Influence of Hosting Major Sports Events on the Performance of Listed Companies in Host Place - A Discussion of the "Double-edged Sword" Effect of Major Sports Events

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Abstract

The purpose of this paper is to test the "double-edged sword" effect of hosting major sporting events. This paper took 18 major sports events held in China from 2007 to 2021 as subjects of quasi-natural experiment, and adopted a Propensity Score Matching - Differences in Differences (PSM-DID) method to study the influence of hosting these events on the performance of listed companies in host place based on the panel data of these companies from 2010 to 2021, thereby figuring out the "double-edged sword" effect of hosting major sports events. Our research findings suggest that, hosting major sports events is significantly negatively correlated with the performance of listed companies in host place, and such correlation has passed multiple robustness tests; heterogeneous analysis shows that, hosting major sports events has a negative influence on the performance of state-owned companies and a slight positive influence on the performance of private-owned companies; in terms of companies engaging in different industries, the influence on the performance of listed companies in tourism, real estate, and industry is significantly negative; overall speaking, regardless of international-level or national-level events, hosting such events will pull down the performance of listed companies; in loss-reporting companies, such negative influence on their performance will be amplified, which might worsen their situations further. Therefore, the host place should allocate resources reasonably and effectively and give full play to the role of major sports events in promoting the development of its industries.

Keywords: Major Sports Events, Performance of Listed Companies, "Double-Edged Sword" Effect, Propensity Score Matching (PSM), Differences in Differences (DID).

Introduction

As the national power of major countries in the world is growing constantly, numerous sports events are held each year in these countries, including major transnational sports events such as the Olympic Games, the Asian Games, and the Youth Olympic Games, etc. In China, the sports industry is developing fast in recent years, according to the statistics of the General Administration of Sport of China, in 2021, the total economic scale of sports industry in China is 3117.5 billion yuan, showing a 13.9% increase compared with 2020. The number of major sports events held by each place is on the rise, and these events are deeply influencing the development of the economy, industries, and listed companies of the host place.

History tells us that hosting major sports events is a double-edged sword (A sword with an edge on both sides, it is used to describe the dual impact nature of things, which has both advantages and disadvantages.), some scholars believe these events can enhance the influence of host place and promote the industrial development of the region, especially tourism, catering service, and transportation (Gratton, Shibli, & Coleman, 2006; Lee & Taylor, 2005; Tian & Xu, 2012; Yu, Zhang, & Ma, 2022). However, some scholars believe that excessively hosting major sports events would hinder the economic development of host place, thereby affecting the development of local industries (Andreff, 2012; Wang, 2012; Wu, 2009; Yu, Zhang, & Luo, 2011). Some studies found that hosting major sports events can adversely affect the development of local manufacturing, real estate and tourism industries (Gibson, 1998; Xiong, 2008).

Existing related studies mainly focus on the influence of hosting major sports events on the host city or a certain industry sector, few of them have concerned about the influence on the performance of listed companies in the host place (Fengfu, Fang, & Shuqi, 2020; Xiong, 2008; Yu et al., 2022). However, hosting major sports events has an important influence on the industrial development of the host place, and listed companies are an important link in the entire industrial chain and their important roles are undoubted. Fengfu et al. (2020) used a quasi-natural experiment to analyze the impact of major sporting events on urban economic development and (Wang & Li, 2022) used a quasi-natural experiment to study the economic development of the city by hosting the Youth Games.

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These studies provide theoretical support for the research in this paper. Therefore, this paper regards the hosting of major sports events as a quasi-natural experiment (Quasi-natural experiment is a method of social science research, as opposed to real experimental research, using certain manipulation procedures, using natural scenarios, and flexible control of experimental subjects. It has wide applicability when it is not possible to control all extraneous variables that may affect the results of the experiment.) and attempts to study the influence of hosting major sports events on the performance of listed companies in the host place, in the hopes of providing a piece of useful evidence for related research.

The rest of this paper is as follows: the second part is literature review and research design of this paper; the third part describes the data sources and sample selection rules; the fourth part is the PSM-DID empirical study of this paper; the fifth part is the conclusion of this paper.

Literature Review and Research Design

Literature Review

As an economic boom has been witnessed in China since the 1980s, major international events such as Olympic Games and the Asian Games have been regarded as a strategic means to promote regional industrial development by local government (Kong, He, & Lin, 2018). Specifically, the influence of major sports events can be divided into two types: tangible influence and intangible influence. In terms of tangible influence, major sports events can affect the economy, investment, and consumption of host place, and may directly affect the total economic value and industrial structure of the host place; in terms of intangible influence, major sporting events have a profound influence on the reputation, openness and international image of the host place (Yu et al., 2022).

Hosting major sports events has many positive effects on the host place, for instance, it is conductive to elevating the political, cultural, and social status of the hosts, promoting regional economic development, creating more employment opportunities (Zhu, 2005), stimulating the development of the service sector, increasing social benefits (Fourie & Spronk, 2011; Tian & Xu, 2012; Zhou & Ma, 2017), enhancing citizen's sense of happiness (Kavetsos & Szymanski, 2010), and exerting positive effects on the economy, tourism, and employment of the host place (Gratton et al., 2006; Lee & Taylor, 2005). At the same time, hosting major sports events can also promote the formation of industrial clusters and the optimization of industrial structure (Shao, Su, & Li, 2018; Yan, 2019). Wang and Li (2022) used regional GDP as the explanatory variable and the opening of the Youth Games in 2015 as the core explanatory variable to empirically investigate the impact of hosting the Youth Games on the city economy using Differences in Differences method. They discovered that the hosting of the Youth Games had promoted the economic development of Fuzhou city. Based on the panel data of house prices in prefecture-level cities from 2002-2018, Yu et al. (2022) empirically tested the impact of hosting major sporting events on house prices in main board cities using the staggered DID model. They found that hosting sports events has a positive impact on the housing price of host place. Fengfu et al. (2020) detected that hosting major sports events can promote a city's primary industry to transform to the secondary and the tertiary industries.

However, hosting major sporting events is a "double-edged sword". Flyvbjerg and Stewart (2012) pointed out that from the 1968 Winter Olympics held in Grenoble to the 2012 Summer Olympics held in London, the expenditure of each game had exceeded the budget, which had a serious impact on the economy of hosts, and an increasing number of residents began to oppose hosting major sports events (Andreff, 2012). Blindly hosting major sports events can inhibit the development of local industries, including reckless expansion, repeated construction, and a significant slowdown in the development of urban economy (Wang, 2012; Wu, 2009; Yu et al., 2011). Gibson (1998) and Indriastuti et al. (2022) argues that hosting sporting events would lead to a rise in price of commodities of the host place, thereby increasing the cost of living for local residents. Nie, Xing and Zhao (2016) demonstrated that hosting the National Games only has a limited effect on urban economic growth. Xiong (2008) and Nawir, Hadi and Roslan (2023) suggests that hosting Olympic Games has an adverse impact on manufacturing, tourism and real estate industries in the host place.

In summary, hosting major sports events has both positive and negative influence on the economic and industrial development of the host place. Previous studies mainly focus on exploring the influence of major sports events in two aspects: one is the influence on the host city, the other is the influence on a certain industry in the host place, such as real estate or tourism. However, few of them have been concerned about the influence on the performance of listed companies in the host place. In fact, listed companies play a crucial role in the development of regional industries, so it's necessary work to figure out questions such as what is the influence of hosting major sports events on the performance of listed companies? Does the influence differ according to the ownership pattern or engaging industry of the companies? In view of these matters, this paper regards the hosting of major sports events as a quasi-natural experiment and adopted the PSM-DID method to

study the influence of hosting major sports events on the performance of listed companies in host place, thereby figuring out the "double-edged sword" effect of hosting major sports events. Unlike previous studies that have mostly focused on the economic dimension of cities, the novelty of this paper lies in the study of company-level impact of hosting major sporting events.

Research Design

This paper comprehensively considered multiple factors including the level of events, the investment, the diversity of sports programs, and the influence of events, etc. Li (2014), and selected 18 major sports events of national and above levels from 2007 to 2021 as subjects, as shown in Table 1.

In Table 1, the scale level of events has been divided into international level and national level. International level events refer to Olympic Games, Asian Games, and other events participated by multiple countries; and national level events are those only participated by Chinese athletes. In order to test the impact of holding major sports events on the performance of listed companies, the impact of holding major sports events on the performance of listed companies can be judged by comparing the changes in the performance of listed companies before and after holding major sports. However, the conclusion reached by the single-difference method may be inaccurate because there are other factors that affect the performance of listed companies. These factors will eventually affect the evaluation results. And such differences cannot be taken into account when applying the single-difference method, which may overestimate the impact of holding major sports events on the performance of listed companies. Therefore, it is more scientific to consider the holding of major sports events as a quasi-natural experiment and apply Differences in Differences method to evaluate the impact of holding major sports events on the performance of listed companies. And the Propensity Score Matching method can effectively overcome the sample selection bias. Based on this, this paper adopts the PSM-DID method for empirical research. This paper took each event as a quasi-natural experiment. In order to minimize sample selection bias, the PSM method was adopted to match the corresponding control group for each host group, then the DID method was adopted to evaluate the influence of hosting major sports events on the performance of listed companies in the host place. Fengfu et al. (2020) and Yu et al. (2022) also applied the PSM-DID method in their studies. The conceptual framework of this study is shown in Figure 1. Data processing using PSM-DID begins with cleaning the panel data; then Propensity Score Matching is performed, using the variables in the panel data to calculate propensity scores and using the propensity score matching method to match the policy intervention group with the control group; and finally Difference in Difference estimation is performed, which requires calculating the differences between the policy intervention group and the control group before and after the policy intervention. By calculating these differences, the effect of the policy intervention can be estimated and statistically tested. The procedure of experimental method is as follows.

Table 1

Major Sports Events Held in China In 2007-2021

Name of event	Opening time	Host place	Scale level
Changchun Asian Games	2007-01-28	Changchun	International level
Shanghai Summer Special Olympics	2007-10-02	Shanghai	International level
Qiqihar Winter Games	2008-01-18	Qiqihar	National level
Beijing Olympic Games	2008-08-08	Beijing	International level
Harbin Winter Universiade	2009-02-18	Harbin	National level
Jinan National Games	2009-10-16	Jinan	National level
Guangzhou Asian Games	2010-11-12	Guangzhou	International level
Shenzhen Universiade	2011-08-12	Shenzhen	International level
Changchun Winter Games	2012-01-03	Changchun	National level
Shenyang National Games	2013-08-31	Shenyang	National level
Tianjin East Asian Games	2013-10-06	Tianjin	International level
Nanjing Youth Olympic Games	2014-08-16	Nanjing	International level
Fuzhou Youth Games	2015-10-18	Fuzhou	National level
Urumqi Winter Games	2016-01-20	Urumqi	National level
Tianjin National Games	2017-08-27	Tianjin	National level
Taiyuan Youth Games	2019-01-14	Taiyuan	National level
Wuhan Military World Games	2019-10-18	Wuhan	International level
Xi'an National Games	2021-09-15	Xi'an	National level

Note: Data sources are official websites of the General Administration of Sport of China and the provincial sports bureaus

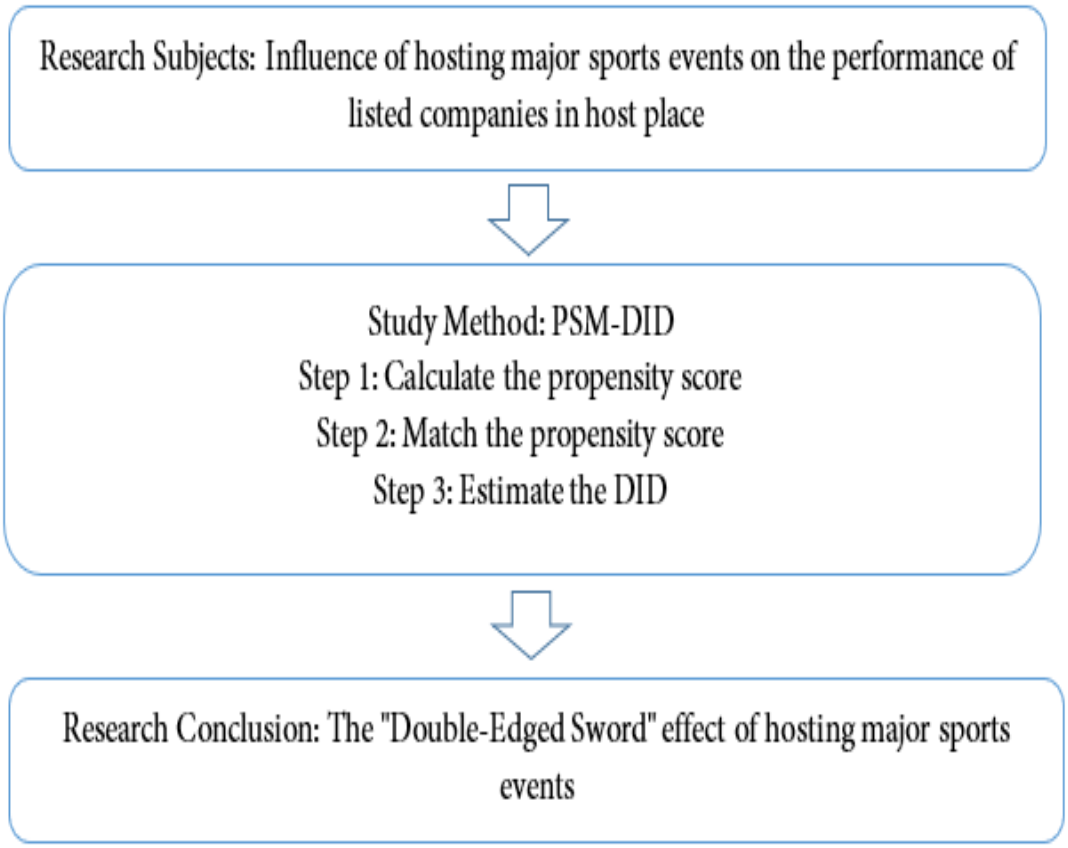

Figure 1: The Conceptual Framework of This Study.

Calculate the Propensity Score

The first step is to calculate the propensity score. Propensity score (PS value) is defined as the conditional probability that the location place of a company will host a major sports event under the condition that the sample feature X is given, that is:

$$p(X) = Pr[D = 1|X] = E[D|X] \quad (1)$$

Where, D is an indicator function. If the location place of a company has hosted a major sports event in a certain year, then D=1; otherwise, D=0. The Logit model can be used to estimate it.

$$p(X_i) = Pr(D_i = 1|X_i) = \frac{exp(\beta X_i)}{1+exp(\beta X_i)} \quad (2)$$

where, Xi is a vector composed of a series of control variables; β is the corresponding coefficient vector; PS value is the predicted value given by the Logit model.

Match the Propensity Score

The second step is to match the propensity score. There are two main tasks in this step:

1. Select matching method. Because for PSM, there is no difference between good and bad (Chen, 2014), so this paper chose to adopt one-to-one matching to look for a different group of individuals whose PS is the closest.
2. Perform common support assumption test and balancing assumption test. As PSM requires to satisfy common support assumption and balancing assumption, these two assumptions need to be tested.

Estimate the DID

The thired step is to estimate the DID. Retain matched samples and perform DID estimation according to Models 3 and 4, due to the different timing of major sports events in the location places of each company, the conventional DID model is not applicable, so a staggered DID model was adopted for estimation.

$$performance_{it} = \alpha + \beta did + \lambda control_{it} + \varphi_i + \varepsilon_{it} \quad (3)$$

$$did = treat_i \times post_t \quad (4)$$

where in, the explained variable performance it represents the performance of company i in year t. This paper used three indicators to measure company performance, return on asset (roa), return on equity (roe), and return on sales (ros). Variable treati represents whether the location place of company i has hosted a major sports event or not, if yes, then its value takes 1, otherwise its value takes 0. Variable postt represents whether the location place of company i has hosted a major sports event in year t, if yes, then its value takes 1, otherwise its value takes 0. Variable did is the cross-product term of variables treati and postt, namely the interaction term of DID. φ_i represents the company-fixed effect; εit is a random disturbance term affecting company performance; β is the estimated value of DID, it measures

the influence of hosting major sports events on the performance of companies in host place, and it is the focus of this paper. Controlit represents a series of control variables affecting the performance of company i in year t. According to previous literatures (Shao, Yan, & Shao, 2022; Tian, Duan, & Yin, 2022; Wang, 2023), this paper selected a few factors as control variables, including the listing time of company (list), company size (size), asset-liability ratio (lev), operating income growth rate (sale_gr), board size (boardsize), ratio of independent directors (independent), shareholding ratio of the largest shareholder (topone), shareholding ratio of CEO (ceo_stk), shareholding ratio of chairman of the board (chair_stk), is CEO duality or not (duality), the natural logarithm of top three executives' salaries (gpay), and shareholding ratio of senior executives (magstk).

The "double-edged sword" effect of hosting major sports events can be analyzed based on the estimated coefficient of variable did: if its estimated coefficient is significantly positive, it means that the positive influence of hosting major sports events is greater than the negative influence, and this will promote the performance of listed companies; if the estimated coefficient is significantly negative, it means that the negative influence is greater than the positive influence, and it will cause the performance of listed companies to decline; if the estimated coefficient of variable did is not significant, it indicates that the positive and negative influence would offset each other, resulting in insignificant changes in the performance of listed companies.

Sample Screening and data Sources

Data used in this study comes from the CSMAR database (China Stock Market & Accounting Research Database), and the time interval of samples is 2010-2021. Data screening steps are: (1) Delete financial listed companies; (2) Delete ST (Special Treatment) and PT (Particular Transfer) listed companies; (3) Delete companies with a asset-liability ratios greater than 100%; (4) Delete companies whose listing time is less than 0; (5) Delete samples whose main variables have missing values. In this paper, the main variables were subjected to 1.5% winsorization, and finally 32·335 observed values were attained. Main control variables and performance indicators are listed in Table 2.

Table 2

Descriptive Statistics of Variables

variable	mean	sd	min	max	Remark
list	14.084	8.355	0.000	36.000	Listing time = 2021 - the year of IPO
size	22.104	1.323	15.577	28.548	Company size = ln (Total assets)
lev	0.410	0.205	0.057	0.861	Asset-liability ratio = Total Liabilities/Total Assets
sale_gr	0.116	0.272	-0.676	0.986	Operating income growth rate
boardsize	8.524	1.679	3.000	18.000	Board size
independent	0.375	0.055	0.143	0.800	Ratio of independent directors
topone	0.344	0.150	0.003	0.900	Shareholding ratio of the largest shareholder
ceo_stk	0.062	0.126	0.000	0.923	Shareholding ratio of CEO
chair_stk	0.097	0.151	0.000	0.923	Shareholding ratio of chairman of the board
duality	0.304	0.460	0.000	1.000	Is the CEO and the chairman of the board a same person, if yes, its value takes 1, otherwise it takes 0
gpay	14.443	0.734	10.380	18.197	ln (Sum of top three executives' salaries)
magstk	0.086	0.152	0.000	0.843	Shareholding ratio of senior executives
roa	0.042	0.057	-0.183	0.184	Net profit/Total assets
roe	0.064	0.115	-0.503	0.303	Net profit/Sum of owners' equity
ros	0.081	0.154	-0.656	0.461	Net profit/Main business income

Note: For specific calculation methods of indicators, please refer to descriptions in CSMAR database.

Empirical Research

PSM

PSM analysis is mainly performed using stata's psmatch2 command. According to whether the location place of companies has hosted major sports events or not, in this paper, the samples were divided into two groups: the host group (Treat) - the location place of companies has hosted major sports events, and the control group (Control) - location place of companies hasn't hosted any major sports event. PSM was performed according to the first step and the second step described above, and the retained matched samples were subjected to common support assumption test and balancing assumption test.

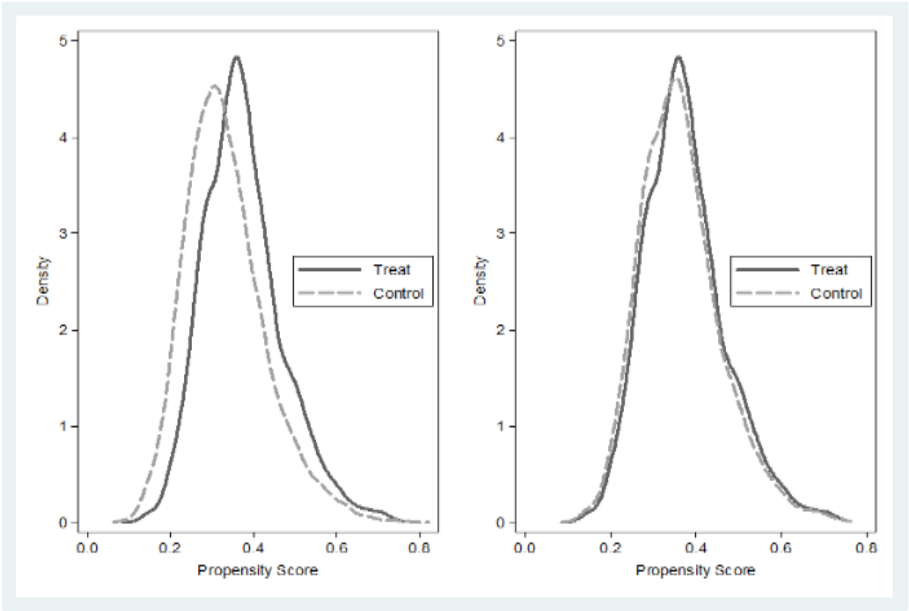

Figure 2: Comparison of Kernel Density Functions Before and After Matching.

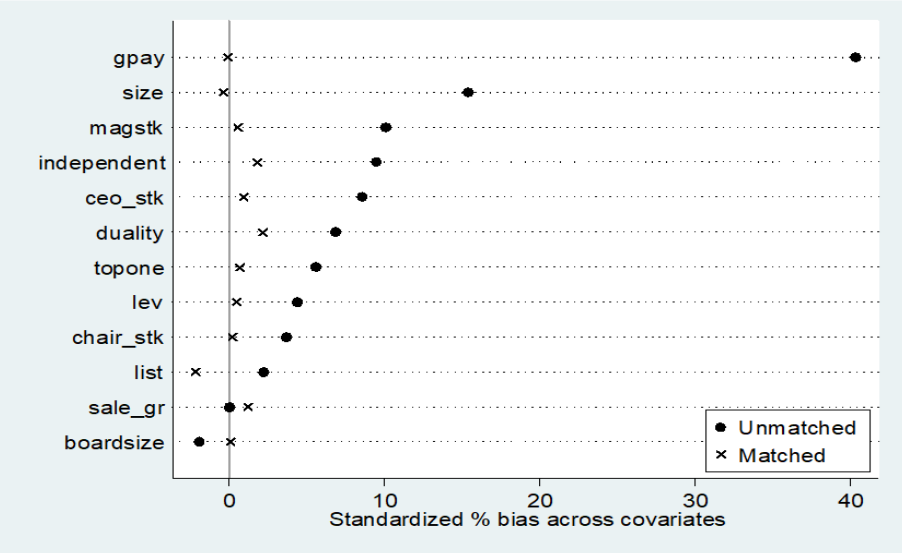

Figure 3: Deviations of Variables Before and After Matching.

Figure 2 reports the kernel density functions of host group and control group before and after matching. According to the figure, we can see that the samples in this paper satisfied the common support assumption of PSM. Before matching, there are obvious differences in the kernel density functions of the two. If performance comparison is conducted using the entire control group and host group, then there will be bias in the results. But after matching, the kernel density functions of the two are very close, and the sample selection bias could be controlled effectively.

Figure 3 reports the degree of variation of each variable before and after the matching of host group and control group. As can be seen from the figure, deviations of each variable after matching are quite small, which has met the balancing assumption of PSM. In this study, only the matched samples were retained, and there were 27·841 remaining observed values.

Staggered DID Estimation

Benchmark Regression Analysis

In this paper, staggered DID benchmark regression analysis was carried out based on Models 3 and 4, the explained variable for benchmark regression is company performance, and the core explanatory variable is done. Regressions were performed using fixed effects and the estimation results are shown in Table 3.

Table 3

Benchmark Regression Results of Staggered DID

	ROA	ROE	ROS
did	-0.010***	-0.023***	-0.029***
	(-4.95)	(-4.88)	(-4.83)
list	-0.001	-0.002	-0.013
	(-0.21)	(-0.16)	(-0.66)
lev	-0.152***	-0.270***	-0.418***
	(-55.38)	(-42.64)	(-51.56)
sale_gr	0.057***	0.123***	0.135***
	(58.66)	(55.1)	(47.39)
boardsize	0.001***	0.002**	0.003***
	(3.24)	(2.46)	(2.95)
independent	-0.006	-0.019	-0.012
	(-0.75)	(-0.98)	(-0.46)
topone	0.074***	0.168***	0.226***
	(16.66)	(16.38)	(17.23)
size	0.000	0.006***	0.024***
	(0.16)	(4.41)	(13.04)
ceo_stk	0.002	0.030*	-0.028
	(0.27)	(1.70)	(-1.27)
chair_stk	0.035***	0.089***	0.103***
	(6.23)	(6.88)	(6.24)
duality	-0.002*	-0.006**	-0.002
	(-1.76)	(-2.39)	(-0.75)
gpay	0.009***	0.017***	0.002
	(12.74)	(9.61)	(0.73)
magstk	0.019***	0.009	0.072***
	(3.15)	(0.65)	(4.04)
cons	-0.056	-0.255	-0.233
	(-0.56)	(-1.09)	(-0.78)
N	27841	27841	27841

Note: ***, ** and * respectively represent the t-test is significant at the levels of 1%, 5% and 10%, values in parentheses are the t-values, same below.

The estimation results in Table 3 show that, no matter which indicator was used to measure the performance of listed companies, the coefficient of variable did was significantly negative, indicating that through staggered DID estimation, the net effect of company performance difference brought by hosting major sports events was significantly negative, that is, overall speaking, for the selected samples, the negative influence of hosting major sports events was greater than the positive influence, resulting in a decline in company performance. The finding that hosting major sporting events has a greater negative impact on the economy is consistent with that of Wu (2009) and Wang (2012). This may be due to the fact that the negative effects of wasted and unused facilities caused by hosting major sporting events outweigh the positive effects.

Robustness Test

Parallel trend test

A key premise of DID analysis is the parallel trend assumption, it assumes that the change trends of the performance of host group and control group companies should be parallel before hosting a major sports event. This paper drew on the event research method proposed by Jacobson, LaLonde and Sullivan (1993) to perform the parallel trend test, which can be expressed as:

$$performance_{it} = \alpha + \sum_{t=-4}^{6} \delta_t D_{it} + \lambda control_{it} + \varphi_i + \varepsilon_{it} \quad (5)$$

where, Dit is a set of virtual variables, if the location place of company i has hosted a major sports event in year t, then its value takes 1, otherwise it takes 0. The meaning of other variables is the same as Formula 3. In this formula, this paper focuses on coefficient δt, which reflects the performance difference between host group and control group in case that the location place of company has hosted a major sports event in year t.

Considering that there is less data for the first five years and the last six years of the surveyed major sports events, in this paper, the data of the first five years was summarized into the -5-th period, and the data of the last six years was summarized into the 6-th period. Besides, the

-5-th period was taken as the base period, and results of the parallel trend test are shown in Figure 4.

Figure 4 shows that, before the location place of listed companies holds a major sports event, no matter which indicator is used to measure the performance of listed companies, the estimated values of coefficient of each period are mostly insignificant, indicating that before holding major sports events, there's no significant difference in company performance between the host group and the control group. While after holding the major sports event, there are significant differences in the estimated coefficient to varying degrees, and the research samples have passed the parallel trend test.

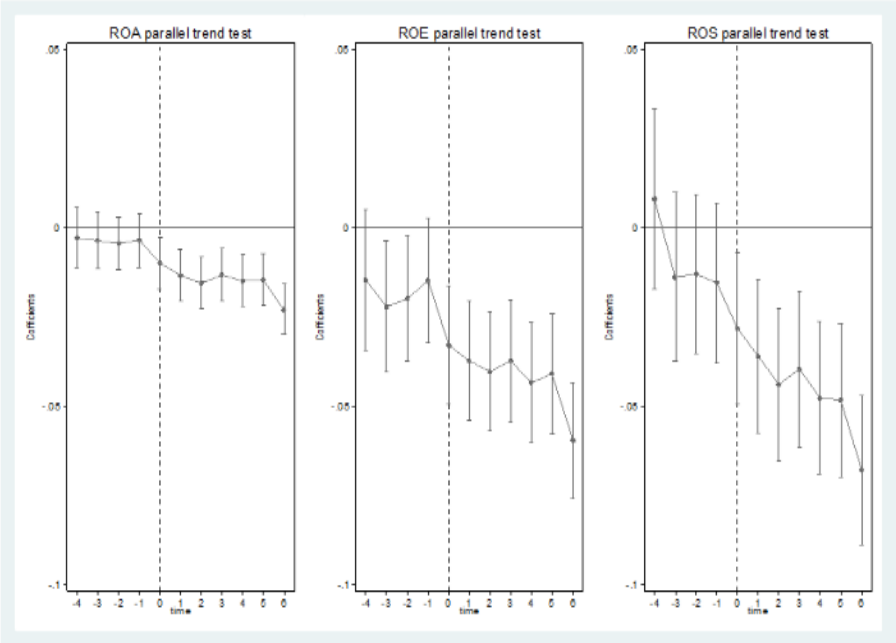

Figure 4: Parallel Trend Test for Staggered DID Model.

Placebo test

Assuming: for each location place, the policy of hosting major sports events occurs five years in advance, then the constructed new interaction term did_5 variable was subject to benchmark regression, and the results are shown in Table 4.

Table 4

Results of Placebo Test

	Roa	Roe	Ros
did_5	-0.003	-0.016**	-0.015
	(-0.87)	(-2.15)	(-1.55)
control variables	yes	yes	yes
cons	-0.051	-0.242	-0.217
	(-0.51)	(-1.03)	(-0.72)
N	27841	27841	27841

The estimation results in Table 4 show that, when roa and ros are taken as explained variables, the estimated coefficient of did_5 is not significant; when roe is taken as the explained variable, the significance of the estimated coefficient of did_5 declines, which has proved that the results of previous empirical analysis were indeed caused by the policy of hosting major sports events.

Estimation with Iroa, Iroe and Iros as Explained Variables

To verify the robustness of experimental results, this paper re-selected three variables to measure the performance of listed companies, which are iroa (the roa adjusted by the median of industry), iroe (the roe adjusted by the median of industry), and iros (the ros adjusted by the median of industry). On this basis, staggered DID estimation was performed, and the results are shown in Table 5.

Table 5

Estimation results for different explained variables

	Iroa	Iroe	Iros
did	-0.006***	-0.017***	-0.022***
	(-2.92)	(-3.58)	(-3.60)
control variables	yes	yes	yes
cons	-0.152	-0.391*	-0.317
	(-1.50)	(-1.69)	(-1.07)
N	27841	27841	27841

The estimation results in Table 5 show that, after the explained variables are changed, the estimated coefficients of did are all significantly negative still, indicating that the experimental results attained in this paper are robust.

Heterogeneity Analysis

Heterogeneity in Ownership

There might be heterogeneity in the influence of hosting major sports events on the performance of listed companies with different ownership patterns, in this study, the state-owned and private-owned listed companies were estimated respectively, and the results are shown in Table 6.

Table 6

Estimation results of influence on the performance of listed companies with different ownership patterns

Ownership Pattern		Roa	Roe	Ros
State-owned	did	-0.010**	-0.026**	-0.032***
		(-2.41)	(-2.57)	(-2.95)
Private-owned	did	0.074	0.166	0.586**
		(0.82)	(0.82)	(2.00)

The estimation results given in Table 6 show that there's heterogeneity in the influence of hosting major sports events on the performance of listed companies with different ownership patterns, such influence on state-owned listed companies is significantly negative, while the influence on private-owned listed companies is slightly positive. Especially when ros is taken as the explained variable, the coefficient of did is positive and has passed the significance test at the level of 5%.

Heterogeneity in Event Scale

There might be heterogeneity in the influence of different-scale sports events on the performance of listed companies, in this paper, the international-level and national-level events were estimated respectively, and the results are shown in Table 7.

Table 7

Estimation Results of Influence of Different-Scale Sports Events on The Performance of Listed Companies

Event Scale		Roa	Roe	Ros
International level	did	-0.009***	-0.020***	-0.021**
		(-3.11)	(-3.02)	(-2.47)
National level	did	-0.011***	-0.028***	-0.039***
		(-3.43)	(-3.44)	(-3.71)

The estimation results given in Table 7 show that, regardless of international-level or national-level events, the influence on the performance of listed companies in the host place is significantly negative. Judging based on the absolute value of the coefficient of did and the significant level, the negative influence of hosting national-level events is greater.

Heterogeneity in Industry

There might be heterogeneity in the influence of hosting major sports events on the performance of listed companies engaging in different industries. Referring to the two versions of industry classification standards issued by the China Securities Regulatory Commission in 2001 and 2012, in this paper, listed companies engaging in tourism, catering, transportation, real estate, and industry were selected and estimated respectively, and the results are shown in Table 8.

Table 8

Estimation Results of Influence on Performance of Listed Companies Engaging in Different Industries

Industry Sector		Roa	Roe	Ros
Tourism	did	-0.042***	-0.089***	-0.112*
		(-2.82)	(-2.80)	(-1.72)
Catering	did	-0.023	-0.044	-0.075*
		(-1.57)	(-1.39)	(-1.89)
Transportation	did	-0.002	-0.001	-0.02
		(-0.33)	(-0.03)	(-0.94)
Real estate	did	-0.010*	-0.038**	-0.046**
		(-1.79)	(-2.47)	(-2.10)
Industry	did	-0.008***	-0.015**	-0.028***
		(-2.84)	(-2.39)	(-3.70)

The estimation results given in Table 8 show that, the influence of hosting major sports events has a significant negative influence on the performance of listed companies engaging in tourism, real estate and industry, the influence on catering listed companies is slightly negative, and the there is no significant influence on transportation listed companies. The finding on the negative impact of hosting major sports events on various industries is similar to that of Xiong (2008).

Heterogeneity in Profitability Level

There might be heterogeneity in the influence of hosting major sports events on the performance of listed companies with different levels of profitability, in this paper, the profit-reporting companies and loss-reporting companies were estimated respectively, and the results are shown in Table 9.

Table 9

Estimation Results of Influence on Performance of Listed Companies with Different Levels of Profitability

Profit And Loss Situation		Roa	Roe	Ros
Profit-reporting	did	-0.004**	-0.006**	-0.013***
		(-2.54)	(-2.47)	(-4.02)
Loss-reporting	did	-0.026***	-0.059**	-0.087***
		(-2.88)	(-2.53)	(-2.93)

The estimation results given in Table 9 show that, hosting major sporting events has a significant negative influence on the performance of both profit-reporting and loss-reporting companies, judging based on the absolute value of the coefficient of did, the negative influence on the performance of loss-reporting companies is greater.

Research Conclusions

This paper took hosting major sports events as a quasi-natural experiment and adopted the PSM-DID method to analyze the influence of hosting major sports events on the performance of listed companies in host place, thereby figuring out the "double-edged sword" effect of hosting major sports events. The findings of the paper are: overall speaking, for sample companies adopted in the study, the combined final effect is the performance decline of listed companies, this may be due to the fact that the negative effects of wasted and unused facilities caused by hosting major sporting events outweigh the positive effects; different ownership enterprises have different ultimate controllers, there's heterogeneity in the influence of hosting major sports events on the performance of companies with different ownership patterns; the negative influence of hosting national-level events is greater, this may be due to the fact that more resources are invested in international events; there's heterogeneity in the influence of hosting major sports events on the performance of companies engaging in different industries, this may be due to the different nature of business in different industries; the negative influence on loss-reporting companies is greater, this may be because loss-reporting companies are more affected by adverse factors.

Research conclusions attained in this paper suggest that, for samples adopted in the study, the negative influence of hosting major sports events is greater than the positive influence, so in most cases, the influence on the performance of listed companies in host place is significantly negative, only the influence on private-owned listed companies is slightly positive. Such negative influence on company performance can act in multiple industry sectors such as tourism, real estate and industry; moreover, in those loss-reporting companies, this negative influence can be amplified, which might further worsen their situations. Therefore, although hosting major sports events has a certain positive influence on regional economic and industrial development, considering its "double-edged sword" effect, each host place should not overestimate its positive influence too optimistically. Host cities should combine with their actual regional conditions and allocate the resource reasonable and effectively, thereby fully exerting the role of major sports events in promoting industrial development and improving the performance of listed companies in the host cities. Future studies can study why holding major sports events has a positive impact on the performance of private companies and the factors that lead to serious negative impact on loss-reporting companies.

Acknowledgment

This paper is supported by the Philosophy and Social Science Project of Anhui Business and Technology College: Research on the path of improving the innovation capacity of Anhui Province in the context of the integrated development of Yangtze River Delta region; the Philosophy and Social Science Project of Anhui Provincial Education Department: Research on the influencing factors and effects of the transformation of financial decision-making digital intelligence; the Philosophy and Social Science Project of Anhui Business and Technology College: Research on the synergistic development of professional setting and industrial structure of higher vocational colleges in Anhui Province in the context of big data.

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