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Is the World Heritage just a title for tourism?

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ABSTRACT

World Heritage inscription denotes recognition of cultural and natural properties that have outstanding universal value. This paper contributes to the debate on the tourism impact of WH inscription with prefectural city data from China. The difference-in-differences framework shows that WH inscription does not promote tourism in terms of tourism revenue and tourist arrivals, which is consistent under various robustness checks. Heterogeneity analysis finds a negative effect of World Heritage inscription on domestic tourism revenue in the developed eastern region, over time, and for World Cultural Heritages, caused by the inscription to properties involving multiple cities. The empirical results suggest that World Heritage inscription in China plays more roles in protecting inscribed properties than developing tourism from them.

Introduction

To protect and preserve cultural and natural heritage from various threats of damage or destruction caused by natural decay and changing social and economic conditions, the United Nations Educational, Scientific and Cultural Organization (UNESCO) declared the World Heritage Convention at the general conference held in Paris in 1972 and began to inscribe properties that have outstanding universal values and meet the announced selection criteria as a World Heritage (WH) site. As of 2018, there are in total 1092 WH inscribed properties, of which 845 are World Cultural Heritage (WCH), 209 World Natural Heritage (WNH), and 38 World Mixed Heritage (WMH).[1] The state parties agreeing to adhere to the World Heritage Convention had grown to 193 countries by 31 January 2017. To be inscribed as a WH site, a property must meet at least one of the ten criteria developed by the World Heritage Committee (WHC), the main body in charge of the implementation of the World Heritage Convention.[2] As a result of strict selection criteria and scarce inscriptions under current inscription procedures, WH inscription brings huge fame to a property and is reckoned to increase the visibility of WH host sites through public announcements of that inscription (Drost, 1996).

Whether or not WH inscription promotes tourism growth has been broadly examined. However, evidence on that effect is mixed, with some studies showing that WH inscription attracts tourists and thus promotes tourism development (Buckley, 2004; De Simone, Canale, & Di Maio, 2018; Jimura, 2011; Kim, Oh, Lee, & Lee, 2018; Su & Lin, 2014; Yang, Lin, & Han, 2010), while others finding that it does not have that effect (Cellini, 2011; Cuccia, Guccio, & Rizzo, 2016; Huang, Tsaur, & Yang, 2012; Reinius & Fredman, 2007; Wang et al., 2015), or that the effect is conditional on empirical specifications, the level of development in the host country and the heritage type (Frey & Steiner, 2011; Yang, Xue, & Jones, 2019). Extant literature has also used case studies to disclose the room for a WH site to improve its operational and managerial efficiency (Yan & Morrison, 2008; Zhang, Fyall, & Zheng, 2015), or disentangle

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[1] Unless stated otherwise, data are taken from the official UNESCO website at http://whc.unesco.org/.
[2] For details of these criteria, see https://whc.unesco.org/en/criteria/.

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tourists' travel behaviours (King & Halpenny, 2014; Shen, Schüttemeyer, & Braun, 2009) and the determinants of WH site's social value to develop sustainable tourism (Parga Dans & Alonso González, 2019).

This paper adds to the debate regarding the tourism promotion effect of a WH inscription. While conducting an empirical study from China, this paper differs from those already using data from China in that it is the first to use prefectural city-level data. The prefecture is the second level of China's four-level local administrations, following province, the top level of those administrations, and followed by county and township. As of 2018, there are in total 333 prefectural level administrations, among which are 293 prefectural-level cities, 30 autonomous prefectures, seven areas, and three leagues. Each provincial-level administration consists of about a dozen of prefectural level administrations which usually govern an area of over 1500 km^2. The merits of using prefectural city-level data lie in the facts that WH inscription is more exogenous to other determinants of local tourism outcomes, there is more variation in the number of WH sites across prefectural cities, and the outcome variables are more accurate than those at the provincial or country level. These merits enable us to identify the causal effect of WH inscription on the regional tourism economy. In addition, compared with studies with provincial data (e.g., Yang et al., 2010), our prefectural city-level data have a longer time horizon of between 2000 and 2015, which enables us to observe the temporal effect of WH inscription, and have a larger number of observations, which enables us to attain more reliable results.

This paper also contributes to identifying the causal link between WH inscription and local tourism outcomes, using the difference-in-differences (DID) framework. Compared with times series data analysis, which compares the outcome variable before and after the treatment, and cross-sectional data analysis, which compares the outcome variable between the treatment and the control group, the DID framework, embedded in the fixed effects panel data model, compares both differences of the outcome variables. Given that the treatment and the control groups share the same trends, the DID framework will lead to a valid causal inference (Angrist & Pischke, 2014). A larger variation in WH inscription in prefectural city-level data than in provincial level data also enables us to implement the DID estimation better.

Our empirical study provides consistent evidence that WH inscription does not contribute to local tourism growth, thereby suggesting the protection and preservation aims rather than the tourism development roles of WH inscription in China. The heterogeneity analysis shows that WH inscription reduces domestic tourism revenue in developed regions, and it reduces that revenue, with lag effects and when the inscription is WCH. The heterogeneity effects are found caused by the inscription of WH site to properties owned by multiple cities.

The rest of the paper is structured as follows. The next section is a brief introduction to China's World Heritage sites, which is followed by a literature review in Section 3, where we also try to hypothesize the impact of WH inscription on tourism outcomes. Section 4 specifies the empirical strategy, including the data, the empirical models, variables and parallel trends test. Section 5 reports empirical results, including the baseline results from the DID framework, robustness checks, and heterogeneities in terms of regions, dynamics, WH significance, and WH types. Finally, we discuss the results and conclude the paper in Section 6.

World Heritage sites in China

China, as one of the world's most ancient countries with colourful cultures and a vast territory, has plenty of properties with an outstanding universal value that are candidates for a WH inscription. Just two years after becoming a state party adherent to the World Heritage Convention in December 1985, China saw her first six properties inscribed as World Heritage sites. The State Administration of Cultural Heritage is responsible for identifying and nominating properties for WH inscription. As of 2018, the number of WH sites had increased to 53, with 36 WCH, 13 WNH, and 4 WMH, ranking second in the world (see online Appendix A1 for a full list of Chinese WH sites and the cities involved).

While some WH sites are located mainly within a single prefecture, others involve several adjacent prefectures or even run across hundreds of miles. For example, the Great Wall, which was constructed from the 3rd century BCE to the 17th century CE as a united defence system against the invasion of nomads from the north, stretches over $>$ 20,000 km from Shanhaiguan in Hebei province in the east to Jiayuguan in Gansu province in the west. Also, some properties are inscribed as a WH site by several phases. For example, Imperial Tombs of the Ming and Qing Dynasties, which comprise several imperial tombs of the Ming and Qing Dynasties located in Beijing, Nanjing, Shenyang and so on, was enlisted as a WH site by three phases, in 2000, 2003 and 2004 (see also online Appendix A1). As a result, the number of cities having WH sites inscribed number many more than the number of WH sites.

Fig. 1 depicts the trends in the number of WH sites and their involved prefectural cities. It is seen that the total number of WH sites contained in the 288 cities included in the present paper increased from 28 in 2000 to 48 in 2015. The number of prefectural cities related to these WH sites increased correspondingly from 87 in 2000 to 128 in 2015, with a sharp increase in 2014 as a result of two WH sites inscribed in that year—that is, the Grand Canal and Silk Roads: The Routes Network of Chang'an-Tianshan Corridor, which are across dozens of prefectural cities.

Fig. 2 further displays the frequency of prefectural level cities having WH sites by provinces in China in 2015, which we find differs remarkably across provinces. It is shown that prefectural cities in northern provinces such as Inner Mongolia, Gansu, Shaanxi, Henan, and Shandong, have many more WH inscriptions than those in the south, a result of central and northern China having a longer and more intense history of human activities than southern China. One exception is Jiangsu province, which has more than eight cities with WH sites due to the fact that the Grand Canal stretches over almost all her prefectural cities. Such a spatial distribution of WH sites can also be verified by the number of WH sites in each province, which is many more in northern provinces like Henan, Shaanxi, Shanxi, Hebei, and Shandong (see also online Appendix A1). Since southern provinces are more developed than northern provinces during the past decades and thus have more tourism revenue, such a pattern of WH distribution may lead to a negative relationship between the number of WH sites and tourism development. However, a simple graph is far from reaching a

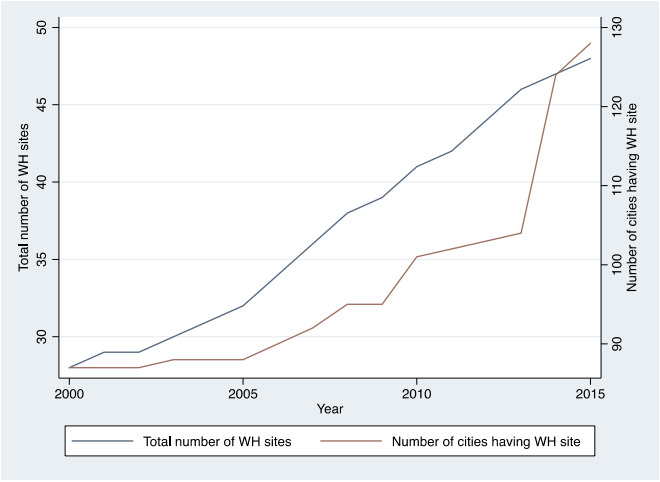

Fig. 1. The number of World Heritage sites and World Heritage cities in China, 2000–2015.
Note: The number of cities having WH sites refers only to prefectural level cities.
Source: Authors' own graph with the data from UNESCO at https://whc.unesco.org/en/list/?search=&id_states=cn&order=country.

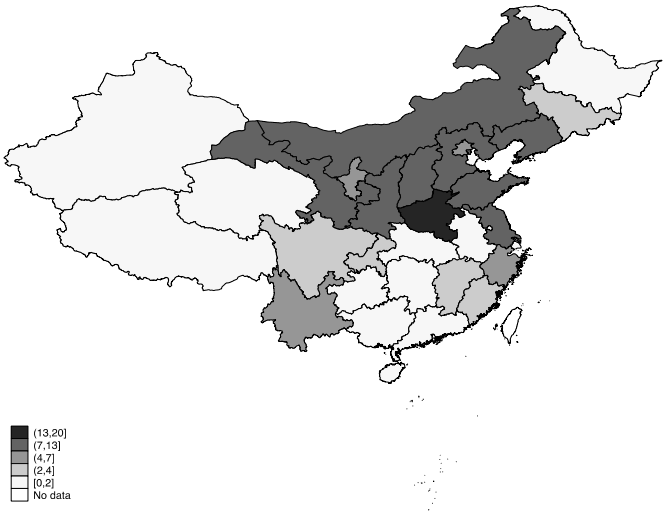

Fig. 2. Frequency in 2015 of prefectural cities having World Heritage sites by the province in China
Note: The figure depicts the number of prefectural level cities having WH sites in each province, which could be less than the actual number. No data refers to areas outside of mainland China.
Source: Authors' own graph with the data from UNESCO at https://whc.unesco.org/en/list/?search=&id_states=cn&order=country.

valid causal inference, because other determinants of tourism outcomes are not considered. In other words, other things are not equal. Thus, in the following sections, after a brief literature review, we will explore the change in WH inscriptions as a natural experiment, match them with prefectural level data of tourism outcomes and their determinants, and use the DID framework to estimate the impact of WH inscription on tourism development.

Related literature and research hypothesis

Since the first batch of WH sites was inscribed by UNESCO in 1978, scholars have been drawn to evaluate the inscription. Because the WH name is subscribed to properties with outstanding universal values, local administrations and tourism companies may expect to boost their tourism development with a successful WH inscription, which would place protected properties under threat of the damage from human activities. Scholars first consider how to reconcile the potential conflicts between property protection and tourism development, both a result of WH inscription (Drost, 1996; Landorf, 2009; Li, Wu, & Cai, 2008; Nicholas, Thapa, & Ko, 2009; Zhang et al., 2015).

Where evaluating the socioeconomic impacts of WH inscription is concerned, related literature first uses case studies to disentangle the effect, which generally leads to a positive impact of WH inscription. For example, Buckley (2004) found with the time

series from Australian National Parks that WH designation increases tourist arrivals. Evidence from WH sites in Anhui, China also shows that WH list status affects travellers' visiting decisions (Yan & Morrison, 2008). In addition, Jimura (2011) used Ogimachi, Shirakawa-mura, Japan as a case study and observed that WH inscription promotes tourism development, attracts domestic tourists and changes attitudes of residents towards conservation of the cultural environment and WH status.

Econometric methods, which are expected to realize a causal inference, are used to evaluate the tourism impacts of WH inscription, but provide mixed evidence. Yang et al. (2010) first used provincial panel data from China to estimate the impact of WH inscription on international arrivals and found that WH inscription has a tourist-enhancing effect. Similar results are found with provincial panel data from Italy (De Simone et al., 2018; Patuelli, Mussoni, & Candela, 2013) and using cross-national panel data (Su & Lin, 2014). However, there are conflicting results. Cellini (2011), after questioning the method used by Yang et al. (2010), showed that WH sites in Italy do not promote tourism overnight. Similarly, Huang et al. (2012) used data from Macau, failing to find a tourism growth effect of WH inscription and finding only a short-term tourism-enhancing effect. Also using data from Italy, Cuccia et al. (2016), using the Data Envelopment Analysis method, found a result different from that of De Simone et al. (2018), that WH inscription is negatively associated with tourism efficiency. Thus, the empirical results are inconsistent and far from conclusive, as revealed by a meta-analysis (Yang et al., 2019) which found that the impact of WH inscription on tourism demand depends on the research period, development level, heritage type, WH site measures, and estimation methods.

If WH inscription could affect tourism outcomes, how would it happen? Firstly, for tourism at the micro-site level, existing case studies can provide some clues. It is argued that WH inscription, as a mark of outstanding property quality and value, can change tourists' travel decision by choosing a WH site as their visit destination, and thus attract tourists (Drost, 1996; Reinius & Fredman, 2007; Yan & Morrison, 2008). But, to discover the channels by which WH inscription affects regional tourism outcome, it is necessary also to consider the impact of WH inscription on tourism in surrounding areas without a WH site. While there is a lack of literature directly related to such impact, Mayer's (2014) study regarding protected areas may provide some hints. The case study of the Bavarian Forest National Park, Germany, showed that the park brings about net gains to surrounding counties with a benefit-cost ratio of over 1. If this also happened with WH inscription, a similar positive impact could be expected.

So, what hypotheses can we propose regarding the impact of WH inscription on regional (here is prefectural city level) tourism economy in China? It is natural to hypothesize that WH inscription promotes regional tourism growth. A successful inscription works to credit the site with high-quality tourist resources and signals its outstanding value to tourists. However, evidence from the Swedish mountain region (Reinius & Fredman, 2007) shows that the WH label has a weaker impact on tourists' behaviours than the National Park label. Furthermore, a study from Germany by Mayer, Müller, Woltering, Arnegger, and Job (2010) using a face-to-face survey observes that daily expenditure per visitor at the National Park is much lower than the national average. As a protected area, a WH site may have a similar effect because, to be inscribed, sites need to be developed with amenities such as transportation and hospitality, and the ticket price needs to be regulated so that its outstanding universal value can be shared.

Successful inscription of the property also implies that the site has to comply with UNESCO's operational practices to protect, maintain and preserve the property. In China, construction and development plans or projects involving a WH site are required to be reported first to local tourism administration and then to national tourism administration, which may require further revisions of the plans or oppose them out of protection and preservation considerations.[3] These strict regulations would prevent local site administrations from maximizing their profit from inscribed properties.

Moreover, the tourism promotion effect of WH sites may also be very limited because exactly the title of WH is inscribed to properties that have outstanding universal value. A WH site is interpreted as an already classified landmark, a geographically or/and historically place with unique cultural or physical significance (Allan et al., 2018). It must represent a remarkable accomplishment of humanity and be considered evidence of the intellectual history of the planet. A study using data from WH sites in Australia and the United States (King & Halpenny, 2014) found that almost no visitors after leaving WH sites can recall the meaning of the WH symbol, though a remarkable proportion of visitors can recognize that symbol, indicating that the WH inscription is mostly a name for tourists.

In China, as a result of economic success, properties with outstanding universal value have been fully exploited by local governments to develop all kinds of tourist attractions, some of which are candidates for WH inscription. As argued by Frey and Steiner (2011), the WH list only works to protect properties when they are undetected and disregarded by national decision-makers due to inadequate financial sources, political control or technical knowledge for conservation, while it does not matter in cases where the heritage site has been effectively protected and preserved, which is very likely the case in China. Because those significant properties have been fully developed as tourist attractions, a successful inscription just adds a new title to them, acting to constrain the potential damage caused by overdevelopment of those properties.[4] Meanwhile, for those properties lacking tourism value, a WH title may mean little for tourism but much for the outstanding value of a property needing protection and preservation. As a result, WH is just a title for tourist attractions, but with some burdens.

Even if WH inscription indeed attracts tourists to WH sites and promotes tourism in WH sites, it may also produce substitute effects, crowding out tourists and tourism revenue in other local tourist attractions without a WH site. As shown by Patuelli et al. (2013) with a spatial correlation model, while WH sites produce both complementary and substitute effects on tourism flows across

[3] The State Administration of Cultural Heritage has listed its official responses to tourism development plans or projects about WH sites which are proposed by local tourism administrations. See http://gl.sach.gov.cn/sachhome/public/gov-info-open.html.

[4] Simple correlation analysis shows that the number of WH sites is positively correlated with the number of 5A tourist attractions, the top-quality grade tourist attraction, by a Pearson correlation coefficient of 0.3271, which is significant because WH inscription is rare.

20 Italian regions, substitute effects dominate complementary effects, suggesting an overall negative effect on tourism flows. Similar effects are also argued by Gao, Su, and Zang (2018) to explain the negative effect of accrediting top quality grade to tourist attractions on regional tourism development. If none top-grade tourist attraction is accredited, tourists' travel destinations would be more evenly distributed across tourist attractions in the same region. When there is an accredited tourist attraction, tourists may be attracted, crowding to it, thereby resulting in a sharp reduction in arrivals and revenues of other tourist attractions. A similar case may happen to WH sites. When the substitute effects of WH inscription outweighs its complementary effects, WH inscription will reduce regional tourism revenue and tourist arrivals.

To sum up, WH inscription may attract tourists and promote tourism, but it may also limit that effect. It is a title with some burdens for inscribed properties, which are required to implement strict regulations after inscription. It may also act as a reference point for tourists to choose visiting destination, thereby crowding out tourism in other non-WH sites. Given that properties with outstanding universal value have been well developed as tourist attractions in China, along with the protection and preservation purposes of WH inscription, we are unable to develop a clear-cut hypothesis on nexus of WH inscription and regional tourism economy but instead argue that WH inscription plays a limited role in promoting regional tourism economy.

Empirical strategy

Data

We matched the data from various sources to evaluate the impact of World Heritage inscription on tourism economy (see also online Appendix A2 for detailed data sources). Firstly, the prefectural city-level data on tourism outcomes, such as domestic tourism revenue, domestic tourist arrivals, and foreign tourism revenue, and their potential determinants are reported in provincial statistical yearbooks and are available from the China Economic and Social Development Statistics Database. Second, the information on the WH sites in China is taken from the official website of World Heritage, UNESCO. For those WH sites that stretch over several prefectures, we assign the same WH inscription year to all these prefectures. Thirdly, we collect data on the high-speed rail (HSR) connection and airport for each prefecture to capture the transport modes for local tourism development. The HSR information is constructed according to China's HSR network map, and each HSR line is checked manually to collect the information on the year it opened and the cities it connects. For those prefectural cities that are connected by multiple HSR lines, we assign their HSR opening to the earliest year they were connected to the HSR. The data on airports are taken from the website of the Civil Aviation Administration of China. We manually checked the opening date of each airport by searching its introduction in Baidu or 360, China's two largest online encyclopaedias. It should be noted that our prefectural-level cities also include provincial capitals and municipalities such as Beijing, Tianjin, Shanghai, and Chongqing, but do not include Hong Kong, Macau, and cities in Taiwan. As a result, we constructed panel data for 288 prefectural cities from 2000 to 2015, which are unbalanced as observations for some variables are not reported in provincial statistics yearbooks.

Empirical model and variables

The DID framework is used to identify the impact of WH inscription on the regional tourism economy. The basic model involved treatment at some time point can be written as follows:

$$y_{it} = \alpha_0 + \alpha_1 D\_Treat_i + \alpha_2 D\_Treat_i \times D\_After_t + \alpha_3 D\_After_t + \varepsilon_{it} \quad (1)$$

where y is the outcome variable, *D_Treat* is a dummy variable indicating the treatment group, which takes one for the treatment group and zero for the control group, and *D_After* is a dummy variable indicating the time of post-treatment, which takes one for the period after the treatment and zero before it. Subscripts i and t denote subjects and time, and ε is the disturbance term. When using the OLS method to estimate the above equation, α_2 measures the treatment effect on the outcome variable, which is a net effect after taking away the difference of outcome variable between the treatment and the control groups, that is, α_1, and the difference after and before the treatment, that is, α_3.

When the treatment happens in multiple periods and the treatment has multiple levels, the basic DID framework is extended into a continuous DID framework embedded in the fixed effects model which also control for year-fixed effects (Angrist & Pischke, 2014). Now, the interaction term is replaced with a time-varying treatment variable which takes positive values in years after the treatment and zeroes in other years. Thus, in our case where WH site is inscribed in different years and some cities have multiple WH sites, we used following continuous DID framework embedded in the fixed effects panel data model to estimate the effect of WH site inscription on local tourism growth:

$$Tour_{pt} = \alpha WH_{pt} + X'_{pt}\beta + c_p + \delta_t + \varepsilon_{pt} \quad (2)$$

where *Tour* denotes the tourism outcome variable, *WH* denotes the number of World Heritage sites, and X denotes a vector of other determinants of tourism outcome. Subscripts p and t denote prefectural cities and year, respectively. c_p, δ_t, and ε_{pt} are prefectural city and year fixed effects, and the random disturbance, respectively; α and β are coefficients to be estimated. We use the Ordinary Least Squares (OLS) method to estimate Eq. (2). It is well agreed that, given the treatment and control groups share the same trends, the DID framework can realize a valid causal inference (Angrist & Pischke, 2014). Furthermore, to obtain a conservative result, standard errors are clustered at the prefectural city level.

We use three variables to make a full measure of tourism economy: domestic tourism revenue, domestic tourist arrivals and

foreign tourism revenue, some of which are also used in extant empirical studies (Cellini, 2011; De Simone et al., 2018; Deng, Hu, & Ma, 2019; Gao, Su, & Wang, 2019; Gao et al., 2018; Huang et al., 2012; Yang et al., 2010). Tourism revenue of a city, according to NTAC (National Tourism Administration of China, 2016), includes all expenditures made by visitors in the course of their travel to and stay in this city, but excludes expenditures for commercial purposes, investments, cash given to friends and relatives, and donations. The variable of our interest is the number of World Heritage sites in each prefectural city from 2000 to 2015, which includes both cultural heritage and natural heritage. Thus, the estimate α in Eq. (2) measures the impact of one more WH site on tourism outcome. To observe how the switch from no WH site to having a WH site affects tourism growth, we also construct a dummy variable regarding having or not having a WH site.

Control variables include GDP per capita, population density, public expenditure per capita, the average salary of workers, and accessibility of the prefectural city. GDP per capita is one of the best measures of local income, giving a comprehensive indication of local development, and is controlled in empirical studies to explore the determinants of tourism demand (Albalate, Campos, & Jiménez, 2017; Albalate & Fageda, 2016; Chen & Haynes, 2015; Gao et al., 2019; Massidda & Etzo, 2012). Omitting GDP per capita may lead to biased estimation on the effect of WH inscription on tourism development, because it may determine both tourism outcomes and the willingness to apply for WH inscription and result in omitted variables bias. Population density measures the intensity and connection of human activities, which contributes to various spillovers worthy of visiting and travelling for tourists. Thus, population density is also controlled for in previous studies (see, for example, Albalate et al., 2017; Albalate & Fageda, 2016; Gao et al., 2019; Massidda & Etzo, 2012). Public expenditure is also pertinent, because public support is crucial for developing tourism amenities and applying for WH inscription, and its importance in cultivating amenable and populous environments for tourism has been well recognized (Felsenstein & Fleischer, 2003; Mules, 2005). Resident income contributes to tourism, as argued by Engel's law, as well as some extant literature (Louca, 2006; Stronge & Redman, 1982). Finally, the accessibility of WH sites is measured by local transport conditions. Here we control for two types of transport, railway, and the airport, measured by HSR connection and airport, respectively, both of which are considered important determinants of tourism outcomes (Albalate et al., 2017; Albalate & Fageda, 2016; Gao et al., 2019).

Fig. 3 displays the trends in tourism outcomes by prefectural cities with and without a WH site and the two-way scatter of WH

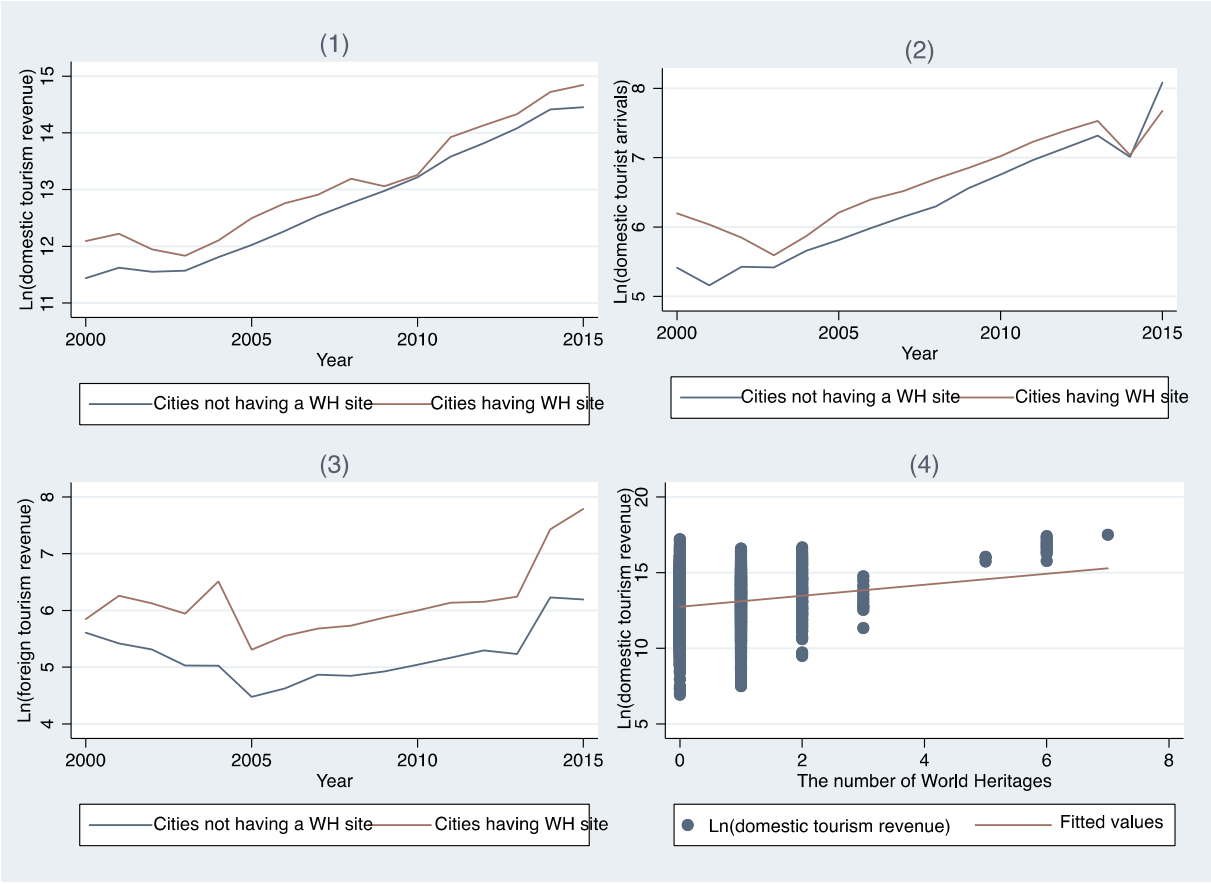

Fig. 3. World Heritage and tourism outcomes, 2000–2015.
Note: All tourism outcomes are in means.
Source: The authors' own graph.

Table 1
Summary statistics.
Source: See online Appendix A2.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Domestic tourism revenue	3722	12.876	1.557	6.928	17.504
Domestic tourist arrivals	3485	6.436	1.211	0	11.947
Foreign tourism revenue	3573	5.501	2.763	0.020	14.704
Number of WH sites	4608	0.400	0.661	0	7
GDP per capita	4604	9.807	0.906	4.727	12.456
Population density	4536	5.717	0.904	1.609	9.356
Public expenditure	4435	7.776	1.051	4.018	11.819
Average salary	4529	9.976	0.650	8.305	12.678
HSR connection	4608	0.165	0.371	0	1
Airport	4608	0.407	0.491	0	1

	(1) Cities not having a WH site		(2) Cities having at least one WH site		(1)–(2)
	Obs.	Mean	Obs.	Mean	Mean difference
Domestic tourism revenue	2114	12.725	1608	13.073	−0.348***
Domestic tourist arrivals	1962	6.296	1523	6.617	−0.321***
Foreign tourism revenue	1966	5.068	1607	6.03	−0.962***
Number of WH sites	2560	0	2048	0.897	−0.897***
GDP per capita	2559	9.706	2045	9.934	−0.228***
Population density	2518	5.828	2018	5.579	0.249***
Public expenditure	2441	7.706	1994	7.862	−0.156***
Average salary	2507	9.953	2022	10.005	−0.051***
HSR connection	2560	0.172	2048	0.156	0.017
Airport	2560	0.416	2048	0.395	0.022

Notes: Tourism outcomes, GDP per capita, population density, public expenditure and average salary are in natural logarithm.
*** Denotes a significance level of 1%.

sites and domestic tourism revenue. We find from Fig. 3.1–3 that both domestic tourism revenue and tourist arrivals increase in most years from 2000 to 2015, while foreign tourism revenue first decreases up to 2005 and then increases slowly in most of the other years, forming a U-shape trend. This is mainly because only a small proportion of cities, which are usually central cities frequently visited by foreign tourists, reported their foreign tourism revenue in the years 2000 to 2005 and after 2013, leading to much larger means in these years. Meanwhile, it is shown that cities with WH sites on average have higher tourism revenue and tourist arrivals in most years, compared with those without a WH site, and they share similar trends in most of the years we investigate. Fig. 3.4 shows that the number of WH sites is positively associated with domestic tourism revenue. However, it is far from conclusive that WH inscription promotes tourism development, because other confounders are not controlled for. As shown by the summary statistics in Table 1, cities with and without a WH site also differ significantly in other aspects, except for HSR connection and airport transport.

Parallel trends test

It is well agreed that a valid causal inference within the DID framework is conditional on the parallel trends assumption—that is, the treatment group and the control group share the same trends. While it seems hard to test parallel trends in the setting of multiple treatments, we follow Autor (2003) and Gao et al. (2019) by checking if the lead effects of WH inscription on tourism outcome are statistically insignificant. If so, we tend to believe that the parallel trends assumption can be fulfilled, because the treatment does not have a statistically significant effect on the outcome variable before the actual treatment. Specifically, we estimate the following empirical model:

$$Tour_{pt} = \sum_{k=-m}^{q} \alpha_k WH_{pt}(t = o + k) + \alpha_l WH_{p,t-k-1} + X'_{pt}\beta + c_p + \delta_t + \varepsilon_{pt} \quad (3)$$

where o is the year when a city gains its WH inscription; q and m are nonnegative integers. α_k measures the lead effects of successful WH inscription when $k < 0$. If lead effects are statistically insignificant, we can say that before the treatment happens there are no differences in the trends of the treatment and the control groups. Eq. (3) can easily be developed to allow for estimating lag effects of WH inscription—that is, letting $m < 0$. The statistically insignificant lead effects joint with statistically significant lag effect indicate WH inscription causes tourism outcome. Test results are reported in Table 2. We find that the parallel trends assumption is basically fulfilled except in column (1), where WH inscription has a positive five-year lead effect on domestic tourism revenue at the 5% significance level.

Table 2
Tests on parallel trends assumption.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue
WH site (o-5)	0.1673**	0.0186	0.1158			
	(0.0747)	(0.0400)	(0.0740)			
WH site (o-4)	0.1115	0.0064	0.1031			
	(0.0873)	(0.0553)	(0.1136)			
WH site (o-3)	0.0181	−0.0933	−0.0500	−0.0776	−0.0038	−0.0453
	(0.1250)	(0.1173)	(0.1520)	(0.0548)	(0.0426)	(0.0720)
WH site (o-2)	0.0624	0.0808	0.0971	−0.0721	0.0301	0.0131
	(0.1496)	(0.1857)	(0.1329)	(0.0663)	(0.0695)	(0.0824)
WH site (o-1)	0.1794	−0.1462	−0.0221	0.0558	−0.1330	−0.0601
	(0.1676)	(0.1542)	(0.1639)	(0.1156)	(0.1130)	(0.1302)
WH site (t)	0.0538	−0.0008	0.1621	−0.0605	−0.0196	0.0561
	(0.1541)	(0.1597)	(0.1969)	(0.1149)	(0.1047)	(0.1531)
Observations	2532	2463	2407	3095	3026	2970
R-squared	0.5989	0.7290	0.3968	0.7304	0.8103	0.4513
Number of cities	286	286	286	288	288	288

Notes: Robust standard errors clustered at the prefectural city level are in parentheses. All columns control for GDP per capita, population density, public expenditure, resident income, HSR connection, and the airport, where GDP per capita, population density, public expenditure and resident income are in natural logarithm.

** Denotes the significance level of 5%.

Results

Baseline results

Table 3 reports the baseline results, all of which are estimated from Eq. (2), that is, the DID framework embedded in the fixed effects panel data model. The first three columns report the results without any controls but city and year fixed effects. It is found from columns (1)–(3) that WH inscription contributes negatively to domestic tourism revenue, and insignificantly to domestic tourist arrival and foreign tourism revenue. However, once all other variables are controlled for, as shown in columns (4)–(6), we find that WH inscription does not reduce domestic tourism revenue at the significance level of 5%. Thus, the baseline results suggest that WH inscription does not cause three tourism outcomes. Among the controls, we only find that GDP per capita is consistently and positively associated with tourism growth.

Table 3
Baseline results from the DID framework.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue
Number of WH sites	−0.1843**	0.0074	0.0847	−0.1337*	−0.0292	−0.0469
	(0.0842)	(0.0866)	(0.1195)	(0.0693)	(0.0821)	(0.1131)
GDP per capita				0.3995***	0.2505***	0.3302**
				(0.0798)	(0.0803)	(0.1409)
Population density				0.0326	0.0156	−0.0918
				(0.0480)	(0.0317)	(0.0747)
Public expenditure				0.2630***	0.1676*	0.0067
				(0.0949)	(0.0881)	(0.1286)
Resident income				0.1765	0.1311*	0.3141*
				(0.1576)	(0.0693)	(0.1799)
HSR connection				−0.0767	−0.0102	0.0561
				(0.0513)	(0.0383)	(0.0735)
Airport				0.1978***	0.0375	−0.1422
				(0.0682)	(0.0617)	(0.1402)
Constant	11.3203***	5.2859***	3.7964***	4.3867***	0.8117	−0.9399
	(0.0561)	(0.0846)	(0.1784)	(1.3271)	(1.0078)	(2.0066)
Observations	3722	3485	3573	3586	3379	3442
R-squared	0.7921	0.7933	0.4454	0.8005	0.7964	0.4450
Number of cities	288	288	288	288	288	288

Notes: Robust standard errors clustered at the prefectural city level are in parentheses; *, **, and *** denote a significance level of 10%, 5% and 1%, respectively; All variables except for the number of WH sites, HSR connection and Airport are in natural logarithm.

Table 4
Robustness check with alternative DID specifications.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue
Having a WH site(s)	−0.0890	−0.0166	−0.0915			
	(0.0846)	(0.0944)	(0.1476)			
Number of WH sites				−0.0612	−0.0269	−0.0148
				(0.0832)	(0.0952)	(0.1518)
Observations	3586	3379	3442	2543	2379	2394
R-squared	0.8003	0.7964	0.4451	0.8577	0.8001	0.3985
Number of cities	288	288	288	201	201	201

Notes: Robust standard errors clustered at the prefectural city level are in parentheses; Control variables are the same to those in Table 2.

Robustness

Here we conduct the following robustness checks on baseline results: using alternative DID specifications, changing the control variables, using subsamples, and using alternative tourism outcomes.

The alternative DID framework first involves using a time-varying dummy variable to indicate whether or not the prefectural city has at least one WH site. We coded the dummy variable 1 for the years when and after a city was granted WH status, and 0 otherwise. The results are reported in columns (1)–(3) of Table 4. We find with the new DID framework a statistically insignificant effect of WH inscription, indicating that the status of having or not having a WH site does not cause tourism growth. We then remove cities that have a WH site throughout the period we investigate, thus making cities without a WH site the only control group. The results in columns (4)–(6) of Table 4 confirm that there is not a statistically significant effect on all three tourism outcomes.

The second category of robustness checks involves changing the control variables. We first add more control variables at the expense of losing a large number of observations due to missing values of these statistics in many cities. These variables include prefectural Consumer Price Index (CPI), with 1999 as the benchmark, Foreign Direct Investment (FDI) per capita, and the number of 5As tourist attractions, so that the price factor, the trade factor and the capacity of local government to develop tourism industries are controlled for (see Appendix A2 for data source).[5] The results are presented in the first three columns of Table 5. Again, we fail to find a causal relationship between the number of WH sites and tourism outcomes.[6] Furthermore, one may concern that the parallel trends assumption is not fully held because there is a five-year lead effect on domestic tourism revenue. To address such a concern, we follow Angrist and Pischke (2014) to control for city-specific trends. However, the results that WH inscription does not affect three tourism outcomes remain unchanged (see columns (4)–(6)).

We also use subsamples. Firstly, Chinese provincial capitals and municipalities are more important, both economically and politically, than the other prefectural cities, having abundant tourism resources. It is more likely that important properties in those central cities have been fully developed as tourist attractions and thus WH inscription there produces a smaller impact. However, as shown in columns (1)–(3) of Table 6, we again do not find a causal effect with the observations from peripheral cities, that is, cities that are neither 31 provincial capitals nor four municipalities. Secondly, we exclude some cities that share WH sites with other cities, including the Great Wall, the Grand Canal, Xinjiang Tianshan, China Danxia, South China Karst, and Silk Roads: The Routes Network of Chang'an-Tianshan Corridor. One may expect that WH sites within a prefectural city can be more fully exploited to boost local tourism than those crossing several jurisdictions. However, empirical results deny such a hypothesis: columns (4)–(6) of Table 6 show that there is still not a statistically significant effect of WH sites on local tourism outcomes.

We finally conduct some robustness checks using the growth rather than the level of tourism outcomes, the number of quality rated hotels, and domestic tourism revenue per arrival, as the dependent variable. WH inscription may promote the growth of tourism outcomes or tourism revenue created per arrival. Meanwhile, one may argue that tourism revenue and tourist arrivals are not accurate measures of tourism outcomes, while the number of quality-rated hotels can be a better measure of tourism demand. However, the results unanimously show that the number of WH sites does not have a statistically significant impact on these new tourism outcomes at the significance level of 5% (see Table 7).

Thus, our empirical study with prefectural city-level data provides consistent evidence that WH inscription does not promote local tourism growth, supporting extant findings by Cellini (2011), Cuccia et al. (2016) and Huang et al. (2012). As analysed in Section 3, our results suggest the property protection and preservation roles of WH inscription.

[5] 5As tourist attractions are top-grade tourist attractions accredited by National Tourism Administration of China since 2007, followed by 4As grade which is the top-quality grade before 2007. As of 2017, there are 249 5As tourist attractions. See Gao et al. (2018) for an introduction to China's tourist-attraction quality-accreditation system.

[6] The results remain unchanged if we use the CPI to deflate tourism revenue, GDP per capita and so on. These tests are available upon request.

Table 5
Robustness check with more controls.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue
Number of WH sites	−0.0188	0.0921	0.0128	−0.0790	0.0769	0.0425
	(0.0909)	(0.0968)	(0.1092)	(0.0673)	(0.1028)	(0.1037)
Additional controls	CPI, FDI, number of 5A tourist attractions			City-specific trends		
Observations	2031	1890	1956	3586	3379	3442
R-squared	0.8825	0.8346	0.5467	0.8466	0.8842	0.7089
Number of cities	191	190	192	288	288	288

Notes: Robust standard errors clustered at the prefectural city level are in parentheses; Control variables are the same to those in Table 2.

Table 6
Robustness checks with subsamples.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Peripheral cities			Removing some cities sharing the same WH		
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue
Number of WH sites	−0.0627	−0.0513	0.0426	−0.0691	−0.0169	0.1152
	(0.0814)	(0.1035)	(0.1523)	(0.0987)	(0.1269)	(0.1994)
Observations	3208	3021	3044	2303	2166	2178
R-squared	0.8009	0.8028	0.4326	0.8472	0.7903	0.3831
Number of cities	257	257	257	185	185	185

Notes: Robust standard errors clustered at the prefectural city level are in parentheses; Control variables are the same to those in Table 2.

Table 7
Robustness check with alternative dependent variables.

Variables	(1)	(2)	(3)	(4)	(5)
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Number of quality-rated hotels	Domestic tourism revenue per arrival
Number of WH sites	−0.0668*	−0.0387	0.0220	−0.0499	−0.0137
	(0.0344)	(0.0445)	(0.0502)	(0.0529)	(0.0893)
Observations	3297	3097	3163	2915	3337
R-squared	0.8325	0.8472	0.6400	0.2789	0.1803
Number of cities	288	288	288	288	288

Notes: Robust standard errors clustered at the prefectural city level are in parentheses; Control variables are the same to Table 2, except that Columns (1)–(3) control for one-year lag of the dependent variable, to make that the estimate of the number of WH sites is its impact on the growth of tourism outcomes.

* Denotes the significance level of 10%.

Heterogeneity analysis

While it seems conclusive that WH inscription on average does not promote prefectural tourism economy in China, its effect may be spatially or temporally heterogeneous, or heterogeneous according to the significance and the type of WH sites. Although China is the second largest economy in the world, its economy divides sharply across regions. It is well known that while China has the most developed eastern region and megacities, it has the least developed western region and remote countries. Since tourism resources in developed cities are more abundant and have been more fully developed than those in less developed cities, a successful WH inscription may produce a smaller tourism promotion effect in developed areas.

To test such a spatial heterogeneity effect, we add the interactions of eastern, central and western region dummies with the number of WH sites to replace the number of WH sites.[7] The results are reported in columns (1)–(3) of Table 8. It is found indeed that

[7] According to the most recent classification under the China West Development Strategy, the eastern region consists of eleven provinces (municipalities): Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan; the central region consists of eight provinces: Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan; and the western region includes twelve provinces (municipalities): Sichuan, Chongqing, Guizhou, Yunnan, Guangxi, Inner Mongolia, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

Table 8
Spatial and temporal heterogeneity effects.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue
WH sites in eastern provinces	−0.3205***	0.0435	−0.1864	−0.1481				
	(0.0931)	(0.1439)	(0.1657)	(0.1653)				
WH sites in western provinces	0.0430	−0.0602	0.0290	0.0251				
	(0.1762)	(0.1482)	(0.1033)	(0.1741)				
WH sites in central provinces	−0.0165	−0.0629	0.0831	−0.0501				
	(0.0744)	(0.1177)	(0.2576)	(0.0880)				
Number of WH sites (o)					−0.0524	−0.0007	−0.0557	0.1037
					(0.0673)	(0.0530)	(0.1064)	(0.0793)
Number of WH sites (o + 1)					−0.0510	−0.0368	−0.0958	0.1036
					(0.0699)	(0.0790)	(0.1151)	(0.0893)
Number of WH sites (o + 2)					−0.0530	−0.0560	−0.1034	0.0090
					(0.0780)	(0.0675)	(0.1200)	(0.0922)
Number of WH sites (t-3)					−0.2396**	−0.1210	0.0434	−0.0797
					(0.0991)	(0.0885)	(0.1758)	(0.0851)
Observations	3586	3379	3442	3230	3210	3084	3064	2165
R-squared	0.8011	0.7965	0.4456	0.7898	0.7717	0.7852	0.3913	0.8275
Number of cities	288	288	288	261	288	288	288	195

Notes: Robust standard errors clustered at the prefectural city level are in parentheses; ** and *** denote the significance level of 5% and 1%, respectively; Control variables are the same to Table 2; Column (4) removes cities sharing the same WH of the Grand Canal and column (8) removes cities sharing the WH of the Great Wall or the Grand Canal.

while domestic tourism revenue of cities in eastern regions suffers from WH inscription by −0.3205, that in other regions does not (see column (1)). However, no such heterogeneity effect is generally observed in terms of domestic tourist arrivals and foreign tourism revenue (see columns (2) and (3)). Why does WH inscription reduce domestic tourism revenue in eastern provinces? We notice that the Grand Canal, which inscribed as WH in June 2014, stretches over 27 cities, most of which are from eastern provinces like Shandong, Jiangsu, and Zhejiang. After removing cities related to the Grand Canal, we also find an insignificant effect of WH inscription on domestic tourism revenue, as shown in column (4). The results are consistent with our previous proposition that WH inscription plays a more significant role of protection and preservation of properties, and less role in tourism development because properties with outstanding universal value have been fully developed as tourist attractions.

The second heterogeneity effect involves temporal dynamics. One may argue that though WH inscription does not currently promote tourism economy, it may take time for it to take effect. Columns (4)–(6) present the temporal heterogeneity effects, which are estimated using Eq. (3) by making $q = 0$, $m < 0$; thus α_k in Eq. (3) now measures the lag effects of WH inscription. We find that WH inscription reduces domestic tourism revenue two years after inscription by about 24%, while it does not have a significant effect on other tourism outcomes or in other years.[8] The only negative lag effect exists in the fact that WH sites involving multiple cities tend to reduce domestic tourism revenue as a result of preservation and protection requirements and the difficulty of tourism development based on these sites. As shown in column (8), after removing two WH sites, the Great Wall and the Grand Canal, the negative lag effect disappears. Thus, the temporal heterogeneity does not exist in most cases although WH inscription to a property related to multiple cities tends to reduce domestic tourism revenue over time.

We also test heterogeneity effects in terms of WH inscription significance, which is measured by the average number of criteria that WH sites in each city have met. It is natural to assume that a WH site meeting more criteria has more outstanding universal value. Similar to the analysis in Section 3, one may first expect that WH sites that are more valuable attract more tourists than those less valuable. However, it could also be the case that those WH sites with more value are more likely to be fully developed as tourist attractions and involve more burdens of protection, or they lead to a larger crowding out effect, thereby facing more limitations from that inscription. Results in columns (1)–(3) of Table 9 tend to support the second scenario, showing that WH sites that are more valuable produce a larger negative effect on domestic tourism revenue but an indifferent effect on other tourism outcomes. One more criterion that WH sites in a prefectural city on average have met is associated with a reduction in domestic tourism revenue growth by 7.22% (see column (1)).

Finally, we test heterogeneity in terms of the type of WH site. We find from columns (4)–(6) that the number of WCH sites reduces domestic tourism revenue, while it has an insignificant effect on domestic tourist arrivals and foreign tourism revenue. One more WCH inscription reduces domestic tourism revenue by 27.47%, at the significance level of 1% (See column (4)). Meanwhile, WNH sites do not have a significant effect on any of the three tourism outcomes. Such a heterogeneity effect is also found caused by the fact

[8] We also find the lag effect of WH inscription on domestic tourism revenue increases over time. These calculations are not reported but are available upon request.

Table 9
Heterogeneity effects in terms of WH significance and type.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue	Domestic tourist arrivals	Foreign tourism revenue	Domestic tourism revenue
Number of WH sites	0.0504	0.0325	−0.0800				
	(0.1271)	(0.1632)	(0.2220)				
Number of criteria × Number of WH sites	−0.0722*	−0.0246	0.0132				
	(0.0429)	(0.0573)	(0.0892)				
Number of WCH sites				−0.2747***	−0.0479	−0.2284	−0.0988
				(0.0798)	(0.1376)	(0.1529)	(0.1380)
Number of WNH sites				0.0179	−0.0182	0.1757	0.0329
				(0.1089)	(0.0995)	(0.1275)	(0.1079)
Observations	3586	3379	3442	3586	3379	3442	2426
R-squared	0.8008	0.7964	0.4450	0.8010	0.7964	0.4467	0.8404
Number of cities	288	288	288	288	288	288	195

Notes: Robust standard errors clustered at the prefectural city level are in parentheses; * and *** denote the significance level of 10% and 1%, respectively; Control variables are the same to Table 2; Column (7) is the result of dropping cities in relation to the Great Wall and the Grand Canal.

that some WCH sites have limited tourism attractiveness or only produce tourism in several cities, but they involve considerable protection and preservation costs. As we have introduced in Section 2, WCH sites such as the Great Wall and the Grand Canal stretch over dozens of cities but can only be developed into tourist attractions in several places. If cities involved by the two WCH sites, that is, the Great Wall and the Grand Canal, are removed, we can also find a statistically insignificant effect of WCH inscription on domestic tourism revenue (see column (7)).[9]

Conclusion and discussion

China is the world's second largest WH country, just following Italy. While it is expected by tourism administrations, and shown by some extant literature, that WH inscription promotes tourist arrivals, the present paper provides solid evidence that WH inscription has a limited role in that respect. In fact, it tends to reduce domestic tourism revenue and has no significant effect on tourist arrivals and foreign tourism revenue. In particular, we find that WH inscription reduces domestic tourism revenue in developed areas, has a negative lag effect, and has a larger negative effect for WCH sites, which are proved caused by WH inscriptions involved multiple cities. We also argued several serval reasons that WH inscription does not promote regional tourism economy: Regulations pertaining to WH sites constrain arrivals and impose protection requirements; WH sites have been fully developed as tourist attractions; and WH sits may crowd out tourism in non-WH sites because they are more attractive and accessible to visitors.

Thus, from the perspective of boosting local tourism economy, the WH inscription is largely a title with some costs. However, this does not mean that it fails to fulfil its original aims of seeking to protect, preserve and maintain properties that have significant universal value. Caust and Vecco's (2017) concern that boosted tourism attracted by WH inscription may damage these properties is not verified in our case. In fact, adherence to the operation guidelines tends to reduce tourism revenue. WH inscription is indeed a burden, in the sense that it costs for WH hosts to protect, maintain and preserve those inscribed properties, and a blessing because it does urge the realization of those aims, it does not cause a sharp increase in tourist arrivals, and it benefits for long-run tourism development. They are very pertinent to China where local governments, particularly those in developing areas, expect to collect income from outstanding local properties by eagerly developing tourist attractions based on these properties. WH inscription puts these properties under the monitoring guided by World Heritage Convention, curbs local governments' reckless development and urges them to “ensure an appropriate and equitable balance between conservation, sustainability and development (World Heritage Committee, 2002).” Since tourism is just one of the multiple purposes of WH inscription, the statistically insignificant impact here does not imply that the inscription is not necessary but tells that less should be expected from it in terms of boosting tourism economy. Finally, since our results are attained with data from China, whose WH management system is quite different from other countries, they should not be extended to predict the WH-tourism nexus in other countries. Despite mounting evidence, that nexus is far from conclusive, needing to be disentangled by future theoretical or empirical works.

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[9] We also conduct a heterogeneity analysis regarding the case that multiple cities share a WH site. Instead of dropping observations from those cities as we did in column (4)–(6) of Table 6, we first construct a dummy variable which takes one for cities sharing a WH site and zero otherwise and then estimate its interaction effect with the number WH sites. Although not reported, the results show that there is not a statistically significant interaction effect regardless of the change in the dependent variable, indicating not such a heterogeneity effect.

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Appendix A. Supplementary data

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