

City Marathon Events and Tourism Industry: A Quasi-Natural Experiment

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Abstract

Building the relationship between marathon events and tourism is a significant strategy for the local governments. However, there has been little agreement on the effect of city marathon events on local tourism performance. Therefore, this research gap is addressed by providing empirical evidence for the effect of city marathon events on local tourism performance. First, the paper analyzes the theoretical mechanism of the effect of city marathon events on tourism from three aspects: the preliminary effect before marathon events, the agglomeration effect during marathon events, and the legacy effect after marathon events. Second, taking the city marathon events in China as a quasi-natural experiment, the paper uses the Difference-in-Difference model to identify the effect of the marathon events on tourism based on the panel data of 50 major tourist cities from 2010 to 2017. The results indicate that city marathon events significantly boost local tourism performance. These research findings are further confirmed by performing various robustness checks.

Keywords

city marathon events, tourism industry, quasi-natural experiments, theoretical mechanisms, difference-in-difference model

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Highlights

- The paper contributes to the relationship between city marathon events and the tourism industry.
- The paper has investigated the influence of city marathon events on tourism with the difference-in-difference (DID) methodology and panel data.
- City marathon events effectively stimulate the development of regional tourism.

Introduction

The local governments hope to raise the popularity of host cities and boost the tourism industry by hosting marathon events. However, scholars have not reached a consensus on whether the marathon events promote the tourism performance of the host city. On the one hand, previous studies believe that marathon events are positively associated with urban tourism performance. The marathon tracks designed on the basis of natural and cultural landscape show the host destinations' style and attract competitors from other places (Baumann et al., 2009). During the city marathon events, the runners, the escorts, the spectators, and other individuals who are related to or interested in the games will come to the host city, thus boosting the industries of catering, hospitality, entertainment, etc. (Emerson & Hill, 2018). After the event, most people are inclined to take advantage of the opportunity to visit the host city (Zouni et al., 2021). As a result, the marathon events generally lead to a positive effect on tourism. For instance, Agrusa et al. (2011) hold the view that the Honolulu Marathon generates a significant tourism effect on the state of Hawaii. Similar to Agrusa et al. (2011), Baumann and Matheson (2016) find that the Honolulu Marathon produces approximately 9800 additional arrivals. On the other hand, another group of scholars argues that the city marathon events show a negative effect on tourism. There are two main reasons. First, it is necessary to close some main roads of the city during the race due to the particularity of the city marathon track, which may cause traffic jams and congestion (Liu, 2013). Second, during the marathon events, numerous event-related individuals (e.g., athletes, coaches, spectators) pour into the city. They may damage the environment of the tourist attraction and cause prices of catering and hotel accommodation to rise abnormally (Chen et al., 2019). As it turned out, plenty of people prefer to travel to other cities rather than visit the host cities during the marathon events, which negatively influence the local tourism industry.

Currently, most literature focuses on applying the qualitative analysis method of the case study (e.g., Agrusa et al., 2011; Agrusa et al., 2009; Baumann & Matheson, 2016; Baumann et al., 2009) to investigate the relationship between city marathon events and the tourism industry. The selection of samples by this method tends to be subjective and small size. It is difficult to reach a consensus by comparing the

changes in tourism performance (e.g., tourism revenue, tourist arrivals) before and after the marathon event. Moreover, there is a lack of theoretical mechanism analysis in the existing studies, and it is difficult to provide a general explanation for the relationship between city marathon events and the tourism industry. At present, whether city marathon events can promote tourism performance is still controversial.

To enrich the previous literature on the relationship between city marathon events and the tourism industry, our paper takes the following actions. First, this paper establishes the theoretical mechanism, analyzing the effect of city marathon events on the tourism industry. Second, the difference-in-difference (DID) methodology is used to identify the net effect of city marathon events on the tourism industry with panel data of 50 major tourist cities in China from 2010 to 2017. Moreover, the robustness tests are conducted in the end. The results indicate that city marathon events boost the local tourism industry. The paper provides empirical evidence for the cities around the world to seize the opportunity of holding marathon events and thus stimulate tourism performance.

To sum up, the paper contributes to the relationship between city marathon events and tourism in two aspects.

1. In terms of theoretical analysis, the paper summarizes the theoretical mechanism of the effect of marathon events on the tourism industry from three aspects. They are the “preliminary effect” before the marathon events, the “agglomeration effect” during the marathon events and the “legacy effect” after the marathon events. In conclusion, this paper reveals the theoretical mechanism of the effect of city marathon events on the tourism industry, which is conducive to establishing a theoretical framework for the relationship between marathon events and the tourism industry.
2. As for research methods, case studies appear to be the primary method for previous studies of the relationship between marathon events and the tourism industry (e.g., Agrusa et al., 2011; Agrusa et al., 2009; Baumann & Matheson, 2016; Baumann et al., 2009). However, there is still a lack of literature using large sample data to comprehensively investigate the relationship between marathon events and the tourism industry. Using DID model, this paper innovatively provides an empirical test for the effect of city marathon events on local tourism performance based on panel data. Furthermore, the robustness test is carried out based on the baseline results. The large sample data and rigorous quantitative method demonstrate a superior empirical understanding of the tourism effect of marathon events.

The rest of the paper is organized as follows. The related literature is reviewed in Section “Literature review”, while we analyze the theoretical mechanism in Section “Theoretical Mechanism Analysis”. Then Section “Empirical Strategy, Variables and Data” introduces the empirical strategy, variables and data, followed by Section “Baseline Results”, where we report the baseline results. To further

confirm the findings, we conduct a set of robustness tests in Section “Robustness Tests”. Eventually, Section “Conclusion and Discussion” summarizes the conclusions and offers policy implications.

Literature Review

Tourism Attitudes and Behaviors of Marathon Participants

Previous studies have suggested that there are two categories of marathon participants, including the sports-oriented participants accounted for 29.8% and the tourism-oriented participants accounted for 70.2% (Rauter & Doupona Topić, 2014). Consequently, there is a high coincidence between the marathon participants and tourists. The marathon participants are engaged in hotel accommodation, entertainment and shopping during the events, which are considered as tourism behaviors to some extent.

Satisfaction and Willingness to Revisit Destinations or Events. Existing literature has extensively examined the influencing factors of marathon participants’ willingness to revisit their host destinations or events. For instance, the consistency of perception image and cognitive image of marathon events positively affect the participants’ satisfaction, and thus further positively influence the willingness to revisit events (Hallmann & Breuer, 2010; Huang et al., 2015). In addition, previous studies also show that destination image (Zouni et al., 2021) and event image (Filo et al., 2013; Zouni et al., 2021) have a significant effect on the willingness to revisit the host destination.

Consumption Behavior and Willingness-to-Pay. As tourists of the marathon events, the participants’ consumption behavior and willingness-to-pay in the destinations have also been widely concerned by scholars. On the one hand, some scholars concentrate on the participants’ consumption behavior. Their findings indicate that the participants’ income (Kruger et al., 2012), duration of stay (Kruger et al., 2012), and hotel accommodation (Agrusa et al., 2011; Kruger et al., 2012) influence their consumption behaviors. However, there are significant differences in the consumption of food, accommodation, shopping, entertainment and transportation between first-time and multiple-time participants, long-distance and short-distance participants (Lee et al., 2015). On the other hand, some studies also focus on the willingness-to-pay of marathon participants. The socio-psychological factors (e.g., health awareness and leisure concept) and income of marathon participants tend to influence their willingness-to-pay for various expenses (e.g., accommodation, entrance ticket) in the host cities (Wicker & Hallmann, 2013). Besides, it is suggested that the participants who are older, self-employed or climate change-focused have a higher willingness-to-pay in the environmental marathon events than the ordinary marathon events (Krugell & Saayman, 2013).

The Effect of Marathon Events on Local Tourism Industry

The marathon events have grown tremendously during the past decades. Under such circumstances, marathon events are regarded as tourism promotion strategy to attract tourists by a growing number of municipal governments. Much of the current literature pays particular attention to evaluate the effect of marathon events on tourism industry in the host cities.

Recently, literature has emerged that offers contradictory findings about the effect of marathon events on the tourism industry in host cities. On the one hand, previous scholarly works believe that marathon events can promote tourism performance. The marathon events have relatively low requirements for destination resources, which provides an opportunity for regions lacking cultural and natural resources to develop the tourism industry through the marathon events. For instance, Agrusa et al. (2011), Gibson et al. (2012) and Baumann and Matheson (2016) point out that marathon events significantly increase tourist arrivals, thus stimulating tourism performance. On the other hand, using a questionnaire survey on foreign tourists in Shanghai, Liu (2013) demonstrates that tourists' perception of sporting events in Shanghai (including Shanghai International Marathon) negatively affects their perception of tourist destination image, and thus negatively influencing their willingness to revisit the host destination. According to Chen et al. (2019), they believe that some problems caused by sporting events have led to a decrease in ordinary tourists¹. In other words, city marathon events have a "displacement effect" on ordinary tourists.

The Influencing Factors of Urban Tourism Performance

A considerable amount of literature has been published on the influencing factors of urban tourism performance. The results have proved that tourism performance is affected by economic development, industrial structure, natural environment and other factors. In general, economic development is considered as the primary determinant of tourism (Antonakakis et al., 2015; Payne & Mervar, 2010). Payne and Mervar (2010) point out that economic development promotes tourism performance by investing various resources to build tourism infrastructure and also acting as a signal of stability to international visitors. Indeed, economic development contributes to the growth of tourism performance, some literature begins to focus on the impact of industrial structure on tourism performance. Using the data from the National Bureau of Statistics of China, Wu (2012) firmly believes that the production demand of the secondary industry directly affects the sales of tourism products. Therefore, the development level of a city's secondary industry is highly positively correlated with tourism performance. The city environment appears to be an important determinant of tourism performance. Thus, Pulido-Fernández et al. (2019) utilize the Structural Equation Model (SEM) to measure the possible relationship between the environment and tourism. They propose that improvement in the environment can attract more tourists and boost tourism performance. The results revealed by

SEM show that environmental sustainability cause a significant positive effect on tourism performance. A study conducted by Endo (2006) confirms that some Foreign Direct Investment (FDI) has been invested in hotels and restaurants, which are the fundamental part of the tourism industry. As a result, FDI contributes much to the local tourism performance (Endo, 2006; Jayaraman et al., 2014). The urban tourism performance is affected by transportation infrastructure has been supported in the previous studies by Massidda and Etzo (2012), Kanwal et al. (2020). They maintain that transportation is a considerable part of the tourism industry, and thus the improvement of transportation infrastructure promotes urban tourism performance. The unemployment rate of the city reflects changes in the economic cycle (Albalade & Fageda, 2016). The cyclical fluctuation of the economy is highly correlated with tourism performance (Guizzardi & Mazzocchi, 2010). Therefore, the unemployment rate is presumed to be related to tourism performance. In addition, a survey conducted by Richards (2002) revealed that strong positive relationship between the population and tourism performance. Due to large populations, these cities have more potential tourists and thus have better tourism performance (Richards, 2002).

The Effect of Sporting Events

Plenty of literature has explored the effect of sporting events on the economy, tourism, and other sections of the host city. An increasing number of academic works evaluate the effect of hosting mega sporting events such as the Olympic Games (Smith, 2009). A previous study by Kasimati and Dawson (2009) suggests that the 2004 Olympic Games in Athens successfully promotes local economy development. However, a study in the context of the 1996 Summer Olympic Games and the 2002 Olympic Winter Games indicates that the Olympic Games have no significant effect on economic development (Porter & Fletcher, 2008). In addition, scholars have been drawn to evaluate the effect of sporting events on tourism. A study by Getz (1997) shows that mega-events and iconic sporting events have strong tourist attractions. For instance, some literature has confirmed that Olympic Games (Bottero et al., 2012; Vierhaus, 2018; Zeng & Luo, 2008) and World Cup (Baumann & Matheson, 2018) are highly positively correlated with tourism performance. Nevertheless, there is another group of scholars who hold the opposite view. Taking the 2010 FIFA World Cup as an example, Plessis and Maennig (2011) reveal that it is too optimistic for governments to estimate the effect of the World Cup on tourism performance. Similar to their findings, Vierhaus (2018) also proves that the World Cup has no significant effect on tourism performance². In conclusion, there is little agreement on the effect of sporting events in scholarly works.

The existing literature is enlightening in terms of perspective and methodology, but there are still two issues as follows. First, the previous literature often uses the case analysis method to examine the effect of one certain marathon event on the tourism industry. However, these studies always ignore the theoretical mechanism

that the city marathon events affecting tourism performance. Under such circumstances, the conclusions are inconsistent and far from a consensus. Second, the scholars may subjectively choose one individual marathon event for a case study. Due to the limitation of the case study method, the existing literature mainly selects the samples of the marathon host city to investigate whether marathon events boost tourism performance. They simply compare tourism performance before and after a city marathon event. However, there are other factors that may affect local tourism performance even if the marathon events are excluded. The weakness of this case analysis method is that it fails to get effective control groups (i.e., cities never host marathon events). Unfortunately, previous literature is incapable of identifying the net effect of city marathon events on the tourism industry while excluding other influencing factors.

Based on the limitation of existing studies, the paper attempts to identify the causal relationship between city marathon events and local tourism performance from the following two aspects. First, we analyze the theoretical mechanism that city marathon events affect the tourism industry. According to the different periods of marathon events, this paper divides the effect of marathon events on the tourism industry into three aspects: before the event, during the event, and after the event. To conclude, this theoretical mechanism offers a theoretical framework for future research on evaluating the effect of sporting events. Second, we apply panel data and the DID method to evaluate the effect of marathon events on the local tourism industry. Large-scale samples and rigorous econometric models are conducive to demonstrating a good empirical understanding of the effect of marathon events on the tourism industry.

Theoretical Mechanism Analysis

The city marathon events promote tourism performance mainly through the “preliminary effect” before the event, the “agglomeration effect” during the event and the “legacy effect” after the event (Figure 1).

The pre-event effect caused by city marathon events on the tourism industry (i.e., the “preliminary effect”). Sporting event marketing activities play an important role in promoting tourism, education and technology in host regions (Ratten, 2016). Similarly, the marketing of the marathon events by various media has raised the popularity and tourist attraction of the host city³. In the pre-event period, the marathon event organizers inevitably carry out marketing activities in the media. People’s sight and audition are filling with marathon events through Internet, TV, radio, newspapers, magazines, and other channels. The cities are also bound to take the opportunity of the marathon event to conduct tourism marketing vigorously. To the potential tourists, the host city has reshaped and communicated its tourism image. Therefore, the preliminary marketing activities of the marathon can bring tourism economic benefits for the host city.

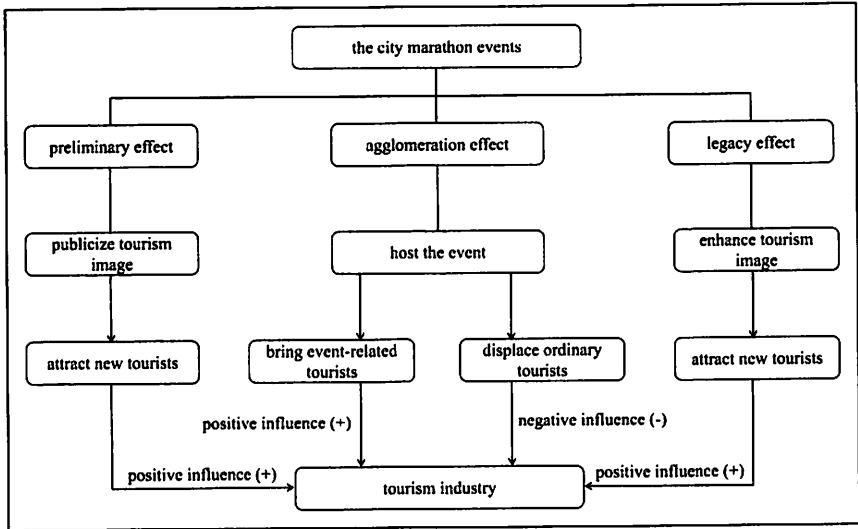


Figure 1. Theoretical framework for the effect of city marathon events on tourism industry.

The effect produced by city marathon events on the tourism industry during the event (i.e., the “agglomeration effect”). Marathon events are able to generate the “agglomeration effect”, which is reflected in the excellent interaction between the tourists, the events themselves and the destinations. The media publicity before the marathon event induces tourists’ tourism motivation to visit the host destinations. During the event, the “agglomeration effect” of marathon events tends to attract a relatively large scale of tourists with the specific flow direction. The arrivals in the host destination can be divided into four categories: participants, sports fans, ordinary tourists and other event-related personnel (e.g., coaches). For the host city, the four types of arrivals are the net growth of tourist arrivals brought by the marathon events, and thus also increase tourism revenue. Therefore, the “agglomeration effect” is expected to be positive. However, sporting events may crowd out non-event visitors (Fourie et al., 2011). During the marathon event, there is a decrease in the number of ordinary tourists due to traffic congestion and other reasons (Liu, 2013). The “tourist displacement effect” may have negative effects on tourists.

The post-event effect generated by city marathon events on the tourism industry (i.e., the “legacy effect”). Sporting events tend to have a legacies effect, showing a positive effect on the economy in the host area (In et al., 2018). As one kind of sporting event, the city marathon events may also have a legacy attraction (i.e., marathon events become a new tourism image of the city), which attracts tourists to visit the host city. Besides, some ordinary tourists who change their plans due to the “displacement effect” during the marathon will also revisit the host city after the marathon (i.e., backflow phenomenon).

In summary, as shown in Figure 1 and logical reasoning above, marathon event has more positive effects than negative effects on the tourism industry. Hence, the paper proposes the following baseline proposition: city marathon events can boost local tourism performance.

Empirical Strategy, Variables, and Data

Empirical Strategy

To test the role of city marathon events in local tourism performance, the paper utilizes DID methodology with panel data from China. The city marathon events are often held continuously every year, which are similar to a continuous exogenous policy effect on tourism performance. In fact, various cities in China hold marathon events in different years. For instance, 11 major tourist cities in China hosted the marathon events in 2010, while 43 major tourist cities successively held marathon events in 2017. There are differences in the time of the marathon events held in each major tourist city. This feature makes the city marathon events have the nature of “quasi-natural experiments”. The paper can capture the “difference” between the two dimensions of year and city for “difference-in-difference”. Therefore, the paper intends to employ the DID method to analyze the effect of marathon events on local tourism performance. As of 2017, 43 of the 50 cities in the paper held at least one marathon event, and thus these 43 cities constitute the treatment groups. The rest of the cities that do not hold marathon events form the control groups. Specifically, the paper applies a two-way fixed-effect econometric model to implement the DID estimation. The baseline regression model adopted in the paper is as follows.

$$tourit = \beta_0 + \beta_1 Marait + \beta_2 X_{it} + \gamma t + \mu_i + \epsilon_{it} \quad (1)$$

where variable *tour* denotes the performance of urban tourism. Considering the data availability, we use the number of inbound overnight tourists to measure the performance of the urban tourism industry. The subscripts *i* and *t* represent the city and year, respectively. β_0 , β_1 , β_2 are parameters to be estimated. *Mara* is the variable of interest. The estimated value of its coefficient β_1 indicates the net effect of the marathon event on urban tourism performance. X_{it} consists of a set of control variables, including the level of urban economic development, industrial structure, greening rate, foreign investment level, transportation development level, unemployment rate and population. γt stands for time fixed effect, and μ_i stands for city fixed effect. ϵ is the random disturbance term.

Variables and Data

1. **Dependent variable.** The paper determines to adopt the number of inbound overnight tourists to represent urban tourism performance due to the data availability and measurement indicators rationality. The previous studies mainly use two indicators to reflect the level of tourism performance, one is tourism revenue (Campa et al., 2016; Hou, 2019; Jin et al., 2019), and the other is the tourist arrivals (Albalade et al., 2017; Albalade & Fageda, 2016; Campa et al., 2016; Hou, 2019). Specifically, tourism revenue statistics fail to form a unified and operational survey system in China, and thus it is difficult to grasp the comparability and accuracy of figures. The tourism industry shows a relatively high correlation with the sectors of the hotel, transportation, trade, etc. At present, the tourism revenue in China tends to include the revenue from the above-mentioned related industries, which conceals the actual revenue from tourism. For instance, there is a considerable discrepancy between the tourism revenue data released by the National Bureau of Statistics of China and the China National Tourism Administration in the same year (Dai, 2016; Zhang et al., 2016). Due to the problems in tourism revenue statistics, the paper decides to use tourist arrivals to measure the level of urban tourism performance. In addition, the relatively complete statistical indicator of tourist arrivals at the city level is the number of inbound overnight tourists in the *Yearbook of China Tourism Statistics*. Consequently, in view of the above logic reasoning and data availability, the paper finally selects the number of inbound overnight tourists as the proxy variable to represent the level of urban tourism performance.
2. **Variable of interest.** To estimate the effect of city marathon events on local tourism performance, we include a dummy variable *Mara* which is the variable of our interest. If *Mara* takes the value of one, it indicates that the city *i* has held marathon event in year t^A ; otherwise, zero. Specifically, once a city holds a marathon, the city will be “treated”. Furthermore, *Mara* has taken the value of one for the rest of the research period. It is worth noticing that the specific time for marathon events in each city is not fixed. It may be in the first half of a year or the second half of a year. However, due to “preliminary effect”, “agglomeration effect” and “legacy effect”, the city marathon events would present the promoting effect on tourism in the very year whether a city holds a marathon event at any time of the year. Therefore, the paper treats the value of *Mara* as one whether a city holds the marathon event in the first half or the second half of a year.
3. **Control variables.** The paper includes a series of covariates to control the effect of other factors on urban tourism performance. The reasons are described as follows.

4. The level of urban economic development is measured by the per capita real GDP of the city (*pgdp*)⁵. The level of economic development is positively related to the tourism demand of residents (Antonakakis et al., 2015). The higher of economic development in a city, the stronger the tourism demand of local residents. However, tourism demand may boost the local tourism industry as well as other regions. Therefore, the effect of *pgdp* on tourism performance is uncertain.
5. Industrial development level is represented by the share of secondary industry in GDP (*str*). Particularly, in China, the correlation between tourism and secondary industry is higher than in other industries (Wu, 2012). Wu (2012) points out the production demand of the secondary industry shows a direct impact on the sales of tourism products, and thus the secondary industry has a great direct driving effect on tourism performance. Therefore, *str* is expected to have a positive effect.
6. The attraction of the natural environment to visitors is denoted by the greening rate (*gre*). In general, tourists may have a strong preference for mountains or forests with high green coverage and volcanoes or deserts with low green coverage. Consequently, the paper uses the greening rate and the quadratic term of greening rate to measure the attraction of the natural environment to tourists. An inverted U-shaped relationship between greening rate (*gre*) and tourism performance is expected.
7. Foreign investment level is represented by the amount of foreign capital actually utilized in the year (*finv*). In fact, the Foreign Direct Investment (FDI) often invests in hotels and restaurants, which makes important contributions to the tourism industry (Endo, 2006). Therefore, FDI plays an essential role in local tourism performance (Endo, 2006). Hence, *finv* is expected to have a positive influence.
8. The level of local transportation development is denoted by the road area per capita (*tra*). In general, the transportation facility level is considered as an important determinant of the tourism economy (Kanwal et al., 2020). Based on data availability, the paper selects road area per capita as a control variable. The level of transportation infrastructure development may promote the urban tourism economy. Therefore, the coefficient of *tra* is expected to be positive.
9. The utilization of urban labor resources is measured by the unemployment rate in each city (*unemp*). Albalade and Fageda (2016) point out the unemployment rate is able to reflect the changes in the economic cycle. The economic cycle is a well-known determinant of tourism performance (Guizzardi & Mazzocchi, 2010). There, the paper also takes the unemployment rate as the control variable and thus the coefficient of *unemp* is expected to be uncertain.
10. Population is measured by the number of permanent urban residents (*pop*). Richards (2002) concludes that the closer the tourist destination is from

tourists, the better the tourism performance. In fact, an area with a large population tends to have more potential tourists. That is, the tourism performance level of a city is highly related to the population size. Hence, the coefficient of *pop* is expected to be positive.

Using the panel data of 50 major tourism cities in China from 2010 to 2017, the paper evaluates the effect of marathon events on urban tourism performance⁶. The data on marathon events are from the official website of China Marathon and the official websites of marathon events in various cities, while the tourism data comes from the *Yearbook of China Tourism Statistics*. Meanwhile, we draw on the data of other variables provided by the *China City Statistical Yearbook*. Table 1 shows the definitions and descriptive statistics of all variables used in the paper.

Baseline Results⁷

According to equation (1), the paper applies *STATA* 15.1 software to estimate the net effect of marathon events on urban tourism performance. The baseline regression results are shown in Table 2.

The results in Table 2 indicate that the regression coefficients⁸ of *Mara* are always significantly positive after controlling time fixed effect, city fixed effect and a series of control variables. The results support the baseline proposition of the paper. That is, the city marathon events show a significant positive effect on local tourism performance. Specifically, hosting marathon events have increased the tourist arrivals in the marathon host city by an average of 100,000 tourists per year. In fact, these marathon samples used in the paper are major events. For instance, the *Shanghai International Marathon* draws at least 25 thousand runners⁹, and more than 30

Table 1. Definition and Descriptive Statistics of Variables.

Variables	Description	N	Mean	Std.Dev
<i>tour</i>	Urban tourism performance (10 thousand people)	368	138.0676	223.3384
<i>Mara</i>	A binary variable taking the value 1 if the city <i>i</i> hosts the marathon event in year <i>t</i> and 0 in other cases	400	0.4700	/
<i>pgdp</i>	Real GDP per capita (10 thousand yuan)	400	7.5598	4.2668
<i>str</i>	The share of secondary industry in GDP (%)	399	43.6654	9.6258
<i>gre</i>	Green area/land area (%)	377	41.1162	6.0992
<i>gre</i> ²	Square term of <i>gre</i> (‰)	377	1727.6399	587.0734
<i>finv</i>	Amount of foreign capital actually utilized in the year (100 million US dollars)	392	33.3052	42.2424
<i>tra</i>	Road area per capita (m ² /people)	400	14.9661	5.7427
<i>unemp</i>	Unemployed rate in the city (%)	367	0.0716	0.0499
<i>pop</i>	Urban population (10 thousand people)	400	622.4061	513.4191

Table 2. The Effect of City Marathon Event on Tourism Performance.

Models	(1)	(2)	(3)	(4)
<i>Mara</i>	10.8568* (1.9410)	10.0680* (1.7980)	10.0688* (1.7001)	10.8161* (1.6947)
<i>pgdp</i>		-0.2574 (-0.3239)	-0.3406 (-0.4167)	-0.3064 (-0.3774)
<i>str</i>		2.1544*** (2.6663)	2.2929*** (2.6599)	2.3285** (2.4930)
<i>gre</i>			0.5032 (0.3500)	0.2971 (0.2063)
<i>gre</i> ²			-0.0076 (-0.5571)	-0.0054 (-0.4035)
<i>finv</i>				0.0008 (0.0080)
<i>tra</i>				1.9135** (2.1091)
<i>unemp</i>				21.2595 (0.2359)
<i>pop</i>				0.0550 (0.7589)
Constant	132.6982*** (42.0564)	41.1686 (1.1473)	26.4614 (0.4699)	-42.1711 (-0.5295)
City FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
R ² _{within}	0.0119	0.0342	0.0375	0.0545

Notes: (1) The t-statistics for the coefficients are reported in parentheses, which is calculated according to the robust standard error of the city cluster. (2) ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. (3) The treatment and control groups remain the same in the following regression.

thousand competitors participate in the *Beijing marathon*¹⁰. Both the Reports and the Statistics show that most of the runners are from out-of-town. The possible reason is that the city marathon events have the “preliminary effect”, the “agglomeration effect” and the “legacy effect”. Before the marathon events, all cities plan to put various advertisements on the news media. They attempt to expand the effect and enhance the brand of the host city by improving an enormous amount of exposure on the press (e.g., television, newspaper, magazine). As a consequence, the host city will attract a large number of tourists and thus promote tourism performance. During the marathon event, plenty of athletes, coaches, and spectators visit the host city. They have a huge demand for the catering industry, hotel industry, and transportation industry, contributing to the performance of tourism greatly. After the event, the host city can further expand its popularity and influence through the marathon events, which is able to strengthen the tourism image of the city. The continuous attention of people to the marathon event is conducive to improving tourists’ cognition and the tourist attraction of the host city. Moreover, numerous

event-related individuals tend to take advantage of this opportunity to visit the host city after the game. To sum up, city marathon events significantly stimulate the local tourism industry.

Robustness Test

To further verify the reliability of the conclusions, the paper conducts a series of robustness tests.

Parallel Trends Test

Scholars have formed a consensus that the parallel trend assumption is the essential premise of the DID methodology. Specifically, the evolution trend of tourism between the treatment group and the control group is consistent in the preintervention periods. However, those cities with a high level of economic development and excellent infrastructure are more likely to give priority to host the marathon events. Consequently, the pre-trend of the tourism industry may be inconsistent between the marathon host cities and the other cities. To address such a concern, we aim to test whether there are significant differences in tourism performance between different cities in the pretreatment period.

First, following the methodology in the previous literature (Galiani et al., 2005), we draw the figure between the treatment group and the control group to illustrate the

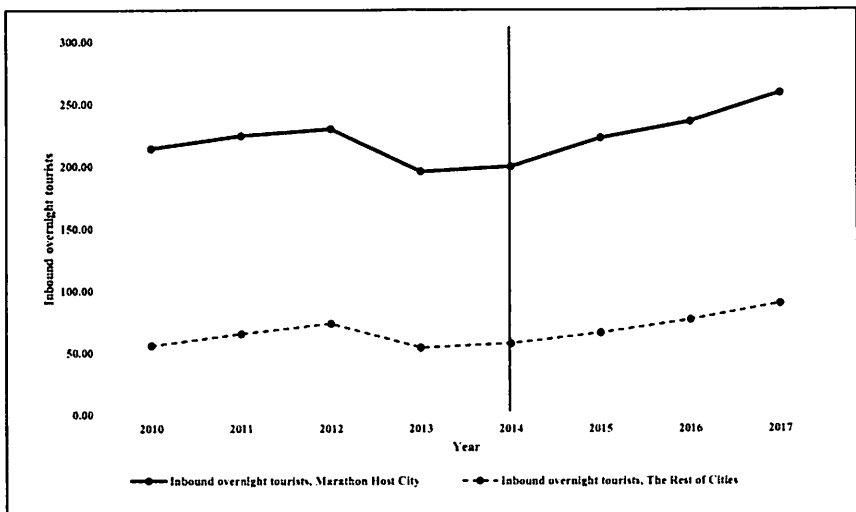


Figure 2. Evolution of tourist arrivals for marathon host city and the rest of cities.

evolution of inbound overnight tourists before and after the city marathon events. Figure 2 depicts the differences in inbound overnight tourists between the marathon host cities and the rest of cities. During the whole pretreatment period (i.e., in 2010–2013), the marathon host cities are parallel to the rest of cities in terms of inbound overnight tourists. Moreover, the inbound overnight tourists of the marathon host city increase faster than the rest of cities after 2014. This means that the growth rate of inbound overnight tourists in the marathon host cities is higher than that in the rest of cities after 2014. As shown in Figure 2, this time is consistent with the year of hosting marathon events. Before 2014 there are a few cities that hosted marathon events, while various cities begin to host marathon events after 2014.

Second, we observe that under the administrative management system in China, various conditions of the city are often closely related to the administrative level. Cities with higher administrative levels tend to possess a more developed economy and better infrastructure conditions, thus they are likely to host the marathon events. Under such circumstances, it is a proper perspective to examine the parallel trends hypothesis from the city administrative level. Since our samples are the prefecture-level cities, we plan to divide the sample into two categories: provincial capital cities (*cap*¹¹) and non-provincial capital cities to verify the common trend hypothesis. The provincial capital cities with the highest priority for development in a province are usually the economic, political and cultural centers. They are inclined to own the highest administrative level and the best development conditions. Moreover, as a provincial tourism distribution center, the provincial capital cities have been developing rapidly in their tourism industry. Therefore, they are likely to violate the common trend hypothesis in our samples. In fact, the significance of the *cap* variable exactly indicates whether the data used in this paper satisfies the parallel trend hypothesis. Specifically, if *cap* variable is statistically significant, there are systematic differences in tourism evolution among the different cities. Otherwise, we can conclude that the tourism performance trend in the preintervention periods conforms the parallel trend assumption.

The regression results are shown in Table 3. We find that the estimated coefficients of the *cap* in columns (1)–(4) are all insignificant. Therefore, without considering the effect of the city marathon events, there is no evidence to reject the equal trends of tourism between the treatment groups and the control groups. This finding indicates that the results of the DID estimation in Table 2 are credible.

Counterfactual Test

To further test the robustness of the results, we refer to previous studies (Deng et al., 2019; Liu & Zhao, 2015) and conduct a counterfactual test by changing the implementation time of policies (i.e., the hosting time of city marathon events). In fact, without the external effect of the city marathon events, some other policies or random factors may also lead to differences in urban tourism performance. Nevertheless, these differences are not related to the marathon events, resulting in

Table 3. Parallel Trends Test.

Models	(1)	(2)	(3)	(4)
<i>cap</i>	-52.2478 (-0.7514)	-45.8179 (-0.8527)	-44.9614 (-0.8377)	-67.1004 (-1.2984)
<i>pgdp</i>		0.3722 (0.4461)	0.3360 (0.3896)	0.5257 (0.5925)
<i>str</i>		1.6740** (2.0355)	1.7633** (2.0112)	1.4236 (1.4774)
<i>gre</i>			0.6380 (0.4172)	0.6442 (0.4049)
<i>gre</i> ²			-0.0075 (-0.5172)	-0.0065 (-0.4370)
<i>finv</i>				0.0539 (0.4999)
<i>tra</i>				1.2637 (1.2902)
<i>unemp</i>				128.7690 (1.3238)
<i>pop</i>				0.0783* (1.8659)
Constant	165.5325*** (2.9401)	81.6303 (1.3743)	63.7657 (0.8480)	14.5122 (0.1760)
City FE	NO	NO	NO	NO
Time FE	YES	YES	YES	YES
R ² _{within}	0.1497	0.1681	0.1642	0.1680

Notes: (1) The t-statistics for the coefficients are reported in parentheses, which is calculated according to the robust standard error of the city cluster. (2) ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

the previous conclusions being invalid. To exclude the effect of these factors, we assume that the year of marathon events held by each city will be 2 years and 3 years in advance and thus include the “pseudo-marathon-host” variable (*L2.Mara*, *L3.Mara*). If the coefficients of *L2.Mara* and *L3.Mara* still keep significantly positive, tourism performance is likely to come from other policies or random factors, rather than the city marathon events. On the contrary, if the coefficients of *L2.Mara* and *L3.Mara* are insignificantly positive in statistical, and then we can conclude that the contribution of tourism performance comes from the city marathon events. Table 4 and Table 5 present the effect of “pseudo-marathon-host” on tourism in each host destination. We observe that it is a statistically insignificant effect of “pseudo-marathon-host” in columns (1)–(4), indicating that the status of hosting the marathon events 2 years or 3 years in advance does not boost tourism performance. These results further confirm that urban tourism performance indeed comes from the marathon events, rather than the other policies or random factors.

Table 4. The Counterfactual Test (Two-Year Lag on the Mara).

Models	(1)	(2)	(3)	(4)
<i>L2.Mara</i>	0.5051 (0.0768)	0.3907 (0.0591)	-0.3179 (-0.0443)	-3.1772 (-0.3883)
<i>pgdp</i>		-0.6732 (-0.9094)	-0.6936 (-0.9019)	-0.7363 (-0.9447)
<i>str</i>		0.5991 (0.6347)	0.7956 (0.7921)	0.8851 (0.7720)
<i>gre</i>			-0.0733 (-0.0407)	-0.8225 (-0.4266)
<i>gre</i> ²			0.0022 (0.1433)	0.0070 (0.4285)
<i>finv</i>				-0.0424 (-0.4147)
<i>tra</i>				1.4848 (1.5644)
<i>unemp</i>				3.3498 (0.0381)
<i>pop</i>				0.0552 (0.6295)
Constant	138.4115*** (46.3190)	118.5362*** (2.8961)	107.8022 (1.6174)	69.8677 (0.7191)
City FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
R ² _within	0.0010	0.0054	0.0081	0.0264

Notes: (1) The t-statistics for the coefficients are reported in parentheses, which is calculated according to the robust standard error of the city cluster. (2) ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Including Province-by-Time Fixed Effects

The province-by-time fixed effects account for the nonlinear changes in the determinants of the urban tourism industry. Apparently, urban tourism performance is affected by the overall tourism planning and policies at the provincial level (Yang & Wong, 2012). As a consequence, these policies may generate nonlinear region-specific differences over time and need to be captured by the province-by-time fixed effects.

Specifically, each province tends to introduce policies (e.g., International Tourism Destination Strategy in Hainan, Ecotourism Strategy in Guizhou) to promote tourism performance in different years. As a result, various provinces are different in their efforts and policies to develop tourism, which can affect local tourism performance. To control the effect of time-variant heterogeneity on the tourism of provinces, the paper includes the province-by-time fixed effects in the regression analysis to isolate the net causal effect more precisely. Table 6 illustrates the effect of the city

Table 5. The Counterfactual Test (3-Year lag on the Mara).

Models	(1)	(2)	(3)	(4)
<i>L3.Mara</i>	-9.8338 (-1.4593)	-10.6243 (-1.5603)	-8.3203 (-1.1444)	-10.0490 (-1.4377)
<i>pgdp</i>		-0.4404 (-0.6997)	-0.3982 (-0.6126)	-0.1449 (-0.2330)
<i>str</i>		-0.7311 (-0.7905)	-0.3583 (-0.3592)	-0.5197 (-0.4913)
<i>gre</i>			-0.2181 (-0.1348)	0.0327 (0.0204)
<i>gre</i> ²			0.0036 (0.2637)	0.0010 (0.0723)
<i>finv</i>				-0.0843 (-1.0079)
<i>tra</i>				0.8765 (1.1319)
<i>pop</i>				0.2844*** (4.2565)
Constant	140.0879*** (51.8177)	175.0372*** (4.4372)	158.9548** (2.5612)	-40.3559 (-0.5373)
City FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
R ² _within	0.0118	0.0181	0.0137	0.1308

Notes: (1) The t-statistics for the coefficients are reported in parentheses, which is calculated according to the robust standard error of the city cluster. (2) ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

marathon events on the tourism industry after controlling the province-by-time fixed effects. In each column, we find that the regression results are statistically consistent with the baseline regression results¹². Therefore, our robustness checks by including province-by-time fixed effects provide consistent evidence with baseline regression that the city marathon events promote local tourism performance.

Conclusions and Discussions

The host cities expect to take the marathon events as an opportunity to improve the overall tourism image of the destinations, expand the tourism source market, and thus stimulate the development of tourism. Under these circumstances, an increasing number of scholars and officers concentrate on how to accurately recognize and evaluate the role of marathon events in regional tourism performance. Recently, marathon events in China have been gradually and continuously held in various cities at different times, which possess the nature of "quasi-natural experiment". The samples

Table 6. The Effect of Marathon Event on Tourism (Including Province-by-Time Fixed Effects).

Models	(1)	(2)	(3)	(4)
<i>Mara</i>	16.4016* (1.9145)	16.5329* (1.8989)	15.8368* (1.7507)	18.6306* (1.9793)
<i>pgdp</i>		0.1337 (0.1158)	0.3375 (0.2883)	0.4172 (0.3536)
<i>str</i>		-0.4962 (-0.2596)	-0.6195 (-0.3071)	-0.8187 (-0.3954)
<i>gre</i>			4.0280* (1.8741)	3.7665* (1.7014)
<i>gre</i> ²			-0.0329* (-1.7058)	-0.0315 (-1.5937)
<i>finv</i>				-0.4002 (-0.9784)
<i>tra</i>				0.7087 (0.5330)
<i>pop</i>				-0.0595 (-0.5608)
Constant	150.9655*** (31.1518)	171.9101** (2.0032)	68.9632 (0.6325)	117.4853 (0.8676)
City FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Province-Time FE	YES	YES	YES	YES
R ² _{within}	0.0364	0.0373	0.0723	0.0925

Notes: (1) The t-statistics for the coefficients are reported in parentheses, which is calculated according to the robust standard error of the city cluster. (2) ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. (3) There are two cities in each province on average.

provided by China allow us to investigate the relationship between marathon events and the tourism industry. Using panel data from 50 major tourism cities in China from 2010 to 2017, the paper takes city marathon events as the “quasi-natural experiment” to verify whether marathon events boost regional tourism performance by the DID model. Our findings suggest that city marathon events stimulate the tourism industry performance. These research conclusions are further confirmed by performing various robustness checks.

Based on these findings, the current research brings essential theoretical and policy implications. Compared with the previous literature, the paper clarifies the theoretical mechanism of marathon events on urban tourism performance. Then, we apply the rigorous DID method with panel data to identify the causal effect of marathon events on the tourism industry. The systematic analysis approach proposed by the paper aims to assist scholars and officers to assess the tourism performance of sporting events effectively. In addition, the policy implications of the paper are obvious. The paper has proven that city marathon events play a significant role in regional tourism performance. How the local governments promote the tourism

industry through city marathon events has become a focus of regional tourism performance. In particular, compared with other large-scale sporting events, the marathon events show a relatively low threshold to be hosted in the cities. They can be held once a year as long as conditions permit. Such continuity is conducive to building the city tourism brands and boosting tourism performance.

Even though this paper provides several significant implications, there are still certain limitations that need to be addressed in future research. The *Yearbook of China Tourism Statistics* only publishes the statistical data of inbound overnight tourists in 50 major tourist cities from 2010 to 2017 in detail. Due to data availability, the paper applies the data mentioned above to empirically examine the effect of city marathon events on tourism performance. To address such a limitation, future research can thereby be conducted with the larger-scale samples released by the official yearbook.

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Notes

1. Definition of ordinary tourists: Tourists who intent to visit their destinations but cancel their travel plans due to the sports events exactly held in the destination.
2. Note: For the host city, most large-scale sporting events are only held once for a long time (e.g., the Olympic Games, the World Cup). While the marathon events are often held several times per year and thus the impact of marathons on the tourism industry may be even greater. Marathon events are even more important to the sustainable development of urban tourism.
3. Note: Different from the promotion not based on the marathon, marathon-based marketing owns the following advantages. First, compared with mega-events, marathon events can be held several times per year, and thus marathon-based marketing is more frequent. Therefore, the impact of marathon-based marketing tends to last longer and may have a significant effect on tourism. Second, in contrast to marketing based on non-sporting events, except for preliminary impact, marathon-based marketing can further produce an agglomeration effect during the marathon events, and a legacy effect after the marathon

event. Generally speaking, marathon-based marketing generates a series of impacts on the tourism industry, and this effect is often even greater.

4. The city marathon events can be divided into the full marathon and half marathon according to the distance. The paper considers that the city has hosted a marathon event whether it holds the full or half marathon. Due to the “preliminary effect”, the “agglomeration effect” and the “legacy effect” of the city marathon events, the marathons play a significant role in the development of urban tourism regardless of the distance.
5. *Note:* The paper has converted *pgdp* into 2010 constant price.
6. *Note:* Data for all variables used in the paper are annual.
7. Before the regression analysis, the paper applies the Pearson Correlation Coefficient (PCC) to perform correlation analysis on independent variables. The results of PCC in Appendix A demonstrate that the correlation coefficients among the independent variables are relatively low. In addition, the correlation coefficient between the *Mara* and control variables does not exceed 0.4, indicating that the model does not suffer from multicollinearity problems.
8. *Note:* The *p*-value shows us the statistical significance (Wasserstein & Lazar, 2016).
9. Source: *Shanghai Sport Events Impact Evaluation Report*.
10. Source: *Data statistics of Beijing Marathon*.
11. If the city is the provincial capital city, *cap* takes the value of 1. Otherwise, it is 0.
12. *Note:* The Seemingly Unrelated Regression confirms the differences between baseline results and the results of including province-by-time fixed effects are insignificant (See Appendix B for detailed results).

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Appendix A. Pearson correlation coefficient between the independent variables.

	<i>Mara</i>	<i>pgdp</i>	<i>str</i>	<i>gre</i>	<i>finv</i>	<i>tra</i>	<i>unemp</i>	<i>pop</i>
<i>Mara</i>	1.0000							
<i>Pgdp</i>	0.3062	1.0000						
<i>Str</i>	-0.1637	0.0278	1.0000					
<i>Gre</i>	0.2251	0.1682	-0.1171	1.0000				
<i>Finv</i>	0.3062	0.3152	0.0204	0.0497	1.0000			
<i>Tra</i>	0.1070	0.2004	0.1100	0.1898	-0.0499	1.0000		
<i>unemp</i>	0.1821	0.3513	-0.0814	0.0261	0.3722	-0.1698	1.0000	
<i>Pop</i>	0.2036	-0.0032	0.1159	-0.0323	0.3411	-0.1767	-0.0560	1.0000

Appendix B. The difference test between baseline results and the results of including province-by-time fixed effects.

Model	Tour baseline results	Tour including province-by-time fixed effects	Tour baseline results	Tour including province-by-time fixed effects
<i>Mara</i>	10.8568* (1.9410)	16.4016* (1.9145)	10.8161* (1.6947)	18.6306* (1.9793)
Constant	132.6982*** (42.0564)	150.9655*** (31.1518)	-42.1711 (-0.5295)	117.4853 (0.8676)
p-value	0.1011			0.1314
Covariates	NO	NO	YES	YES

Note: (1) The paper utilizes the Seemingly Unrelated Regression to test the difference between baseline results and the results of including province-by-time fixed effects. Specifically, the p-value is used for testing the significance of the difference in these regression results. (2) The null hypothesis (H_0): there are insignificant differences between baseline results and the results of including province-by-time fixed effects. The p-values are all larger than 0.1, and thus the paper can accept the null hypothesis at the 10% significant level. That is, the differences between baseline results and the results of including province-by-time fixed effects are insignificant.