



Effect of Financial Input and Market Mechanism on the Development of the Sports Industry

Sizhuo Li¹ Shanshan Ye^{2,*} Lingfeng Ye³

¹*School of Economics and Commerce, Guangdong University of Technology, Tianhe, Guangzhou, Guangdong, China*

²*The Financial Department, Shaoguan University,*

³*College of Economy, Shenzhen University, Nanshan, Shenzhen, Guangdong, China*

* *Shanshan Ye. Email: yeshanshan2020phu@gmail.com*

ABSTRACT

Combined with the new industrial development, the vector autoregression model covering sports market activity and sports financial investment, the added value of the sports industry is constructed by selecting a time series data from 2006 to 2020 in China to realize scientific research on the key factors affecting the development of the sports industry. The results show that: (1) Compared to the sports financial input, sports market activity has a long-term and significant effect on promoting the development of the sports industry; (2) Improving the vitality of the sports market, widening the channel for sports industry financing and investment, and promoting the standardized operation of sports industry capital market is expected to enhance the positive driving effect of the market mechanism on the high-quality development of the sports industry.

Keywords: *sports industry, financial input, market mechanism, vector autoregression model*

1. INTRODUCTION

As an emerging field with a high degree of industrial integration and strong correlation, the sports industry has effectively stimulated the development of retail, tourism, media, and other industries with its unique business types, employment direction categories, and professional systems and mechanisms, thus promoting the benign development of the national economy^[1]. From 2015 to 2019, the total size of China's sports industry jumped from 1.71 trillion yuan to 2.95 trillion yuan, with an average annual growth rate of 14.6% which far exceeds China's gross domestic product (GDP) growth rate. In October 2021, The General Administration of Sport of China issued the "14th Five-year Plan for Sports Development" (hereinafter referred to as the "Plan"), which clearly stated that the total scale of China's sports industry would reach 5 trillion yuan by 2025.

In recent years, based on the effective data before and after the background of sports marketization, relevant research on sports marketization comprehensively analyze the influence of different factors on the sports industry^[1-7]. To further explore the influence of different factors on the sports industry, this article explores the inherent relation of government financial investment, market mechanism, the driving force of government

financial investment, and the market activity level of the sports industry to the development of the sports industry, thus putting forward relevant policy suggestions to promote high-quality development of the sports industry and providing a theoretical foundation for the potential mining of the sports industry.

2. STATUS ANALYSIS

At present, China's economic operation presents three characteristics: the economy has shifted gear from the previous high speed to a medium-to-high speed growth, the economic structure is constantly being improved and upgraded, and the economy is increasingly driven by innovation instead of input and investment. Figure 1 shows that China's GDP growth has slowed in recent years, especially since 2020, when the epidemic status and complex external circumstances became serious. Therefore, to offset downward economic pressure, China needs to speed up the transformation of the pattern of economic development, actively cultivate emerging industries with high-growth potential, encourage investment in high value-added manufacturing and service industries, and create new economic growth points.

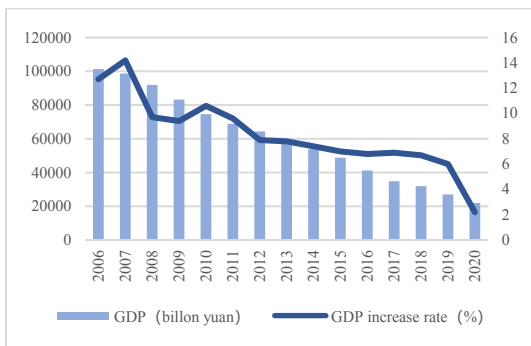


Fig. 1 Absolute value and annual growth rate of China's GDP from 2006 to 2020

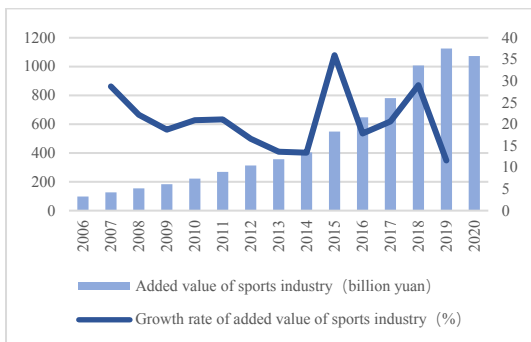


Fig. 2 Added value and growth rate of China's sports industry from 2006 to 2020

By comparing Figures 1 and 2, it can be seen that the growth rate of the output value of China's sports industry is much higher than that of China's GDP. Combined with its characteristics of the high added value of products, low resource consumption, and strong industrial correlation, the sports industry contains great development potential to become a pillar industry of the national economy.

After the release of "Several Opinions of the State Council on Accelerating the Development of Sports Industry and Promoting Sports Consumption" (hereinafter referred to as the "No. 46 Document"), the activity of the sports market increased significantly, in addition to the added value and growth rate of the sports industry. It can be seen from Figure 3 that the annual turnover of the sports index reached an interval peak in 2014; further, the added value of the sports industry reached a peak in 2015. It can be seen that the "No. 46 Document" pushed the development of the sports industry into a new development stage. Since 2014, the development trend of the added value of the sports industry has been similar to that of the sports market volume, showing that sports marketization has increased to a higher degree and larger extent. However, because of the uncertainty and risk of the capital market, sports market activity fluctuates significantly, thus hindering the stable development of the sports industry.

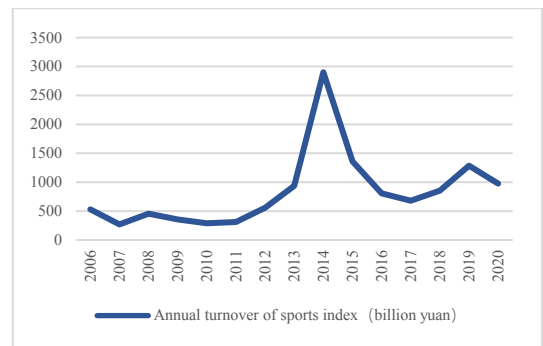


Fig. 3 Annual turnover of the sports index from 2006 to 2020

As the fiscal policy remained stable over the period (Figure 4), the ratio of sports financial investment to GDP stabilized at 1%, guaranteeing the basic sports public services and the development of recreational sports. However, to realize the role of the driving function of the sports industry, it is necessary to foster new growth drivers.

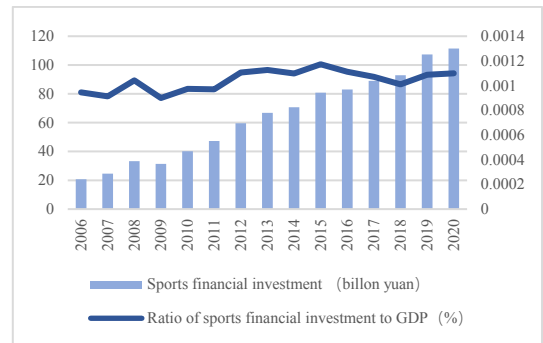


Fig. 4 Ratio of sports financial investment to GDP from 2006 to 2020

3. EMPIRICAL ANALYSIS

The vector autoregression (VAR) model was introduced into economic research by the economist Christopher Sims. The theoretical essence of VAR is that by examining the dynamic interaction between the system of multiple variables, the system thinks about all the endogenous variables in the model as the lag value of the endogenous variable to establish the model. This method, which can not only effectively solve the artificial variables bias, but also better analyze the dynamic images among variables, has been widely used in macroeconomic analysis. Therefore, employing the VAR model, Granger causality test, impulse response analysis, and variance decomposition, this paper empirically analyzes the dynamic effects of sports financial investment (F), sports market activity (M), and economic growth of the sports industry (Y).

3.1. Variable selection and data description

Selecting the time series data from 2006 to 2020, this paper uses the sports financial input to represent the

government’s sports input, uses the annual turnover of the sports market index of the Wind database to represent the marketization degree of the sports industry, and uses the added value of the sports industry to represent the development level of the sports industry. Among the variables, the data on the added value of the sports industry is derived from the annual data announcement of the Department of Sports Economics of the General Administration of Sport of China, the annual turnover of the sports market index is based on the Wind database, and the data of sports financial investment from 2006 to 2012 is derived from the relevant literature “Sports Financial Input, Sports Development and Economic Growth” (Zhang Yu, 2015).^[2-8] Simultaneously, the research found that there is a long-term stable proportional relationship between sports financial investment and national financial expenditure on culture, sports, and media in the national statistical yearbook. Therefore, this paper uses the calculation method of public data and relevant literature (Zhang Yu 2015) to estimate the data on sports financial investment from 2013 to 2020.

3.2. Stationarity test

The data used in the time series model should be stable. Therefore, before building the vector autoregression model, the Augmented Dickey-Fuller Test, which is the most common method of unit root test, is first used to test whether the time series mentioned above is stationary, using various information criteria to select the optimal lag intervals for endogenous. The test identified that sports financial investment (F) and annual turnover of sports market index (i.e., sports market activity, M) reject the null hypothesis that the unit root exists at the significance level of 5%, thus indicating that the variables are stable series and that the added value of the sports industry becomes stable data at the significance level of 5% after logarithmic processing. See Table 1 for relevant test results.

Table 1 ADF unit root test results

Variable	ADF test		Inspection results
	T statistic	P values	
F	3.985600	0.0053	Smooth
M	2.469893	0.0315	Smooth
Y	0.984436	0.3481	Not smooth
Ln(Y)	6.839250	0.0000	Smooth

3.3. Establishment of vector autoregression model

Three stable time series that have passed the test are selected to establish the VAR model, including the logarithmic series of the added value of sports industry (LnY), sports financial investment (F), and annual turnover of sports market index (M).

Different lag intervals for endogeneity may lead to completely different empirical results. Therefore, the lag length must be judged before the VAR model is constructed. According to the Akaike information criterion, Schwarz criterion, and likelihood ratio test, the lagged differences of the VAR model are selected. It can be seen from Table 2 that each criterion indicates that the optimal lag period is 1. It can be seen from Figure 5 that the reciprocals of the characteristic root modules of VAR (1) model are all less than 1 and are located within the unit circle. As such, it can be concluded that VAR (1) model is relatively stable. Thus, the first-order VAR model is constructed as follows:

$$\begin{bmatrix} LnY_t \\ M_t \\ F_t \end{bmatrix} = \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix} \begin{bmatrix} LnY_{t-1} \\ M_{t-1} \\ F_{t-1} \end{bmatrix} + \begin{bmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \end{bmatrix} \quad (1)$$

Using the ordinary least square method, the regression estimation of the model shows that the final goodness of fit of the model is 99.27%, indicating that the fitting effect of the model is good.

Table 2 Selection of VAR lag period

Lag	0	1	2
LogL	211.668	173.351	169.0644
LR	NA	53.05446 *	3.9565
FPE	4.42 e+10	5.17 e+08 *	1.47 e+09
AIC	33.0258	28.51547 *	29.24067
SC	33.15617	29.03696 *	30.15328
HQ	32.999	28.40828 *	29.05309

Note: * represents the optimal lag length selection

Inverse Roots AR Characteristic Polynomial

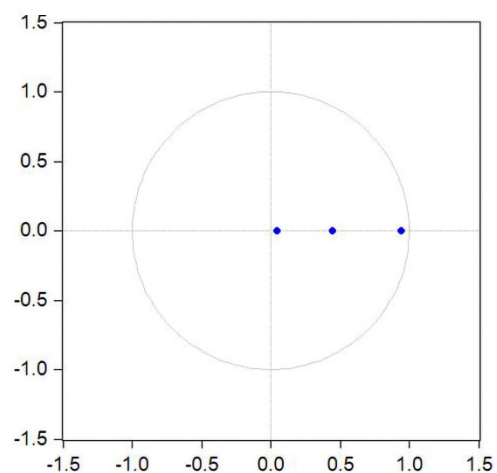


Fig. 5 Stability test results of VAR (1) model

3.4. Granger causality test

The test results in the economic model show that some variables are significantly correlated, but these relations do not all have reasonable economic significance. However, Granger causality can be used to

test whether the lagged variable can affect the current value of other variables. Therefore, based on the established VAR (1) model, the VAR Granger causality test is used to analyze the causal relationship between sports market activity (M), financial investment (F), and added value of the sports industry (Y).

Table 3 Granger causality test results

Dependent variable	Exogenous variables	Chi - sq statistics	Degrees of freedom	P values	Results
LnY	M	3.997837	1	0.0456 *	Refuse
	F	1.410039	1	0.2350	Accept
	All	4.011909	2	0.1345	Accept

Note: All represent the joint test of causality between two exogenous variables and dependent variables, * represents the significance level of 5%

The null hypothesis of the VAR Granger causality test is that exogenous variables are not Granger causes of the dependent variables. It can be inferred from Table 3 that, at the significance level of 5%, sports market activity is the Granger cause of the increase of sports industry output value, while sports financial investment is not the Granger cause of the increase of sports industry output value.

3.5. Impulse response analysis

The VAR model is a non-theoretical model. As such, there is no need to make priori constraints on all variables in the model. Therefore, in the process of studying VAR, it is better to use impulse response functions to analyze the dynamic influence on the whole system when the model is affected by certain factors, than to study how the change of a variable affects other variables.

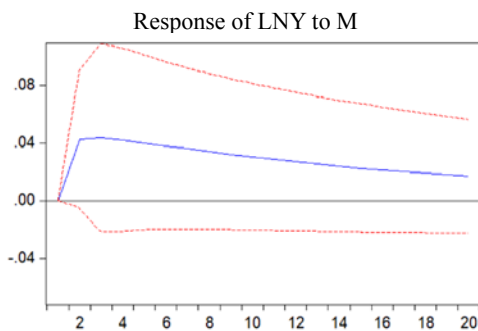


Fig. 6 Impulse response of sports market activity to the added value of the sports industry

Figure 6 is the impulse response diagram of the sports industry added value caused by a 1% increase in sports market volume. It can be observed that for the positive impact of one standard deviation of sports marketization level, the added value of the sports industry begins to increase significantly, reaches a peak 2 years later, and then maintains stable development. The result shows that sports market activity has a positive far-reaching influence on the growth of sports industry output value.

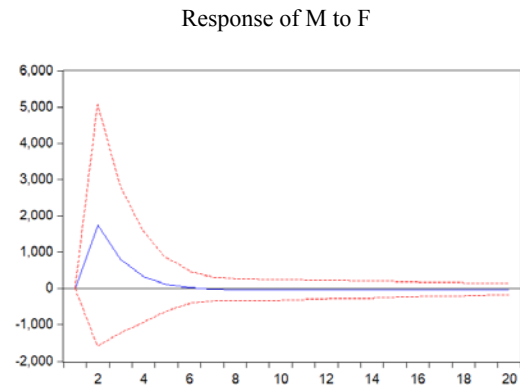


Fig. 7 Impulse response of sports financial input to sports market activity

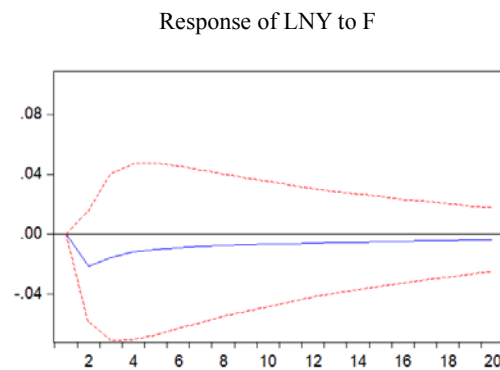


Fig. 8 Impulse response of sports financial investment to the added value of the sports industry

Figures 7 and 8 show the impulse response of sports market activity and sports industry added value caused by a 1% change in financial investment in sports. It can be observed that for the impact of one standard deviation of the government’s sports financial investment, the added value of the sports industry decreases slightly in the short-term, and the impact is close to zero in the long-term. However, the impact of sports financial input promotes the increase of market activity in the short-term, while the long-term impact tends to be zero, indicating that sports financial input cannot directly promote the economic development of the sports industry, but can indirectly promote the economic development of the sports industry by sending positive signals to stimulate the market capital flow to the sports industry in the short-term.

Sports financial investment promotes sports market activity in the short-term, and the effect gradually decreases after 2 years and approaches zero after 5 years. As shown in the figure, government fiscal policies guide the capital market in the short-term. At the beginning of the marketization of the sports industry, government financial investment can stimulate the activity of the sports market, but in the long-term, the sports market must generate a wholesome and stable market environment and explore the mechanisms for sustaining

the steady and sound development rather than rely heavily on the government’s financial support.

3.6. Variance decomposition

Variance decomposition is undertaken by decomposing certain variables into different parts and analyzing the contribution degree of each structural impact to the endogenous variable, where the impact degree of each structural impact can be evaluated. Variance decomposition can provide the key information of random disturbance that causes changes in various variables in the VAR model. Therefore, variance decomposition is adopted to study the contribution degree of sports financial input (F) and sports market activity (M) to the added value of the sports industry (Y). Based on the VAR (1) model, the standard error (LnY) of the sports industry added value is decomposed into three parts.

It can be observed from Figure 9 that the added value of the sports industry declined significantly in the first and second periods under the impact of its fluctuations, and then maintained a slight downward trend. The impact effect of sports market activity on the economic growth of the sports industry increased sharply in the first and second periods, increased to 20% in the third period, and then maintained a slightly rising trend. However, sports financial investment has a limited effect on the economic growth of the sports industry. It illustrates that the sports industry economy is strongly impacted by sports market activity.

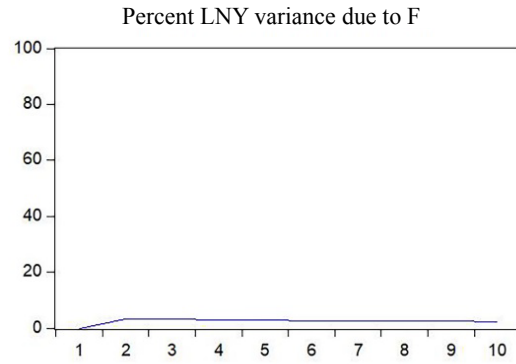
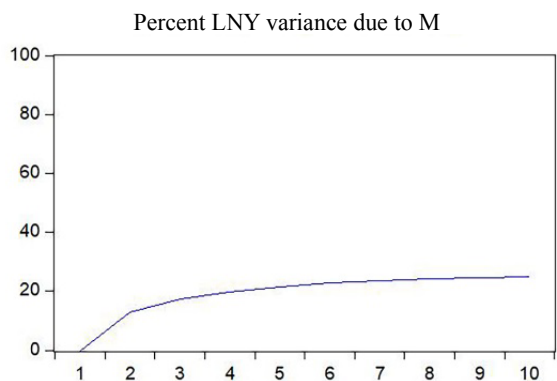
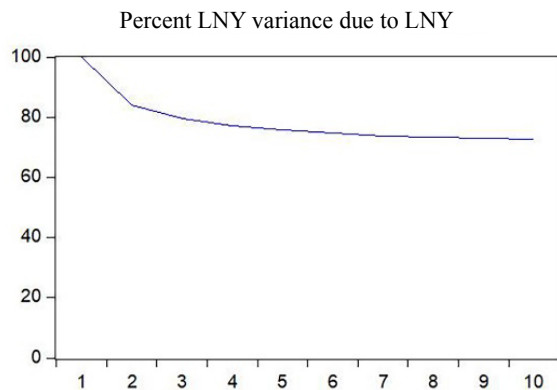


Fig. 9 Variance decomposition results of the sports industry added value

4.CONCLUSIONS AND RECOMMENDATIONS

On the one hand, through the construction of the VAR model and using the Granger causality test, it can be concluded that sports market activity has a positive effect on the added value of the sports industry, while sports financial input has no significant effect on the added value of the sports industry. It can be seen that in recent years, with the further development of China’s market economic system and the continuous promotion of sports market reform, the economic development of China’s sports industry is tied more closely to the market environment. The market mechanism is primarily used to allocate industrial resources and to improve industrial vitality and operation efficiency. It is also the key factor in accelerating the transformation of the old and new kinetic energies of the sports industry and promoting the high-quality development of the industry. However, the effective function of the market mechanism is limited by the solidified thought of a “strong government” to some extent [4]. The boundary between the government and the market is not clear, and the chaos of “absence,” “offside,” and “dislocation” of the government often appears in the sports industry.

For instance, commercial competition and government events are difficult to define: football and other sports associations are often dominated by their administrations; a larger number of professional leagues are excessively interfered with by administrations, where problems are likely to cause less professional management, lack of rights and interest protection of athletes, imperfect transfer system, non-transparent financial situation, and blocked shareholding reform, inevitably hindering the further development of the sports industry economy. In contrast, professional leagues such as the American Professional Basketball League and the English Premier League, the model of professional leagues, have achieved stable operation and great development of commercial value through a series of measures such as the establishment of a modern enterprise system and the marketization operation. Such

professional leagues maintain strong anti-risk capability even under a complex external environment such as the epidemic. Therefore, it is necessary to further clarify the boundary between the government and market, so that the market can play a better role in promoting the development of the sports industry.

On the other hand, the empirical results of impulse response and variance decomposition show that the activity of the sports market has a long-term promoting effect on the sports industry economy, while the impact of sports financial input is not significant. Therefore, the government should gradually introduce a series of relevant policies to invigorate the sports market to promote the high-quality and sustainable development of China's sports industry. The suggestions provided are as follows:

(1) Clarify the boundary between the government and market, and deepen the market-oriented allocation of sports resources. The government should pay more attention to the financial investment in public sports, and share part of its competitive resources and sports business with the sports market. For example, in recent years, the breaking of CCTV's monopoly on the broadcast rights of large-scale events has resulted in increased capital inflows to the new sports media industry, and the operators of sports events have gained a stronger pricing power, thus increasing the enthusiasm of capital bidding and the activity of the sports market.

(2) Optimize the sports market environment, improve fiscal and tax policies to support industrial development, and guide the social capital flow to the sports industry. "No. 46" proposes to build the sports service industry and sports goods manufacturing industry into new and high-tech industries supported by the State, reduce the tax rate of business income tax to 15% for approved high and new tech enterprises with domestic investment, provide tax breaks for non-profit social organizations of sports services, and levy a 3% sales tax on the enterprise engaged in cultural and sports[9]. After the business tax was changed into value-added tax in 2016, the tax payment standard for cultural and sports services changed as follows: VAT rate of 6% for general taxpayers, 3% for small-scale taxpayers, and 6% for sports event broadcast services. However, with constant changes in the sports market environment, the related tax policies of the sports industry have not been adjusted accordingly. Therefore, it is necessary to formulate reasonable sports industry tax standards as soon as possible to reduce the sports enterprise tax burden, increase their profitability and anti-risk capability, gather high-quality resources for the sports industry, and promote the industry interaction between the sports industry and a new generation of information technology such as Hadoop, artificial intelligence, and Blockchain technology.

(3) Adjust the structure of main market players, realize the role of driving function of the leading

enterprises, and promote the diversity of sports market entities. It is necessary to promote state-owned sports enterprises to enhance enterprise strength and expand enterprise scale by methods such as equity investment, assets reorganization, financing guarantee, and capital injections. Further, the huge potential of large-scale private sports enterprises should be fully unleashed, and nurturing and supporting small and medium-sized sports enterprises of great promise should be focused on. By the end of 2020, on the main board of China's A-share Market, the ChiNext Stock Market, SSE Star Market, and Hong Kong Stock Exchange, there were 6, 2, 1, and 16 sports-related enterprises, respectively. By the end of 2019, 87 sports companies were listed on the New Third Board and 644 sports equity investments were completed in the private equity market. In conclusion, China's sports industry is still dominated by small- and medium-sized enterprises, and their main financing channels are the OTC market, such as private equity funds and venture capital funds. As such, they face problems such as weak risk resistibility, poor financing capability, and lower profitability.

Therefore, to encourage the financial support role of physical capital markets, it is important to both lower the barrier of IPO and expand channels, and provide technical assistance for small- and medium-sized enterprises to obtain financing by enriching sports capital markets innovation tools such as inclusive finance, asset securitization, venture investment, and angel investment [10-12].

The research identified that owing to the closer connection between the sports industry economy and the sports market, the volatility and risk of the development of the sports industry are further increased. Therefore, the sports market supervision system should be improved to prevent the chaotic situation of the sports market manipulated by capital and maintain the healthy development of the sports industry. Simultaneously, sports finance also needs to play a more active role in resource allocation by increasing investment in public sports, areas with relatively backward sports infrastructure, and innovative high-tech sports enterprises. In addition, fiscal policies have the responsibility to stabilize the economy and provide more powerful support for the recovery of the sports industry, particularly under complicated and volatile international situations, continuous recurrence of the epidemic, and economic recession.

5. CONCLUSION

With the deepening sports marketization reform, China's sports industry has gradually changed from the situation when the industry was dominated by the single mechanism-government finance. Instead, market mechanism has become the key force to stimulate the sports industry to step into a new stage. Therefore, it is of

great significance to clarify the power boundary between the government and market, release the vitality of the sports market, and optimize the investment and financing environment of the sports industry to promote the high-quality development of China's sports industry. However, simultaneously, the sports market, which is in the initial stage of development, is vulnerable to the interference of external factors and its risk resistance capacity is still weak. The COVID-19 pandemic has caused a huge impact on the sports industry, especially the sports service industry. In the post-epidemic era, the wave of has capital faded, and how to prompt the sports market to follow the rules of market operation, guide the sports industry to return to the path of sound development, and stimulate the vitality of the sports industry has become an important topic for the future development of China's sports industry.

REFERENCES

- [1]. YAO N.G., XU F.. (2021) Progress, Shortcomings and Prospects of Mining Science and Technology in Anhui Province: Based on the Data of Technology Awards in Mining Field in the Past 10 Years., *Metal Mine*, (1):202-212.
- [2]. Zhang Y., Yang T.L., Zhao X.. (2015) Sports Financial Investment, Sports Business Development and Economic Growth—A Empirical Study Based on the Time Series Data in China. *Journal of Beijing Sport University*, 38(06):12-17.
- [3]. Zeng M.. (2013) Research on the Relationship between Sports Investment and Economic Growth in China. *Statistic & Decision*, (22):134-135.
- [4]. Huang H. Y.. (2020) Strategic Thinking on Promoting Sports Industry to Become a Pillar Industry of National Economy. *China Sport Science*, 40(12):3-16.
- [5]. Zhou A.G., Du G.S.. (2016) A Study of Sports Industry Development in China from the Perspective of New Normal State. *Journal of Physical Education*, 23(06):7-13.
- [6]. Guo J.H., Pu Y.. (2021) Mechanism and Path: Financial Socialization Promotes Deep Integration of Sports Industry. *Journal of Xi'an Physical Education University*, 38(06):681-688.
- [7]. Xu J. H.. (2020) The Combination of Industry and Finance for Sports Industry: Generation Logic, Mode Selection, Research and Prospect of Countermeasures. *China Sport Science*, 40(01):26-41,97.
- [8]. Chen P.. (2012) Empirical Study of Sports Financial Investment and Economic Growth in China — Based on the 1977 to 2020 Time Series Data Analysis. *Journal of Wuhan Institute of Physical Education*, 46(05):34-39.
- [9]. General Administration of Sport of China. (2014) Some Opinions of The State Council on Accelerating the Development of Sports Industry and Promoting Sports Consumption. <https://www.sport.gov.cn/whzx/n5590/c904544/content.html>.
- [10]. Zhu Q. Y., Huang H. Y.. (2016) The Short-term Impact of Sports Industry Policy on Capital Market Value of Sports Listed Companies. *Journal of Shanghai University of Sport*, 40(06):1-7,15.
- [11]. Zhu Q. Y., Xu K. J., Huang H. Y.. (2021) Capital Market Supporting High-Quality Development of Sports Industry: Mechanism, Dilemma and Path Choice. *Journal of Shanghai University of Sport*, 45(12):35-49.
- [12]. Zhu Q. Y., Huang H. Y.. (2018) The Development Characteristics and Functional Efficiency of Sport NEEQ Market. *Journal of Shanghai University of Sport*, 42(02):66-71,88.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

