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THE ECONOMIC LEGACY OF MEGA SPORTING EVENTS. THE IMPACT OF HOSTING EUROPEAN OLYMPIC GAMES ON GDP GROWTH THROUGH INFRASTRUCTURE DEVELOPMENT

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Abstract

Introduction. The positive legacy of the Olympics is often cited by the International Olympic Committee and national organizers. Some scholars, however, question an uncritical approach to an exclusively positive economic legacy. The aim of this study is to evaluate the impact of hosting the Olympics on infrastructure development, with a potential impact on economic growth in the form of Gross Domestic Product (GDP) in three phases of seven Olympic Games organised in Europe in recent years. *Material and methods.* The effect of a particular Olympic period on the GDP was analysed using a difference-in-difference technique in which the difference between each of the analysed seven host countries' GDPs and those of a reference set of countries was obtained. Each time, as part of the observation, an event time period was distinguished covering all three phases of the event: the preparatory phase, the event phase and the post-event phase. *Results.* For the Winter Olympic Games, no statistically significant positive results are observed in the long term, which may indicate a very limited importance of the economic legacy of these events for potential host countries. In the case of Summer Olympic Games, the positive impact of the organization of these events in the post-event phase is noticeable. *Conclusions.* The obtained results confirm the ambiguous impact of Olympic Games on the hosts' economies and are in line with the attitude of many scholars to an uncritical approach to the only positive legacy of these events.

Key words: GDP, economic legacy, infrastructure, Olympic Games

Introduction

According to Preuss [1], the mega sporting event's legacy is considered to be "planned and unplanned, positive and negative, tangible and intangible structures created for and by a sport event, which remain longer than the event itself". Unfortunately, neither this nor any other known definition [2, 3] gives much clue as to how to measure the legacy of sporting events. This is mainly due to the potential size of the legacy, which may include, but is not limited to economy, culture, environment, social issues, urban regeneration, infrastructure changes, sport and image [4, 5, 6].

In the worldwide literature, infrastructural changes are supposed to be the most frequently mentioned types of mega sporting events' (MSEs') legacies [7, 8, 9, 10]. This development is usually called urban regeneration and is associated either with basic urban infrastructure within housing, sports facilities, transport development, etc. or advanced urban services such as smart city grids, improved safety and security features [3]. Once the Olympic Games are awarded to a host, structural changes are going to be made. These are not the least infrastructural projects, which lie at the root of both internal drivers seen as all the requirements to stage the Olympic Games and external drivers that are of a political choice [11]. Infrastructural changes in the host area embrace urban regeneration both basic and advanced [3]. Simultaneously, the investment in infrastructure involves enormous capital demand, since nowadays the expenditures incurred at the time of MSEs organisation mainly consist in infrastructural projects [12, 13].

The importance of infrastructural development is emphasized by the International Olympic Committee (IOC) itself in the sense of taking some actions in order to ensure usefulness and utility of the infrastructure which fulfil the expectations of each host city's population. That is why, in almost each bid report, special consideration is devoted to the maximum long-term use of the infrastructural projects in order to justify the massive expenditures incurred on that occasion [14]. For example, Sochi's bid for the 2014 Winter Olympic Games (WOG) was based on the premiss that the Games would "modernise the area through creating substantial new transport, telecommunications and energy infrastructure as well as accommodation and sports facilities by creating new infrastructure in rail, road, telecommunications, energy and accommodation and through the construction of sports venues" [15]. Such an IOC approach does not mean, however, that infrastructural changes have only a positive impact on hosts, especially since it was not until 2012 Summer Olympic Games (SOG) that the organisers were seriously engaged in a legacy schedule for each infrastructure project [16, 17]. For many host cities, a well-known concept is the occurrence of "white elephants", over-scaled sporting objects not at all adjusted to the needs of the area's residents [18].

Measuring mega event legacies in general, but infrastructural development in particular is considered to be a challenge. It is caused, among other things, by the longer duration of infrastructural legacy in comparison to other types of legacy [15].

The mere measurement of the economic impact of infrastructure projects as a legacy of MSE raises a number of fundamental questions, for example: what should be the geographical scope of the potential impact (city?, region?, state?), time span of analysis (especially how long after the event?), and what should actually be measured (profitability of the facilities in financial terms?, impact on the labor market?, tourism flow?, investment level?, or something else?) [19].

All the above-mentioned drawbacks mean that legacy is rarely fully analyzed and empirical studies, if any, are limited to collecting rather subjective opinions of their authors. This study is an attempt to deal with these disadvantages and a proposal to evaluate the legacy, in economic terms, of the seven recent Olympic Games on the European continent: the three summer (Barcelona 1992, Athens 2004 and London 2012) and four winter (Albertville 1992, Lillehammer 1994, Turin 2006 and Sochi 2014). In particular, the main objective is to assess the impact of hosting the Olympics on infrastructure development, with a potential impact on economic growth in the form of GDP in three phases of a sporting event: preparatory phase, event phase and post-event phase.

Material and methods

The economic legacy assessment was carried out based on the GDP growth ratio at the host country level. Indeed, one of the most frequently quoted economic effects of organizing the largest sports events is the impact on the GDP or GDP per capita of the organizer's economy [20, 21, 22, 23, 24, 25, 26, 27]. The potentially positive impact of the organization of MSEs on the GDP of the host has its source in large funds which are supplied to the economy of the organizers in connection with the implementation of extensive infrastructure tasks [28]. Hence, the implementation of infrastructure investments due to the organization of MSEs determines a number of impulses for an additional increase in final demand in the organizer's economy, which in turn affects the increase in production in specific sectors of the economy and may contribute to GDP growth. On the other hand, a number of limitations can be identified that can neutralize the potentially positive impact of the largest sports events on the organizer's economy. The most frequently cited problem is the economic phenomenon known as the crowding out effect, consisting in crowding out investment projects important from the point of view of the local community, but not directly related to MSE [28, 29, 30, 31].

In this study, the observation of the GDP growth indicator is to prove whether the provision of large funds had an impact on the economy of the host country during the time window of the Olympic Games. Considering the data at the state level, when organized events take place in one city (region), is quite debatable, especially in the case of large economies for which the organization of even the largest events could turn out to be irrelevant and the potential effects difficult to observe. However, on the other hand, it is the state level that is most often referred to in official reports and thematic studies [23, 32]. This approach should be considered more reliable, inter alia, because it covers all regions: those involved in the MSE's organization and those excluded from the MSE's organization. Therefore, it is possible to establish whether, for example, the potential benefits disclosing in one region were not outweighed by costs occurring in another part of the same country. The analysis at the state level allows to take into account, inter alia, crowding out effect (e.g. building a stadium in one region instead of building roads in another). In addition, a larger area shows less need for importing resources to meet the autonomous demand caused by the organization of the sporting event, reducing the likelihood of the funds involved in organizing the event fleeing and weakening the primary and secondary effects.

Depending on the availability of data, the analysis of the state of the economies of the host countries was carried out for the period 1980-2019 or shorter (for Russia 1990-2019). The research material comes from data taken from the World Bank database. Each time, as part of the observation, an event time period was distinguished covering all three phases of the event: the preparatory phase, the event phase and the post-event phase. The time window for the event in year "t" was five years before the event started (t-5) and five years after its end (t+5) (Fig. 1). As a result, the five-year period before the event covered almost the entire preparatory phase for the Olympic Games. The assumption was made that only the announcement of the host of the sports event will determine the expected changes in the organizer's economy. On the other hand, although it was theoretically possible to extend the post-event phase beyond the established five-year period, such an approach would eliminate an increasing number of recently organized sporting events. For example, for an event organized in Sochi in 2014, taking into account e.g. the seven-year duration of the post-event phase meant the need to observe the data until 2021 inclusive. At the time of writing this article, the research material from 2020 was the last available.
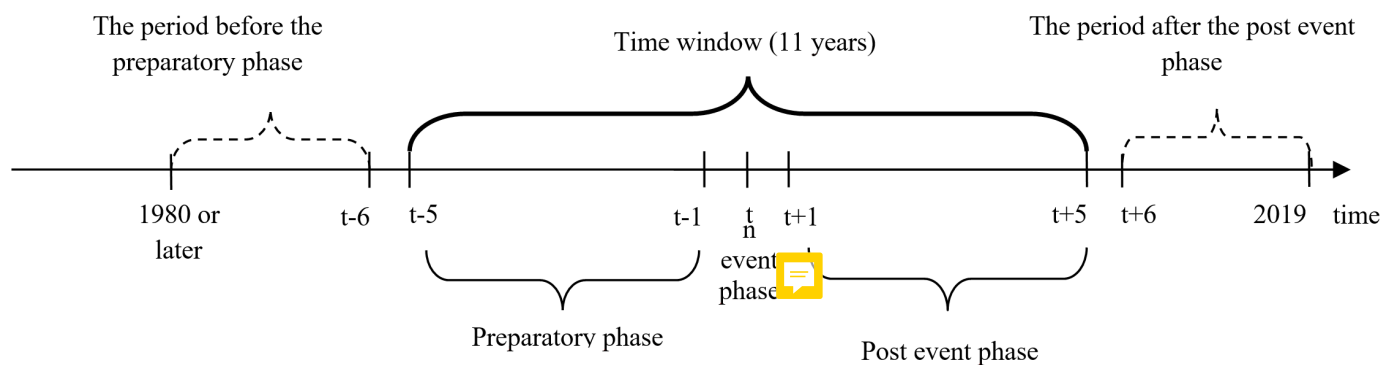

Figure 1. The characteristics of the time window for economic infrastructural legacy of European Olympic Games

Ultimately, therefore, each event was analyzed over 11 years. The assumption of such a long period was supposed to allow to determine not only the direction and strength of the potential dependence, but also the durability of the observed economic changes, which is the legacy of MSEs in economic terms.

The effect of a particular Olympic period on the GDP was analysed using a difference-in-difference technique (D-D) applied in [33]. In this technique, in the first step, the intragroup change (i.e. the change in the value of a given parameter over time) is analyzed and then compared with the analogous change observed in the so-called control group. Therefore, D-D is also called the double difference method due to two types of comparisons: i. comparison of the situation before and after the intervention – i.e. before and after the announcement of the results of selecting the host of a mega sporting event – the first difference; ii. comparison of the first difference between beneficiaries and non-intervention entities (comparison between the experimental group and the control group) – the second difference. The organizer (city, region, state) is the beneficiary of a mega sporting event. The control group may include other cities, regions or countries not related to the organization of a sporting event. Then, the result of the event is considered to be the deviations between the value generated by a specific sporting event and the adopted reference value.

In this study the difference between each of the analysed seven host countries' GDPs and those of a reference set of countries was sought. Specifically, each of the seven analysed European host countries was assigned to one of four control groups: Western Europe (France, Italy, UK), BRICS (Russia), Southern Europe (Greece, Spain), Nordic countries (Norway) (Tab. 1). This approach allows the exclusion of external determinants influencing the economy of MSEs' organizers. The reference groups include countries with a level of economic development similar to the host country, often located in the same region of the world. At the same time, it was assumed that the economies of the countries included in the reference group and the economies of the host countries reacted in a similar way to the emerging external determinants. A comparison of GDP changes in the same period made it possible to determine the scale and direction of deviations between the host country and the countries included in the reference group. The organization of MSEs was considered to be one of the possible determinants of these deviations. At the same time, in terms of legacy, importance should be given to the post-event phase. The occurrence of a relationship between the organization of the event and the level of GDP in this phase can be considered as a positive/negative economic legacy in the host country.

It has to be stressed that the proposed approach is not without drawbacks. First of all the interpretation of the obtained results should be considered with caution and restraint. Any empirical analysis is complicated by the fact that the economic situation of the host depends on many different determinants, including macroeconomic ones, and it is not easy to distinguish one of them, resulting from the organization of a mega sporting event. Attempting to assess the impact of such events is always associated with the risk that the complex network of cause-and-effect relationships shaping the state of the economy will be reduced to a small number of regularities. Hence, in the case of clearly positive or negative relationships, they should not be associated only with the organization of sports events, but also other, parallel causal factors should be sought. Another weakness is the greatly reduced number of countries that applied for the organization of mega sporting events in the analyzed time frame and location. These were mostly rich countries of the G7 and Western Europe. As a result, the predominance of wealthy nations made it impossible to analyze the potential impact of sporting events on less developed economies.

Results

In order to obtain first impression figures presenting GDP growth of host countries were prepared (Fig. 2). They encompass the period 1980-2019 (for Russia 1990-2019) with marked events windows: it has been marked with grey background and a dashed line marking the phase of the event (year t). On the left of the dashed line there is the preparatory phase, and on the right – the post-event phase. The observation that emerges at the outset is the lack of a uniform trend of changes in GDP in the time window of events. Growth rates reached various levels – both positive and negative – regardless of the category and phase of sporting events. This makes the determination of a clear relationship between the organization of MSEs and economic growth problematic, especially in the long term. Nevertheless, the economic performance of some Olympic Games' hosts has been affected by business cycle. It is well seen in the case of Greece 2004 and Italy 2006 preparatory phase as well as UK 2012 post-event phase due to the global financial crisis that started in 2007.

The basic findings presented in figure 2 ought to be treated as purely descriptive and should be supplemented with results of difference-in-difference technique, which allows to determine the statistical significance of the impact of the organization of sporting events on the GDP growth rate in the host countries. In tables 2 and 3, the results with statistical significance at the level of at least 10% (p-value < 0.1) are marked in darker colour. The results obtained are characterized by high ambiguity both in the case of the summer and winter Olympic Games.

Focusing only on the statistically significant results for WOGs, it is worth noting the positive impact of the organization of these MSEs in the preparatory phase for two host countries (Norway – year t-3 and t-2; Russia – year t-5). At the same time, the positive impact of all four WOGs' host cities in the year t-2 can be observed. However, the post-SMEs phase is characterized by negative levels of the coefficients, which is confirmed by the year t+1 covering all four WOGs' host countries. For the winter version of MSEs, no statistically significant positive or negative results are observed in the longer period, i.e. after the year t+2, which may indicate a very limited importance of the economic legacy of these Olympics in the analyzed scope.
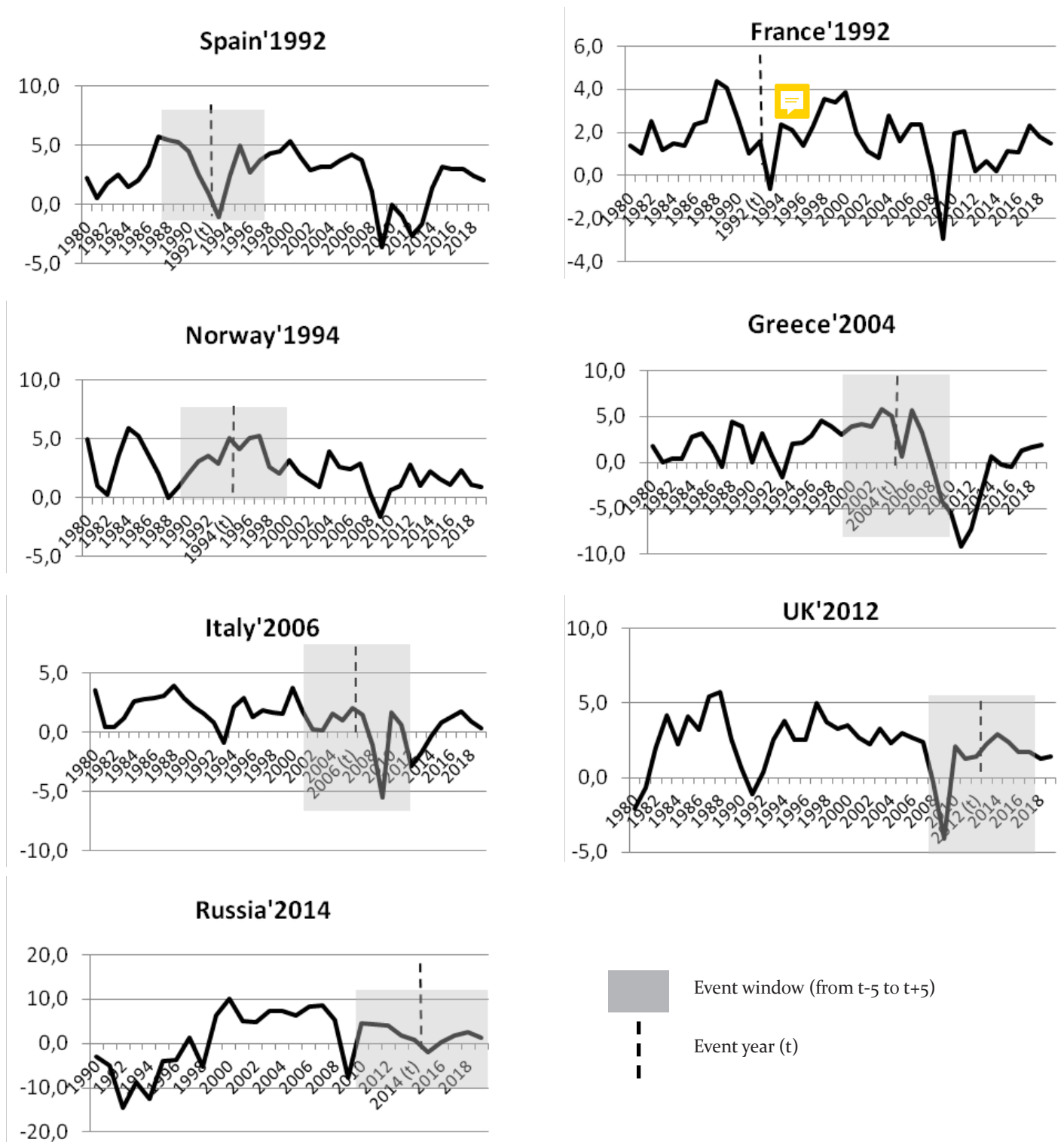
Table 1. Assignment of the host countries of MSEs to the reference groups

Host Country	Reference group
France	G7: France, Japan, Canada, Germany, USA, Great Britain, Italy
Greece	Southern Europe: Greece, Portugal, Spain, Italy
Spain	Southern Europe: Greece, Portugal, Spain, Italy
Norway	Nordic countries: Denmark, Finland, Iceland, Norway, Sweden
Russia	BRICS: Brazil, Russia, India, China, RSA
Italy	G7: France, Japan, Canada, Germany, USA, Great Britain, Italy
Great Britain	G7: France, Japan, Canada, Germany, USA, Great Britain, Italy

Figure 2. Gross Domestic Product growth rate in the host countries of the European Olympic Games in 1992-2014

The results obtained for SOGs are slightly different. First of all, the positive impact of the organization of these events in the post-event phase is noticeable. Taking into account all three European host countries, the positive impact of these MSEs on GDP is visible over four years (from t+1 to t+4). In the case of the SOG in 2012, the positive impact of the event organization is noticeable also for the year t+5. The obtained results can be equated with a positive economic legacy, although limiting the research to the period t+5 makes it impossible to fully answer the question about the time scope of the legacy.

Table 2. Empirical results for Summer Olympic Games' host countries

variable	Spain 1992		Greece 2004		UK 2012		SOG (all three ho-sts)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Const.	**0,471650**	**0,0378**	0,136359	0,6091	0,00740619	0,6141	**0,00753806**	**0,0424**
t-5	−0,0283640	0,9588	−0,156234	0,7333	−0,0243510	0,5839	0,00478984	0,7286
t-4	−0,124178	0,8466	−0,105528	0,8216	−0,0360373	0,4118	−0,0100315	0,4687
t-3	0,140828	0,7945	−0,109828	0,8030	−0,0253168	0,5732	0,000868970	0,9504
t-2	0,211195	0,6859	−0,125841	0,7967	−0,0299147	0,5100	0,00655433	0,6378
t-1	0,259158	0,6143	−0,0373546	0,9312	−0,0325130	0,4717	0,0126512	0,3655
t	0,0494271	0,9186	−0,204898	0,5839	−0,0130204	0,7676	0,0133271	0,2205
t+1	0,143198	0,7750	0,0923225	0,8300	0,00409765	0,9327	**0,0281795**	**0,0458**
t+2	0,0658349	0,8948	0,254758	0,5555	−0,000188155	0,9966	**0,0491529**	**0,0006**
t+3	0,0254694	0,9599	0,252094	0,5601	−0,00930248	0,8383	**0,0426934**	**0,0026**
t+4	−0,188294	0,7057	0,0816955	0,8504	**0,106057**	**0,0690**	**0,0236603**	**0,0927**
t+5	−0,359190	0,4891	0,124383	0,7726	**0,455315**	**<0,0001**	0,0219459	0,1199
R²	0,859081		0,660103		0,995244		0,575395	
Log likelihood	−7,861725		−1,943770		81,70060		321,6649	

Table 3. Empirical results for Winter Olympic Games' host countries

variable	France 1992		Norway 1994		Italy 2006		Russia 2014		WOG (all four hosts)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Const.	**0,000575297**	**0,9942**	0,0219505	0,0088	0,0647040	0,4648	**0,219740**	**0,0132**	0,00560191	0,2454
t-5	0,0157022	0,7152	−0,00456084	0,7338	0,00780291	0,9762	0,118129	0,0277	−0,000658469	0,9667
t-4	0,0156747	0,7200	0,0130101	0,3283	0,00649588	0,9807	−0,0349349	0,4923	0,00314788	0,8415
t-3	0,0300637	0,7378	0,0306688	0,0331	−0,0469868	0,8685	−0,0484803	0,3583	0,0201046	0,2068
t-2	0,00505986	0,9201	0,0363169	0,0135	−0,0353040	0,9131	−0,0375506	0,4722	0,0274835	0,0865
t-1	−0,00783984	0,8772	0,0162140	0,2078	−0,0620389	0,8368	−0,0412169	0,5206	0,0107901	0,4963
t	0,00579090	0,8736	0,0110548	0,3846	−0,0700104	0,7711	−0,0550922	0,3034	−0,000540873	0,9621
t+1	−0,00385779	0,9288	0,00379413	0,7680	0,120289	0,6774	**−0,0990724**	**0,0821**	**−0,0413701**	**0,0098**
t+2	−0,00398745	0,9243	0,0162401	0,1968	0,103529	0,7501	**−0,157664**	**0,0627**	0,0246354	0,1215
t+3	0,00129492	0,9759	0,0151890	0,2435	0,0572593	0,8438	**0,569855**	**0,5465**	−0,0260002	0,1041
t+4	−0,0117964	0,7776	−0,00325259	0,7992	**0,199603**	**0,4934**	**1,03538**	**0,3517**	−0,0192530	0,2285
t+5	−0,0193643	0,6617	−0,00826230	0,5032	**0,187802**	**0,5113**	0,507433	0,3810	−0,0211138	0,1837
R²	0,997687		0,709159		0,806485		0,995044		0,453889	
Log likelihood	91,05626		131,2565		17,82719		76,31067		392,1361	

Discussion

Although the concept of mega sporting events' legacy is a frequently discussed subject in the literature, there is no clear consensus as to how to understand its meaning. It seems outlandish, since the term "legacy" has been emerging as a central idea for the bidding process of the hosts [34, 35, 36]. The IOC uses positive legacy to justify the high and ever increasing costs of organizing mega sporting events. According to IOC: 'Olympic legacy (…) encompasses all the tangible and intangible long-term benefits for people, cities/territories and the Olympic Movement'[37]. This definition has been perceived problematic due to associating it with positive results only. This is comprehensible from the IOC point of view, as it only highlights the positive side of organizing mega events, thus justifying the fact

of spending public funds and attracting other candidates to organize further events of this type [38]. Most scholars are not so unequivocal in their assessment, pointing to numerous examples of negative and unpredictable effects appearing in connection with the organization of mega sporting events [5, 6, 39].

This study complements the ongoing discourse. The obtained results show that MSEs do not have to be a guarantee of economic success in the long term, and the uncritical approach of the IOC and politicians to the organization of such costly events should be considered at least a controversial approach. The size of Summer Olympic Games is very likely to contribute to the fact of stimulation of the host's economy. Events of this rank should be classified as the largest and most demanding, also in terms of infrastructure tasks, which causes greater capital needs than in the case of other categories of events, mainly

in the preparatory phase. Apart from the primary effects, the involvement of multibillion-dollar funds causes induced effects due to the possibility of reusing the "new" money. Assuming that the engaged financial resources will not generate negative effects (e.g. excessive indebtedness) or support projects contributing to the emergence of such effects (e.g. the crowding out effect), there is room for the emergence of positive economic effects in the long term.

In the case of smaller events, such as the Winter Olympics, there was no clear positive dependence. Sometimes, only negative relationships were noticeable. Theoretically, the disclosure of negative effects is possible when the tasks undertaken as part of the organization of a sporting event lead to the crowding-out of better solutions, carrying greater economic potential, better prospects for the labour market, etc. The success of the Winter Games, as in no other case, depends on the weather conditions. Admittedly, modern technological development allows, among other things, for the production or transport and storage of snow, but it is associated with a large amount of money, which increases the costs of the event and is difficult to predict. In addition, these events are not as popular as the Summer Olympics or even some football tournaments, which reduces the possible flow of tourists.

The cases of the given countries prove that potentially positive effects caused by the greatest events may go unnoticed due to the occurring economic fluctuations. The global financial crisis which started in 2007 was marked by a significant decline in the GDP growth rate in years 2007-2010. On this basis, it should be stated that even the most positive effects related to the organization of mega sporting events during a crisis can at best mitigate the course of a recession. Therefore, a question seems legitimate whether the economic situation would not be worse than the existing one without the event.

Conclusions

In the adopted research concept, a certain fragment of the relationship between the organization of the Olympic Games and the host's GDP was analyzed, covering an important, but not the only, area of influence. Therefore, this study does not provide a definitive answer to the question about the net economic effect of events, although it provides a descriptive approach to the evolution of an important and often cited economic indicator in the time-window of MSEs.

The obtained results indicate a different approach to the issue of economic infrastructure legacy depending on the category of the Olympic Games. While in the case of the SOGs some positive signals for the economy may be observed, this cannot be confirmed in the case of WOGs. Such results suggest the ambiguous impacts of MSEs on the hosts' economies and are in line with the attitude of many scholars to be critical about the purely positive legacy of these events.

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