_3 + \alpha_{41}^*Z_4 + \varepsilon_1, \quad (2)$$

where Y represents the explained variable, X_1 , X_2 , and X_3 represents the core explanatory variable, Z_1 , Z_2 , Z_3 , and Z_4 represents the control variable, α represents the exogenous parameter, and ε_1 represents the random disturbance term.

3.2.2. Descriptive Statistical Analysis, Correlation Analysis, and Multicollinearity Test of Variables. Using Eviews8.0 to calculate the variables, from Table 3, the average (Y) of return on net assets is 13.4583%, which shows that the profitability of A-share sports listed companies is general and needs more attention from investors, and there is a wide gap between the maximum and minimum values, indicating that there are great differences in profitability among different types of listed companies. The average rate of return on total assets (Y_1) is 7.4445%, and its index can directly reflect the general level of comprehensive operation and management of A-share sports listed companies. From the descriptive analysis results of bank credit financing (X_1), bond financing (X_2), and equity financing (X_3) of A-share sports listed companies, the lowest mean value is the bond financing variable; the highest mean value is the equity financing variable; and the highest value is the equity financing variable, indicating that the A-share listed sports companies rely more on the equity market for financing. From the results of descriptive analysis of control variables, retained earnings financing (Z_1) is at the same level as commercial credit financing (Z_2) and plays a certain role in A-share sports listed companies. The average asset-liability

TABLE 1: A-share sports listed companies are classified by the main business.

Industry classification	Company name replaced by its pinyin initials	Time to market	Main business
02 sports competitions and performance activities	LSSC	2017-03-24	Race operation, racing team, track operation, and automobile activity promotion business
08 other sports services	XHYL	2010-01-20	Research and development, production, and sales of car models and provide quality content and services in games, toy derivatives, football, and other fields
	XWSP	1996-11-26	Healthy edible oil and exercise nutrition and weight management
	WMSJ	2011-10-28	Research and development, distribution, and operation of online games; production, distribution, and derivative business of TV dramas and movies; variety entertainment business; and artist brokerage service and related service business
	DDMC	1998-03-03	Investment, development, and consultation of film and television, culture, sports, media, animation, and game projects
	ZQGF	2016-08-02	Production of marine diving equipment, diving training, diving tourism, and so on
09 manufacture of sporting goods and related products	YPS	2017-09-15	Manufacture of fitness, recreation, and sports equipment; sports venues and facilities; and so on
	YJKJ	2011-08-05	Design, production, and sale of playing cards and mobile game business
	XLJK	2007-01-12	Development, production, and sales of bicycle spare parts and sports fitness rehabilitation equipment
	TLZ	2009-10-30	R & D, design, organization, and outsourcing of production and sales of outdoor supplies
	RTJK	2017-01-11	Design, R & D, production, and sales of massage utensils
	MGD	2017-03-07	R & D, design, production, and sales of camping tents, outdoor clothing, and other outdoor products
	JLTY	2017-05-09	Research and development, production, sales, and sports event services of sports equipment and stadiums and facilities
	JSJT	2015-01-27	Research and development, design, manufacture, and service of cotton socks and seamless underwear and have established long-term strategic cooperation with world-renowned sports brands and retailers
	GRN	2014-01-24	Research and development, design, production, and sales of sports shoes and sportswear
	DFSY	2017-04-20	Application of intelligent stage, building acoustics engineering, public decoration, and seat stands in stadiums and other public spaces
10 sales, rental, and trading agents of sporting goods and related products	BYLF	2016-12-23	Golf clothing R & D design, brand promotion, marketing network construction, and supply chain management
	AJH	2011-09-09	Design, R & D, production, and sales of all kinds of massage appliances
11 construction of sports venues and facilities	SFWW	2015-12-09	Integration of sales and service of outdoor products such as offline retail + experience comprehensive store, organization of outdoor events, design, construction, and operation of outdoor sports camps and outdoor experience education and training for young people
	ZTCY	1998-03-27	Sports real estate, sports space and operation, sports services, physical education and training, and so on
	LYTY	1994-05-09	Real estate sales and leasing business and sports integrated business

ratio (Z_3) is 37.1958%, indicating that the debt operating capacity of A-share sports listed companies is at a general level, and enterprises still need to be further stimulated. From the perspective of short-term bank loans (Z_4), A-share

sports listed companies need some short-term loans to speed up the flow of funds, and the interest rate of short-term bank loans is relatively low; the supply and repayment of funds are relatively stable; and there is no lack of priority for enterprise

TABLE 2: Variables, symbols, and calculation formulas.

Variable type	Measurement index	Symbolic identification	Calculation formula
Explained variable	Return on net assets (%)	Y	Net profit/net assets
	Return on total assets (%)	Y ₁	Net profit/total assets
Core explanatory variable	Bank credit financing (millions of yuan)	X ₁	Medium- and long-term loan
	Bond financing (millions of yuan)	X ₂	Bonds payable
	Equity financing (millions of yuan)	X ₃	Equity + capital reserve
Control variable	Retained earnings financing (millions of yuan)	Z ₁	Surplus reserve + undistributed profit
	Commercial credit financing (millions of yuan)	Z ₂	Accounts payable + notes payable + payments received in advance
	Asset-liability ratio (%)	Z ₃	Total liabilities/total assets
	Short-term bank loan (millions of yuan)	Z ₄	Bank short-term loan

TABLE 3: List of statistical descriptions of variables in this section.

Variable	Mean value	Standard deviation	Minimum value	Maximum value
Y	13.4583	15.9553	-100.8668	58.9979
Y ₁	7.4445	7.2131	-23.4600	27.9183
X ₁	126.0703	311.6122	0	2,032.6190
X ₂	38.1308	172.9392	0	1,295.1730
X ₃	641.6472	842.4883	0	5,476.8180
Z ₁	375.0912	618.1706	-1,041.7880	5,858.8180
Z ₂	325.4303	424.4408	0	5,858.8020
Z ₃	37.1958	20.5785	0	87.1963
Z ₄	202.5837	309.5125	0	1,726.1140

TABLE 4: Correlation coefficients and VIF values between variables.

	Y	Y ₁	X ₁	X ₂	X ₃	Z ₁	Z ₂	Z ₃	Z ₄	VIF
Y ₁	1.0000									
Y ₂	0.9060	1.0000								
X ₁	-0.0910	-0.1948	1.0000							1.9682
X ₂	-0.0296	-0.0512	0.2415	1.0000						1.2275
X ₃	-0.2274	-0.2264	0.5750	0.2860	1.0000					2.8677
Z ₁	0.1128	0.0944	0.3388	0.1551	0.6834	1.0000				2.0849
Z ₂	-0.0810	-0.1680	0.4011	0.1305	0.4323	0.4125	1.0000			1.7951
Z ₃	0.2306	0.0857	0.3700	0.1726	0.1538	0.1106	0.5193	1.0000		1.8454
Z ₄	-0.1711	-0.2230	0.6315	0.4154	0.6169	0.4860	0.3743	0.4697	1.0000	2.7270

financing. In addition, it can be seen from Table 4 that except for the return on net assets (Y) and the total return on assets (Y₁), the correlation coefficient between variables is low, and there is no problem of multicollinearity between explanatory variables. Then the variance expansion factor (VIF) is used to further test the multicollinearity between explanatory variables. The results show that the VIF values of all explanatory variables are less than 10; then there is no multicollinearity problem in the multivariate regression model set up in the study.

3.2.3. *Selection of Models and Results of Parameter Estimation.* According to the characteristics of panel data, in order to solve the validity of the set model, it is necessary to test the mixed estimation model (mixed-effect model),

fixed-effect model (random-effect model), and random-effect model (random-effect model). The fixed-effect model includes the individual fixed-effect model and the time fixed-effect model. First of all, *F*-test is carried out on the fixed- or mixed-effect model, and the original hypothesis can be rejected when $Purge\ 0.002 < 0.05$, which shows that the fixed-effect model is more effective. Second, the fixed- and random-effect models are selected. Hausmann's result shows that $Purge\ 1.0000 > 0.05$ does not reject the original hypothesis, so the random-effect model should be chosen, but the test results are invalid, indicating that there may be an individual random effect, time fixed effect, or time random, individual fixed effect. Then the Hausmann test is carried out for individual fixed and time random effects, and the result is $0.0023 < 0.05$, indicating that the original hypothesis is not rejected, but the test results are still invalid. Finally, the

Hausmann test was carried out on the time fixed and individual random test, and the results showed that the original hypothesis was not rejected, and the test was valid, so the time fixed- and individual random-effect model was selected for parameter estimation.

Table 5 shows the parameter estimation results of the traditional multivariate linear regression basic model and the extended model. Models (a) and (b) take the return on net assets (Y) as the explanatory variable and will only include the control variable, three core explanatory variables, and three core explanatory variables at the same time, while model (c) takes the total return on assets (Y_1) as the explanatory variable and carries on the calculation in the same way to ensure the robustness of the model. From the parameter estimation results of model (a), retained earnings financing (Z_1) and asset-liability ratio (Z_3) have a significant positive impact on the return on net assets (Y), while commercial credit financing (Z_2) and short-term bank loans (Z_4) have a significant negative impact on the return on net assets (Y), which ensures that it is reasonable to include the control variables in the model. From the parameter estimation results of model (b), it can be concluded that bank credit financing (X_1) has a significant positive impact on the return on net assets (Y), that is, bank credit financing (medium- and long-term loans) will play a positive role in promoting the development of the sports industry. Bond financing (X_2) has a positive impact on the return on net assets (Y), that is, bond financing has a positive impact on the development of the sports industry, but the impact is not significant; then hypothesis 2 is not true. Equity financing (X_3) has a significant negative impact on the return on net assets (Y), that is, equity financing has a significant negative impact on the development of the sports industry; hypothesis 3 is not true. In addition, comparing the parameter estimation results of model (c) with model (b), unlike model (b), the positive impact of bank credit financing (X_1) on the return on total assets (Y_1) is not significant, that is, hypothesis 1 is not true, while the effects of bond financing (X_2) and equity financing (X_3) on the return on total assets (Y_1) are the same as model (b), and hypotheses 2 and 3 are not true. From this point of view, the effect of bank credit financing (X_1) on the development of the sports industry is not stable, but from the modified fitting degree of the model, the fitting degree of the model with the return on net assets (Y) as the explanatory variable is higher than that with the return on total assets (Y_1) as the explanatory variable, so the parameter estimation results of model (b) are selected.

4. Summary

From the above analysis, it can be seen that in the process of collecting sample data, A-share sports listed companies are mainly engaged in the manufacturing of sporting goods and related products, although they are involved in various business forms. After establishing the traditional multiple regression model according to the theory, the model passed the multiple collinearity test and finally selected the time fixed-effect model and individual random-effect model to estimate the parameters according to the different

characteristics of the panel data. The results of parameter estimation show that bank credit financing (medium- and long-term loans) will play a positive role in promoting the development of the sports industry, through the original hypothesis; bond financing will have a positive impact on the development of the sports industry, but the impact is not significant and did not pass the original hypothesis; equity financing has a significant negative impact on the development of the sports industry, which does not pass the original hypothesis, and the results can be explained. At the same time, the model also passed the robustness test of alternative variables, which shows that the model is robust, and the model can be embedded into the spatial econometric model to consider whether it has spatial correlation or not.

5. Spatial Econometric Test of Capital Market Supporting the Development of Sports Industry

Compared with traditional multiple regression analysis, spatial econometric analysis can incorporate the spatial spillover effects of explained variables, explanatory variables, or random perturbations into the model construction and consider the impact of geographical agglomeration among A-share sports listed companies on the development of the sports industry. Under the background of coordinated regional development and rational flow and efficient agglomeration of factors in China, the spatial effect of the capital market supporting the development of the sports industry is becoming more and more prominent. In order to deepen the empirical cognition of the capital market supporting the development of the sports industry and reveal the spatial effect characteristics of the capital support of A-share sports listed companies, the effectiveness of China's capital market supporting the development of the sports industry will be further tested and analyzed under the framework of spatial econometric analysis.

5.1. Basis of Spatial Metrological Test of Capital Market Supporting Sports Industry Development

5.1.1. Practice Background. Implementing the strategy of coordinated regional development is one of China's major national strategies. It is one of the fundamental driving forces for China's internal economic cycle to promote the development of central cities and city clusters based on a new type of urban development and foster new growth poles. With the deepening of China's regional coordinated development strategy, the adjustment and optimization of the spatial layout of the sports industry is not only an important part of the adjustment of the sports industry structure but also an important measure to promote the regional coordinated development with the rational allocation of industries [12]. The regional characteristics of sports industry development in China are obvious. Central cities and urban agglomerations are becoming the main spatial forms bearing development factors. The spatial links in major urban agglomerations such as the Yangtze River Delta urban

TABLE 5: Parameter estimation results of traditional multivariate linear regression basic model and extended model.

	Model (a)	Model (b)	Model (c)						
Constant	-2.4563	-2.3080	-2.1985	-0.0488	0.9507	2.4304	2.7843	3.6350	3.8600
term	(-1.27)	(-1.19)	(-1.14)	(-0.02)	(0.45)	(2.62)***	(3.09)***	(3.66)***	(3.83)***
Z_1	0.0146	0.0148	0.0148	0.0169	0.0177	0.0057	0.0058	0.0066	0.0067
	(8.32)***	(8.37)***	(8.43)***	(8.95)***	(9.31)***	(6.72)***	(7.04)***	(7.43)***	(7.51)***
Z_2	-0.0129	-0.0133	-0.0133	-0.0111	-0.0117	-0.0051	-0.0056	-0.0045	-0.0047
	(-4.82)***	(-4.89)***	(-5.04)***	(-4.06)***	(-4.32)***	(-3.83)***	(-4.47)***	(-3.41)***	(-3.65)***
Z_3	0.5347	0.5329	0.5310	0.4917	0.4780	0.1864	0.1793	0.1657	0.1612
	(9.72)***	(9.70)***	(9.69)***	(8.72)***	(8.48)***	(7.19)***	(7.02)***	(6.26)***	(6.06)***
Z_4	-0.0262	-0.0280	-0.0273	-0.0207	-0.0254	-0.0112	-0.0119	-0.0095	-0.0098
	(-6.98)***	(-6.43)***	(-6.96)***	(-5.01)***	(-5.57)***	(-5.29)***	(-6.43)***	(-4.82)***	(-4.50)***
X_1		0.0030			0.0075	-0.0012			0.0004
		(0.81)			(1.98)**	(-0.67)			(0.24)
X_2			0.0053		0.0067		0.0009		0.0014
			(1.01)		(1.27)		(0.37)		(0.56)
X_3				-0.0052	-0.0064			-0.0023	-0.0024
				(-3.14)***	(-3.73)***			(-2.92)***	(-2.91)***
Modified degree of fit	0.3985	0.3976	0.3950	0.4228	0.4310	0.3113	0.3038	0.3355	0.3264
F statistics	11.8833	11.1184	11.0121	12.2299	11.2478	7.9309	7.6906	8.7400	7.5554
D-W value	0.6528	0.7328	0.7262	0.6614	0.6672	0.6661	0.6749	0.8313	0.6821

*, **, and *** represent significance at the statistical level of 1%, 5%, and 10%, respectively; the values in parentheses are T statistics; model (a) represents the basic model with (Y) as the explained variable and only included in the control variable; and model (b) represents the extended model with (Y) as the explained variable and included in all explanatory variables. Model (c) represents the extended model that takes the total return on assets (Y_1) as the explanatory variable and includes all the explanatory variables.

agglomeration, Beijing Tianjin Hebei Urban agglomeration, Harbin Great Wall urban agglomeration, Chengdu Chongqing urban agglomeration, the urban agglomeration on the West Bank of the Strait, and the Great Bay area of Guangdong, Hong Kong and Macao will be closer, the administrative barriers will be further weakened, the gathering trend of sports factor resources, including the capital market, will be more obvious, and the flow channels will be more and more smooth. In terms of system and mechanism, represented by regional sports industry development alliance and other forms, the sports cooperation mechanism between provinces and cities in the region will be constantly innovated. In terms of project cooperation, regional joint organizing of competitions and regional sports tourism development will be further implemented. The trend of regional sports industry integration is becoming more and more obvious [13].

5.1.2. Theory Basis. From the perspective of the development process of capital embedding in sports industry, there is a certain positive spatial spillover effect in the development of the sports industry supported by the capital market. According to relevant studies, in general, the development of sports enterprises is not only affected by their own capital market financing conditions but also related to the positive spatial spillover effects of other sports enterprises, such as capital market financing conditions, production efficiency improvement, and resource transfer across regions. With the evolution of the sports industry development stage, the spatial spillover effect of the capital market to support sports industry development is increasing [14]. In terms of bank credit

support, policy-driven bank-enterprise cooperation plays a leading and exemplary role. With the increasing capital attraction of sports industry, sports financial product innovation of banks and other financial institutions has emerged. Under the financial system of the supply chain, the influence of spatial channels of enterprises in the sports industry chain appears [15]. From the perspective of the stock market and venture capital support, due to the existence of sports industry clusters and listed companies, the relevant scale effect and agglomeration effect based on the positive spatial spillover of capital market are more prominent [9]. In the process of institutional innovation and service system improvement of China's capital market, the establishment of the Beijing Stock Exchange and Science and Technology Innovation Board, the implementation of the registration system, the pilot of "investment and loan linkage," and the development of asset securitization have further promoted the positive spatial spillover effect of capital market supporting the development of the sports industry [16].

5.2. Standardization of Variables and Construction of Spatial Weight Matrix. In order to reduce the influence of variables on the construction of the model, the variables are quantified without dimension at first, and the calculation formula is as follows:

$$\text{Variable}^S = \frac{\text{Variable} - @\text{Min}(\text{Variable})}{@\text{Max}(\text{Variable}) - @\text{Min}(\text{Variable})} \quad (3)$$

The scatter diagram of each variable after standardization is shown in Figure 1.

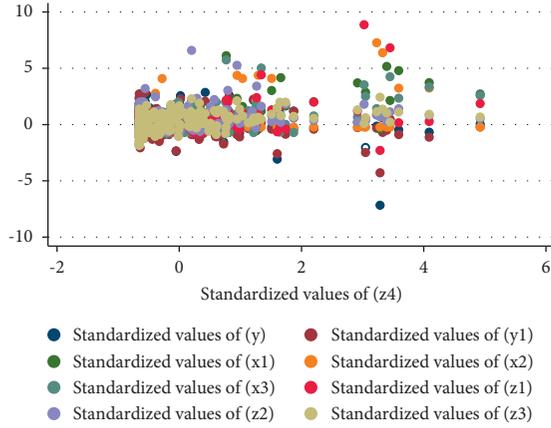


FIGURE 1: Scatter plot of standardized variables.

The determination of spatial weight matrix is very important in spatial econometric test and analysis, which is used to represent the spatial layout of observation variables, and its adjacency is usually expressed by a binary symmetric spatial weight matrix. In view of the different geographical layouts of A-share sports listed companies (Figure 2), this section calculates their spatial weight matrix based on the longitude and latitude distance of 21 A-share sports listed companies. Table 6 uses XGEOCODING V2 Beta software to capture the longitude and latitude of listed companies, calculates the distance between the two according to the Euclidean distance formula, and then determines the specific value of the spatial weight matrix, which is convenient for the calculation of spatial econometric test.

5.3. Spatial Correlation of Capital Market Supporting the Development of Sports Industry. When analyzing the supporting effect of the capital market on the development of the sports industry, there is a spatial spillover effect due to the different regions where A-share sports listed companies are located. In order to further verify the reliability of the results of the traditional multiple regression model, the Moran index is used to test whether there is a spatial correlation between variables. The calculation formula is as follows:

$$\text{Moran's } I = \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} (A_i - \bar{A})(A_j - \bar{A})}{S^2 \sum_{i=1}^n \sum_{j=1}^n w_{ij}}, \quad (4)$$

where Moran's I value indicates the spatial correlation of index A (variables $Y, X_1, X_2, X_3, Z_1, Z_2, Z_3,$ and Z_4), A_i is the attribute value of area i , n is the number of listed A-share sports companies, \bar{A} is the sample mean of the index A , S is the sample standard deviation of the index A , and w_{ij} is the binary adjacent space weight matrix. Using MATLAB software for calculation, the global Moran's I value is 0.076, which passed the 1% significance level test. According to the value range of the Moran index $[-1, 1]$ and the calculated global Moran index is significant and different from zero, it



FIGURE 2: National layout of A-share sports listed companies.

shows that there is a spatial spillover benefit between the capital market and the development of the sports industry, and the spatial measurement model can be used to perform parameter estimation.

In order to further identify the local spatial accumulative effect, the Moran scatter diagram is drawn on the two-dimensional plane, and the index is shown in four quadrants, in which the first quadrant represents the spatial aggregation feature of high-high combination, the second quadrant represents the spatial accumulative feature of low-high combination, the third quadrant represents the spatial accumulative feature of low-low combination, and the fourth quadrant represents the spatial accumulative feature of high-low combination. Figure 3 shows Moran's I scatter chart of the return on net assets of A-share sports listed companies in 2009, 2012, 2014, and 2017. As can be seen from Figure 1, the return on equity of A-share sports listed companies in 2009 and 2012 is relatively scattered and distributed in all quadrants, indicating that there are great differences in the degree of capital support among companies, while Moran's I index in 2014 and 2017 is concentrated in the first and second quadrants, and the overall degree of capital support of listed companies is more balanced in a period of time after 2014. It can be observed that in the study sample, the third quadrant, which represents the low return on net assets, continues to shift to other quadrants over time, which is closely related to the influx of capital into the sports industry and the promotion of the rapid development of the sports industry after the release of the State Council No. 46 in 2014.

TABLE 6: Longitude and latitude of A-share listed sports companies.

Company name replaced by its pinyin initials	Code	Address	Longitude	Latitude
ZTCY	600158	225 Chaowai Street, Chaoyang District, Beijing	116.448418	39.930158
ZQGF	300526	Xin Wei Zhen Chang Bu Cun, Huiyang District, Huizhou City, Guangdong Province	114.36584	22.842287
YPS	002899	Yingpai Industrial Park, No. 369 Huashan Second Road, Jimo District, Qingdao City, Shandong Province	120.412066	36.414107
YJKJ	002605	No. 4218 Cao an Road, Huangdu Town, Jiading District, Shanghai	121.260222	31.281723
XHYL	300043	No. 122, West Huangpu Road, Tianhe District, Guangzhou	113.347533	23.131644
XLJK	002105	Bitou Third Industrial Zone, Songgang Street, Baoan District, Shenzhen City, Guangdong Province	113.812512	22.780385
XWSP	000639	Xiwang Industrial Park, Zouping County, Binzhou City, Shandong Province	117.716379	36.925565
WMSJ	002624	Perfect World Building, 86 Beiyuan Road, Chaoyang District, Beijing	116.429787	40.009839
TLZ	300005	No. 28, Hongfu Science and Technology Park, Beiqijia Town, Changping District, Beijing	116.373079	40.113288
SFHW	002780	No. 23, Chenjiaying West Road, Changping District, Beijing	116.407617	40.046955
RTJK	603579	No. 1226, Zhufeng Road, Qingpu District, Shanghai	121.055707	31.086579
MGD	603908	14/ F, Yiting Building, Hefeng Creative Plaza, 475 Jiangdong North Road, Ningbo City, Zhejiang Province	121.578712	29.891346
LSSC	002858	2/ F, Block 8, 518 Fuquan North Road, Changning District, Shanghai	121.364305	31.233817
LYTY	000558	Leyinda Mansion, No. 535 Wensan Road, Hangzhou City, Zhejiang Province	120.13047	30.282267
JLTY	300651	88 Xingyuan Road, Nanfeng Town, Zhangjiagang, Jiangsu Province	120.662825	31.89182
JSJT	603558	No. 111, Jinyi Road, Xiaoshan Economic Development Zone, Hangzhou City, Zhejiang Province	120.266839	30.214695
GRN	603555	Chendaigou West Industrial Zone, Jinjiang City, Fujian Province	118.608116	24.818701
DDMC	600136	33/ F, Block A, Poly Building, 99 Zhongnan Road, Wuchang District, Wuhan City, Hubei Province	114.341995	30.550007
DFSY	603081	No. 737, Xinjian North Road, Yangming Science and Technology Industrial Park, Yuyao City, Zhejiang Province	121.166688	30.103206
BYLF	002832	No. 608, Xingye Avenue East, Nancun Town, Panyu District, Guangzhou City	113.378384	23.002141
AJH	002614	8/ F, 31-37 Anling Second Road, Huli District, Xiamen	118.165321	24.532178

5.4. *Setting of Spatial Econometric Model.* According to the above research results, the selected financial indicators have complex spatial autocorrelation, which makes the A-share sports listed companies have different degrees of capital support in different spaces. For the financial indicators with spatial dependence, we need to use the spatial econometric model to analyze the relationship between the explanatory variables and the explained variables. Anselin puts forward two kinds of spatial econometric models: general spatial lag model (SLM) and spatial error model (SEM). The spatial lag model can represent the spatial spillover effect of each financial index in a certain area, and the spatial error model mainly discusses the influence of the error impact of the interpreted variables in the neighboring area on the research object [17].

The general expression of the spatial lag model is as follows: y is the explained variable, that is, the rate of return on net assets; ρ is the spatial regression coefficient; W is the binary spatial weight matrix; Wy is the spatial spillover effect of the explained variable, that is, the influence of the capital support of the neighboring region on the capital support of

the region; X represents the explanatory variable matrix; β represents the parameter vector of the explanatory variable, that is, the direction and degree of the influence of the explanatory variable on the explained variable, and ε is the random disturbance term. According to the explained variable and explanatory variable selected in the study, formula (5) can be rewritten into formula (6), and its spatial lag model can be constructed.

$$y = \rho Wy + X\beta + \varepsilon, \quad (5)$$

$$Y = \beta_0 + \rho_1 WY + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + Z_1\beta_1^* + Z_2\beta_2^* + Z_3\beta_3^* + Z_4\beta_4^* + \varepsilon_2. \quad (6)$$

In addition, the spatial error model is based on the differences between financial indicators caused by different geographical layouts of A-share sports listed companies. The general expression is as shown in formula (7). The key point of the construction of the spatial error model is that the spatial dependence of the explained variable is reflected in the random error disturbance term, and the influence degree

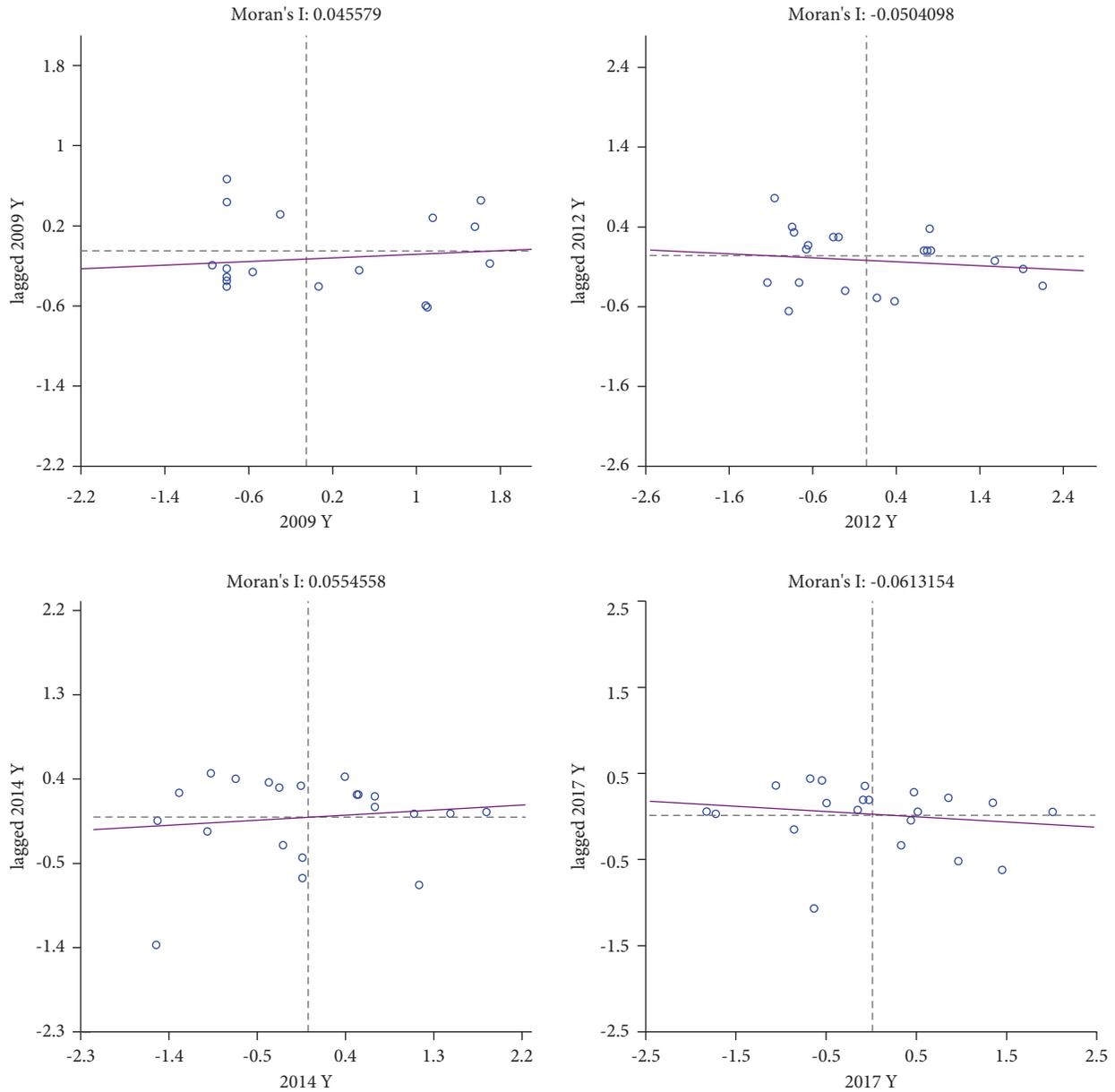


FIGURE 3: Moran's I scatter chart of return on net assets of A-share sports listed companies from 2009 to 2017.

of the error impact of the adjacent region on the explained variable on the research object is described. As a result,

equation (7) can be rewritten into formula (8), and its spatial error model can be constructed.

$$\begin{cases} y = X\beta + \varepsilon, \\ \varepsilon = \lambda W\varepsilon + \mu, \end{cases} \quad (7)$$

$$\begin{cases} Y = \gamma_0 + X_1\gamma_1 + X_2\gamma_2 + X_3\gamma_3 + Z_1\gamma_1^* + Z_2\gamma_2^* + Z_3\gamma_3^* + Z_4\gamma_4^* + \varepsilon_3, \\ \varepsilon_3 = \lambda W\varepsilon_4 + \mu, \end{cases} \quad (8)$$

where ε represents the random error vector of the explained variable; λ is the spatial error coefficient of the rate of return on net assets; and μ is the random error vector and obeys the normal distribution.

5.5. Results and Analysis of Spatial Metrological Test

5.5.1. *Estimation Results.* Because the data samples selected in this section are standard panel data, we are faced with the

problem of choosing a random- or fixed-effect models. Elhorst proposed that the fixed-effect model is more explanatory when the sample is some specific individuals [18]. In this section, 21 A-share sports listed companies are selected, so the spatial fixed-effect model is better than the spatial random-effect model, and the results of the Hausmann test show that there are significant fixed effects, so the spatial lag fixed-effect model and spatial error fixed-effect model will be used for analysis. It includes time fixed-effect model, space fixed-effect model, and space-time double fixed-effect model [18].

The parameter estimation results of the spatial lag and spatial error models based on the capital market supporting the development of the sports industry are shown in Table 7. Through the LM test, which is more explanatory, the lag model or the error model can be tested. Generally speaking, first of all, compare the significance level of LM-Error and LM-Lag and give priority to the model with a high significance; if the test results of both are similar and significant, then we need to further compare the model with high significance level of Robust LM-Error and Robust LM-Lag, which means that the fitting effect of the data is better. According to the results of the LM test, in the case of Y as the explained variable, the significance level of LM-Lag is higher (0.000), while that of LM-Error is relatively low (0.021). Compared with Robust LM-Lag and Robust LM-Error, it is found that the significance level of the lag model is still higher (0.000), while that of the error model is relatively low (0.087). From the further comparison and analysis of the parameter estimation results, it can be found that the fitting degree value of the modified spatial lag model is obviously larger than that of the spatial error model, and the log-likelihood value of the spatial fixed effect in the spatial lag model is higher than that of other models. Therefore, the spatial fixed-effect model is the best in the spatial lag model.

5.5.2. Empirical Analysis. According to the estimation and significance level of relevant parameters in Table 7, on the whole, the test results of the spatial lag fixed-effect model based on spatial autocorrelation are consistent with the analysis of the traditional multiple regression model above, focusing on the mechanism and effect of capital market supporting the development of the sports industry. There are some spatial effects and structural characteristics in the capital market supporting the development of the sports industry.

First, geographical proximity has a significant positive impact on the development of the sports industry supported by the capital market. Compared with the goodness of fit of the traditional multiple regression model and the spatial lag model, the spatial lag fixed-effect model is better than the traditional multiple regression model, and it is more reasonable to include the spatial dependence effect in the regression analysis. The above estimation results show that the spatial autoregressive coefficient ρ of the spatial lag model is 0.205, which is significant at the statistical level of 1%, indicating that the capital market supports the development of

the sports industry and has a positive spatial spillover effect. The performance and capital support influence of the sports listed companies are transmitted or superimposed to the adjacent sports listed companies through the transmission mechanism. The development of the adjacent sports capital market is conducive to the improvement of the capital support level of the development of the local sports industry. From 2012 to 2019, the added value of China's sports industry grew at an average annual rate of 23.7%, and regional sports industry clusters and sports industry integration continued to develop. Under the background of the rapid growth of the sports industry scale and the evolution of agglomeration form, it is more and more important to promote the reasonable flow and efficient allocation of sports industry resource elements through capital market and improve the development efficiency of the sports industry.

Second, the agglomeration effect of the capital market to support the development of the sports industry is increasing and showing certain regional characteristics. From the local spatial correlation test results, the spatial difference degree of A-share sports listed companies' capital support changes in the time dimension. Moran's I index data in 2009, 2012, 2014, and 2017 show that the regional correlation of the development of listed sports companies shows an overall trend of improvement. The number of sports enterprises in the high-high agglomeration area and the low-high agglomeration area keeps increasing, while the number of sports enterprises in the low-low agglomeration area significantly decreases. With the continuous release of the agglomeration effect of sports industry development, the overall benefits of sports industry development and the development pattern of regional sports industry continue to expand, and the important role of capital market in supporting the promotion of regional sports industry competitiveness is increasingly prominent. The construction and improvement of the capital market infrastructure such as Beijing Stock Exchange, Shanghai Stock Exchange, and Shenzhen Stock Exchange are of great significance to the formation of regional sports industry advantages and the promotion of high-quality development of the sports industry.

Third, the structure characteristics of the capital market's influence on the development of the sports industry are obvious. According to the parameter estimation results of the spatial fixed lag model, the coefficient of bank credit financing is positive (0.022) and significant at the statistical level of 1%, which indicates that bank credit financing plays a positive role in promoting the development of the sports industry. Therefore, hypothesis 1 is valid, but its contribution to the growth and development of the sports industry is not high. The coefficient of bond financing is positive (0.015), but it does not pass the significance level test. Therefore, bond financing has a positive but insignificant impact on the development of the sports industry, so hypothesis 2 is not valid. The coefficient of equity financing is negative (-0.002), which is significant at the statistical level of 1%, indicating that the equity market has a reverse change relationship to the development of the sports industry, so

TABLE 7: Estimation results of spatial econometric parameters of capital market supporting the development of the sports industry.

Variable	Spatial error model (SEM)			Spatial lag model (SLM)		
	Time fixed	Spatial fixation	Space-time double fixation	Time fixed	Spatial fixation	Space-time double fixation
Bank credit financing, X_1	0.006 (0.004)	0.013*** (0.004)	0.011*** (0.004)	0.016*** (0.002)	0.022*** (0.002)	0.012*** (0.002)
Bond financing, X_2	0.009* (0.005)	0.005 (0.005)	0.001 (0.005)	0.001 (0.003)	0.015 (0.003)	0.015 (0.003)
Equity financing, X_3	-0.006*** (0.002)	-0.009*** (0.002)	-0.004*** (0.002)	-0.004*** (0.002)	-0.002*** (0.004)	-0.025*** (0.021)
Retained earnings financing, Z_1	0.018*** (0.002)	0.016*** (0.002)	0.014*** (0.002)	0.014*** (0.001)	0.023*** (0.002)	0.008*** (0.004)
Commercial credit financing, Z_2	-0.013*** (0.002)	-0.009*** (0.003)	-0.006** (0.003)	-0.014*** (0.002)	-0.023*** (0.003)	-0.017*** (0.002)
Asset-liability ratio, Z_3	0.438*** (0.055)	0.510*** (0.053)	0.597*** (0.054)	0.284*** (0.036)	0.284*** (0.036)	0.284*** (0.036)
Short-term bank loan, Z_4	-0.024*** (0.004)	-0.033*** (0.005)	-0.033*** (0.005)	-0.027*** (0.003)	-0.030*** (0.003)	-0.021*** (0.003)
Intercept, _cons				1.786 (1.319)	1.926 (1.319)	1.346 (1.319)
Spatial error regression coefficient, λ	0.101** (0.042)	0.103** (0.042)	1.000*** (0.000)			
Spatial autoregressive coefficient, ρ				0.315*** (0.029)	0.205*** (0.029)	0.415*** (0.029)
Variance estimation of random disturbance term, σ_2_e	111.727	96.907	0.000** (0.000)	52.628	39.628	44.628
Log-likelihood function value, lgt_theta				0.3232 (0.330)	0.426 (0.423)	0.381 (0.326)
Sample size, N	231		231	231	231	231
The revised fit, $r2_a$	0.3854	0.3678	0.2940	0.3952	0.4482	0.3933

*, **, and *** are significant at the significant level of 1%, 5%, and 10%, respectively, and the values in parentheses represent the T statistics of each estimated coefficient.

hypothesis 3 is not valid, and the result is consistent with the traditional multiple regression model. On the whole, the main channel function of bank credit support for sports industry development is not fully played, the guarantee of bond financing is insufficient, and the development of equity financing is insufficient, which is related to the characteristics of China's overall financial system with bank indirect financing as the main body and the development stage of financial repression.

Fourth, the estimation results of spatial fixed lag parameters of control variables are consistent with those of traditional multiple regression models. Among them, retained earnings financing and asset-liability ratio have a significant positive impact on the development of the sports industry, and the asset-liability ratio has a stronger correlation with the development of the sports industry. Through bank lending, issuing bonds and so on, to achieve a certain level of asset-liability ratio, is conducive to the improvement of sports enterprises' own performance. In addition, commercial credit financing and short-term bank loans have a certain negative impact on the development of the sports industry. At the level of micro sports enterprises, we should pay attention to the application of "investment and loan linkage" and supply chain finance in the sports field. The increasingly rich sports financial product innovation of financial institutions will become a strong support for the growth and high-quality development of the sports industry.

6. Analysis of the Effect of Capital Market Supporting the Development of Sports Industry

6.1. Capital Promotes the Development of Sports Industry with Spatial Agglomeration Effect. From the geographical location of A-share sports listed companies in the country and the spatial measurement model constructed, it is proved by the spatial autocorrelation test that there is a spatial accumulative effect in the support of capital market to A-share sports listed companies. Capital is obviously pooled to the eastern coastal areas, including the Yangtze River Delta, Guangdong Province, Fujian Province, and Shandong Province. We must pay attention to the contribution of sports listed companies to the growth of sports industry and the transformation of sports industry structure in the region. For sports listed companies, they rely on regional capital accumulation to absorb and integrate production factors, expand production and operation scale, and realize diversified development of business. For the development of regional sports industry, it integrates the regional advantages in capital, talents, and technology, combined with the financing demand characteristics of sports listed companies, so as to realize the upgrading of regional sports industrial structure and the coordinated development of regional sports industry. First, the location choice and strategic layout of sports listed companies are the results of a comprehensive

evaluation of regional factor endowment, market scale and demand, government support, economic development, and other factors. LSSC is attached to Shanghai's good foundation for the development of the automobile industry and automobile sports, and since 2004, F1 Chinese Grand Prix has been held in Shanghai, which has gradually cultivated Shanghai motorsports. LSSC as a leading enterprise in automobile sports, the company's strategic layout of automobile production and marketing centered on Shanghai Tianma Racecourse has begun to take shape. Many listed sporting goods manufacturing companies settled in Fujian Province are also a typical case. Fujian Province is moving towards the construction of the country's largest sporting goods manufacturing base, the world-famous modern sports and intelligent sporting goods manufacturing base; sporting goods manufacturing industry has become the pillar industry of Fujian sports industry. Second, sports listed companies form the core network resources in the region, which often combine the upstream and downstream enterprises of the relevant industrial chain and similar small- and medium-sized enterprises vertically and horizontally with the help of scale, capital, and other advantages. As a supplier of outdoor products, TLZ is gradually realizing the transformation from products to outdoor services. Since 2013, in order to create one-stop outdoor services, TLZ has shifted from single outdoor products to products + services and has continuously built a complete outdoor ecological industrial chain from online and offline markets. Capital operation behavior is reflected in the acquisition of an online outdoor platform and then invested in the "extremely beautiful" north and south pole travel business of a travel agency while taking a stake in a Xiamen Outdoor supply company. Third, sports listed companies take advantage of the capital market to carry out mergers and acquisitions, which not only can diversify the company's business but also can achieve economies of scale. XHYL acquired a Spanish first division football club for 101.7881 million euros in 2015 to open up the sports competition and marketing chain by cutting into the IP, in the upper reaches of the sports industry chain. As a result, the driving and radiation effect of the location layout of sports listed companies will inevitably lead to changes in regional spatial structure and play a role in the development of the regional sports industry through the effect of capital allocation.

6.2. The Relationship between the Supporting Role of Capital Market and the Development Stage of Sports Industry. From the perspective of the industrial life cycle, the development of China's sports industry is still in the early stage of formation and development, which not only has broad development prospects but also has great difficulties and challenges. The main results are as follows: (1) the sports industry has good growth, and the sports capital market is becoming more and more active under the guidance of the policy. The stock market can often see the operation of listed companies; there is no lack of sports listed companies with good performance in the stock price. For example, driven by the market led by "Great Health,"

XWSP acquired a well-known global sports nutrition company, greatly increased the company's performance, and raised funds through nonpublic offerings, the market performance is better. However, due to the long time limit for the cultivation of the sports industry market and the vague profit model of many sports enterprises, they are vulnerable to the impact of market spread and economic downturn in the face of homogeneous competition. Since 2019, the income of expensive people's clothing has declined greatly, and the number of franchise stores has decreased significantly. The company has been relying on the blocked sales channels of offline stores, and the company has fallen into financing difficulties and predebt repayment pressure. (2) The sports industry has outstanding characteristics of "light assets." On the one hand, it is conducive to enterprise innovation, and on the other hand, the property rights trading market is not yet mature, and the difficulty of asset mortgage makes enterprises fall into financing difficulties. DDMC had continuously innovated its business model, realized the two wheel drive of "film and television + sports," acquired a sports copyright leading Xinying sports enterprise, and had the ability of content production and integrated marketing to form a diversified business model and cash realization model. For sports tangible assets such as equity, equipment, equipment, and so on, intangible assets such as copyright, event operation rights, advertising sponsorship rights, and other rights conversion transactions are less; sports resources trading mechanism lags behind. (3) There is still a big gap between the financing needs of the capital market and the development of the sports industry. Capital flows to various micro-market entities under the action of the market mechanism, and the current development of China's sports industry is inseparable from the strong support of policies at the national level. In the short window period after 2014, huge amount of capital poured into enterprises in good condition. However, compared with other listed companies, the display of relevant financial indicators of sports listed companies is poor, and the capital tends to be calm quickly. In 2019, the investment and financing cases of domestic sports-related start-up companies were less than 1 billion yuan in 2018, and there were only 6 big orders at the level of 100 million yuan, which was significantly less than 23 in the same period previous year. (4) With the gradual emergence of the transformation trend of the sports industry structure from the manufacturing owner to the service industry, e-sports and fitness have become important areas of concern in the current capital market. WMSJ is the game company with the highest R & D investment in A shares. The company has ushered in a product explosion in recent years. Mobile game revenue in 2019 was 3.881 billion yuan, an increase of 43.15% over the same period last year. It has become a pillar business of the company, and the arrival of the 5G era has also made cloud games more mature. To gain more market share for WMSJ in the game market. The fitness industry for content, mode, experience, and other personalized services, deeply taps the diverse needs of fitness users and, at the same time, combined with intelligent technology has broad financing prospects.

6.3. Different Types of Capital Markets Have Insufficient Effect on the Development of Sports Industry. From the results of traditional multiple regression analysis and spatial econometric analysis, the support degree of the bank credit market, bond market, and equity market to the development of the sports industry is not high. The indirect financing mode under the guidance of bank credit is still the main way of capital support in the primary stage of the development of the sports industry, but due to the lack of credit mechanism between the sports industry and banks, the support of the bank credit market is far from meeting the requirements of the high growth rate of the sports market. In addition, the micro-main body of the sports industry involves many and scattered forms of business, and there are different financing needs for sports venues and facilities management, sports competition performance activities, and other sports services. In addition, banks provide mortgage credit support to enterprises with state-owned backgrounds or real estate, equipment manufacturing, and other attributes, but credit methods for other forms of credit have not yet formed a standard. Equity financing should play a higher role in promoting the development of the sports industry. The “light assets” characteristics of the sports industry determine that it needs the promotion of equity capital that can bear certain risks, but due to the unclear profit model of sports enterprises, it is also limited to the imperfect system and mechanism of the capital market, the rigidity of the stock issuance mechanism, and other problems, such as the high threshold for the listing of sports enterprises, the high transaction cost of the stock market, and the low efficiency of equity transactions in the sports industry. It also increases the difficulty for sports listed companies to use capital to transform and upgrade. As far as bond financing is concerned, sports listed companies themselves need to bear huge risks in issuing bonds, which most sports listed companies avoid because of the problems such as low general value of intangible assets and low credit of issuing bonds. It is difficult for sports listed companies to raise funds by issuing bonds.

7. Conclusion

This paper focuses on the development and effectiveness of China’s sports capital market and uses the data of A-share sports listed companies to conduct spatial econometric inspection and analysis on the mechanism, effect, and characteristics of the capital market supporting the development of the sports industry. The main conclusions are as follows:

- (1) Capital market has a differentiated influence on the development of the sports industry. Indirect financing channels with bank credit as the main body play a more obvious role; bond market, equity investment, and other support are not prominent. The structural effect of the sports capital market needs to be optimized.
- (2) The agglomeration effect of sports industry development and sports capital market appears. The exertion of the resource allocation effect of the capital

market is conducive to the reasonable flow and efficient agglomeration of the resource elements of the sports industry and to the promotion of the competitiveness of the regional sports industry and the high-quality development of the sports industry.

- (3) The spatial dependence of the capital market to support the development of the sports industry is increasing. The development of the sports capital market has a positive spatial spillover effect. In the process of capital market construction and system perfection, the spatial effect of sports industry development capital support is more and more obvious.

The development of the sports industry supported by the capital market is an important content of supply-side structural reform of China’s sports industry. In the new development stage, the effectiveness of the sports capital market is more closely related to the high-quality development of the sports industry, and the structural contradictions and spatial characteristics of the development of the sports capital market are more prominent. Complying with the development needs of the sports industry and the law of the role of the capital market and constantly improving the efficiency of the capital market to support the development of the sports industry are the internal requirements and realistic choices to promote the high-quality development of the sports industry in the new stage. We should tap the functional potential of the existing sports financial system, ensure the basic supply channels of the sports capital market, encourage financial institutions to carry out the innovation of sports financial support tools, and expand the development space of the sports industry supported by the banking industry. Highlight the spatial governance and regional coordinated development of sports capital market, constantly improve the regional coordinated infrastructure of sports capital market, support qualified local sports enterprises to issue bonds and go public for financing, and give play to the leading role of regional sports capital market development. We will pay attention to the construction of sports capital market system and institutional innovation, take the establishment of the Beijing Stock Exchange as an opportunity to strengthen the direct financing service to the physical economy of sports, support the innovation and development of the sports industry subjects including small- and medium-sized sports enterprises, and further optimize the spatial layout of sports capital market. In addition, in view of the development of the sports industry and the reality of capital market innovation, it is necessary to continuously strengthen the research on sports capital market and relevant international comparison and continuously push forward the understanding and practice of the role of sports capital market and its influence on the development of the sports industry.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

- [1] F. Liu, "Implementing the "Opinions of the general office of the state council on promoting the national fitness and sports consumption and promoting the high-quality development of the sports industry" to promote sports industry to become a pillar industry of China's national economy," *China Sport Science*, vol. 39, no. 10, pp. 3–10, 2019.
- [2] Y. I. Huiman, "Increase the proportion of direct financing," *Economic Daily*, pp. 12–21, 2020.
- [3] S. Xiang-xiang, X.-l. Zhou, and H. Liang-xiong, "Development of capital market and upgrading of industrial structure," *Review of Industrial Economics*, no. 25, pp. 86–104, 2018.
- [4] J. Xu and J. Sun, "Synergetic evolution of sports industry and financial supply: theoretical and empirical study," *Journal of Tianjin University of Sport*, vol. 35, no. 6, pp. 672–678, 2020.
- [5] G. Yi, "Revisiting China's financial asset structure and policy implications," *Economic Research Journal*, vol. 55, no. 3, pp. 4–17, 2020.
- [6] P. Cai, H. Yang, and X. Wang, "Financing structure of Chinese sports listed companies," *Journal of Sports Adult Education*, vol. 36, no. 3, pp. 29–34, 2020.
- [7] Y. Xun, *The Impact of Financing Methods on Industrial Structure Upgrading*, Shanghai Academy of Social Science, Shanghai, China, 2019.
- [8] Y. Huang, "Promote high quality development with financial innovation," *New Finance Review*, no. 4, pp. 1–33, 2019.
- [9] Q. Zhu, *The Allocation Effect of China Sport Capital Market*, Shanghai University of Sport, Shanghai, China, 2018.
- [10] J. Huang, Z. Zhao, J. Shi, and M. Jiang, "Research on financial support to the development of strategic emerging industry in Jiangsu province—based on empirical analysis of listed companies," *Science and Technology Management Research*, vol. 36, no. 2, pp. 95–100, 2016.
- [11] X. He, *Capital Market Development and Strategic Emerging Industry Growth Research Review*, Chinese Academy of Social Sciences, Beijing, China, 2013.
- [12] H. Huang, "Strategic thinking on promoting sports industry to become a pillar industry of the national economy," *China Sport Science*, vol. 40, no. 12, pp. 3–16, 2020.
- [13] T. Lian and H. Huang, "Research on spatial structure of integrated development of sports industry in Yangtze river delta," *China Sport Science*, vol. 40, no. 10, pp. 21–30, 2020.
- [14] Y. Tao, *Research on the Capital Market Support Mechanism for the Development of China's New Energy Industry*, Lanzhou University, Lanzhou, China, 2019.
- [15] P. Chen and B. Liu, "Research on financing mode innovation of sports goods manufacturing enterprises in China based on blockchain technology," *Journal of Sports Research*, vol. 34, no. 1, pp. 12–20, 2020.
- [16] Y. Huang, "Understand the supply-side structural reform of finance," *China Review of Political Economy*, vol. 11, no. 1, pp. 149–162, 2020.
- [17] L. Anselin, "Local indicators of spatial association-LISA," *Geographical Analysis*, vol. 27, no. 2, pp. 93–115, 1995.
- [18] J. P. Elhorst, "Specification and estimation of spatial panel data models," *International Regional Science Review*, vol. 26, no. 3, pp. 244–268, 2003.