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THE EFFECTS OF MAJOR SPORTS EVENTS ON ECONOMIC GROWTH AND FOREIGN DIRECT INVESTMENT INFLOWS: THE RESULTS OF EMPIRICAL ESTIMATION

Abstract:

In the modern literature there is no consensus on the effects arising in countries as a result of hosting major sports events, namely the Olympic Games, FIFA World Cup and UEFA European Championship. This paper focuses on two aspects of the major sports events effects in the hosting country: on economic growth and foreign direct investment inflows. The estimated database includes indicators for all countries that hosted major sport events during 1970–2015. This paper confirms the hypotheses of positive effects both on economic growth and foreign direct investment in the hosting countries. Positive significant effects are found not only during the period of preparation to the event, but (what is more important) during the 4 to 12 year period after the event.

Keywords:

major sports events, economic growth, foreign direct investment inflows, the Olympic Games, FIFA World Cup, UEFA European Championship, effects of hosting major sports events, Solow model

JEL Classification: L83, O11, O19

1 Introduction

Major sports events such as the Olympic Games, Football World Cup and European Football Championships, have been significant global events for many years. There is always strong competition for the right to host major sport events, and countries with developing economies are increasingly involved in this competition. In addition, the amount of funds that countries invest in organizing such events is steadily increasing, which suggests that the authorities of the countries treat the major sports events as an opportunity to improve economic and social indicators, to give impetus to the development of the country and the region.

Over the past two decades, scientific literature has shown increasing interest in assessing the impact of major sports events on the socio-economic and political life of the host region and country. Despite the fact that all researchers investigating this issue confirm existence of effects from major sports events, there is no common view on the nature and the extent of these effects.

The well-known arguments in favor of holding major sports events are based on the existence of both short-term and long-term positive effects for the host country.

Short-term and medium-term effects could be the following: growth of gross regional product, employment growth, tourist growth, etc.

The long-term benefits include the use of constructed buildings and structures after the events, the creation of urban infrastructure (reconstruction and construction of airports, roads, hotels, expansion of power grid and telecommunications capacity), creating momentum for the development of service, image and reputation growth for the business climate improvement. Long-term positive effects also include such intangible benefits as increasing the pride of the population for their country, the nation cohesion, the number of people engaged in sports, etc.

Potential negative aspects of major sports events comprise the high capital cost (in most cases, a heavy burden on the state budget), the effects of crowding out other socially significant costs, very high costs of operating sports facilities after events, price increases and creating inconveniences for local residents during the period of the major sports events, etc. It is also necessary to take into account the low efficiency of public investment.

This research paper focuses on two types of the major sport events effects: effects on economic growth and effects on foreign direct investment inflows in the hosting country.

2 Literature review

Since the potential effects of major sports events go beyond the net financial result, studies related to the identification and estimation of long-term effects for the host

countries are of interest. With respect to the effect of major sports events, in the research studies the following variables are widely investigated: export, tourism, employment and GDP growth. To our surprise, we found only one paper investigated effects of major sport events on foreign direct investment inflows.

Rose and Spiegel (2009), using various trade models, have shown that holding mega-events like the Olympic Games has a positive effect on national export (Rose, 2009). At the same time, Bista (2017) used different methods of regression estimation and the results have not shown a reliable positive effect of the event on the country's total amount of export.

Song (2010) analyzed the impact of major sports events on export and tourism and concluded that there are positive long-term effects with regards to exports and negative for the tourism sector. Li, Blake and Cooper (2011) found that the effects on exports are positive and long-lasting, while the effects on the tourism sector are mostly short-term, occurring within 4 years before and after the actual Olympic Games.

The report of the Mizuho Research Institute (2014) shows that the number of foreign tourists begins to grow starting from the time when the host city of the Olympic Games is chosen, and not directly in the year of the Games, moreover, the dynamics tend to outrun the previous 10-year trend line.

Li, Blake and Cooper (2011) estimated the impact of the Beijing Olympic Games in 2008 on the inflow of international tourists into the country with the use of the general economic equilibrium model. It was found that, although the economic effects of international tourism are forecasted as positive ones in the ex ante analysis (before the event), this influence is negative in the ex post analysis (after the event).

Levy and Berger (2013) accomplished comparative analysis of the number of tourists eight years before and eight years after the Olympic Games and did not find the increase in the flow of foreign tourists to the country.

In different studies there is ambiguous effect of the major sports events on economic indicators of the country. In the studies of Wallman (2006) and Hotchkiss, Moore and Rios-Ávila (2015) it is shown that the Olympic Games and other major sports events enhance the level of employment in the region, moreover, they lead to an increase in the real wages. However Jakobsen et al. (2013) did not find any significant effects from holding major sports events on the inflow of direct foreign investments into the country.

Bruckner and Pappa (2015) show that holding the Olympic Games significantly increases the real GDP in the host countries. According to the results obtained, the cumulative effect on the level of real GDP was about 10 per cent of growth in the years of preparation for the Games. The increase in GDP before the Olympics is mainly due to increased investment in the construction of infrastructure facilities and an increase in the

number of foreign visitors in the host country. In addition, the level of GDP is not significantly reduced after the Olympic Games.

Analysis of existing literature allows distinguishing two main categories of research on the impact of major sports events on the economy: ex ante and ex post models. The results of most ex post studies showed that the forecasts made before the event are predominantly exaggerated and, as a rule, are not correct, as the previously described mechanisms of the influence of major sports events are based on a set of assumptions that are not always present. This is also related to the fact that existing studies do not take into account such factors as crises, significant political and social events that have an impact on the development indicators of the countries organizing major sports events.

3 Methodology and database description

To identify the effects of hosting major sport events on economic growth and foreign direct investment inflows we have to construct two different econometric models.

The model concerning the effects on economic growth is based on the neoclassical Solow model. The Solow model allows describing the mechanism of long-term economic growth, maintaining equilibrium in the economy and full employment of factors. It highlights technical progress as one of the factors of sustainable well-being growth and allows finding the optimal growth option that provides maximum consumption (Solow, 1956). Despite known shortcomings and limitations (see, for example, Lucas, 1988 and Romer, 1990), the Solow model is fundamental in the literature related to the analysis of the economic growth determinants at country level.

The Cobb-Douglas production function at time k with constant returns to scale has the following form:

$$Y(k) = K(k)^{\alpha}\big(A(k)L(k)\big)^{1-\alpha} \quad (1)$$

where the amount of GDP (Y) depends on the capital K, the labor L and the level of technology A, α is the parameter taking the value in the interval (0; 1).

It is assumed that L grows with the exogenous rate of population growth n, and that A increases in g, which implies technical progress. Let s be the share of investment in total income, and δ the depreciation rate, then we can derive the ratio of the capital stock to the effective unit of labor (k*):

$$k^{*} = \left(\frac{s}{n+g+\delta}\right)^{1/(1-\alpha)} \quad (2)$$

The resulting equation is directly proportional to the share of savings and is inversely proportional to the growth rate of the population.

Substituting equation (2) in the production function and taking logarithms of the left and right parts, we obtain the equation determining the income per unit of the able-bodied population in the form:

$$\ln\left(\frac{Y}{L}\right) = \frac{\alpha}{1-\alpha}\ln(s) - \frac{\alpha}{1-\alpha}\ln(n+g+\delta) \quad (3)$$

Mankiw, Romer and Weil (1992) argued that the Solow neoclassical model explains the difference in income between countries significantly when an additional variable, human capital (HC), is introduced. Following this logic, we formulate the final model for empirical evaluation as follows:

$$\ln\left(\frac{Y}{L}\right)_{it} = \beta_1 + \beta_2 \ln(s)_{it} - \beta_3 \ln(n+g+\delta)_{it} + \beta_4 \ln(HC)_{it} + \varepsilon_{it}, \quad (4)$$

where β_1 is a constant, β_2... β_4 are regression coefficients, i and t are indices for the country and year respectively, ε is the error term. Thus, the explained variable in the model is the Y / L ratio, where Y is the real GDP of the country; L is the population of working age (15-64 years).

The following statistical indicators are used as explanatory variables: s is gross fixed capital formation, equal to the share of investments in real GDP, characterizes the share of investments in the economy; n is population growth rate; δ is depreciation rate. Following a common approach, this indicator is defined as a constant equal to 0.02 (see, for example, [17-18]);g is characteristic of technological progress. Following a common approach, this indicator is defined as a constant equal to 0.02 (see, for example, Mankiw et al., 1992 and Islam, 1995); HC is the percentage of enrolled in secondary school. Followed by many distinguished studies, we use this indicator as a proxy variable that characterizes the level of human capital development (see, for example, Dreher, 2006, Batten et al., 2009, Fabro, Aixala, 2012).

According to the theoretical model, we expect positive signs of the coefficients β_2 and β_4, and a negative value of β_3.

Constructing the model of foreign direct investment inflows in the recipient economy, we use the set of the following explanation variables:

$$\ln fdi_{it} = \gamma_0 + \gamma_1 ln\ sizeofeconomy_{it} + \gamma_2 lnecdlevel_{it} + \gamma_3 lntrade\_open_{it} + \gamma_4 infl_{it} + \gamma_5 gdpgrowth_{it} + \gamma_6 balance_{it} + \gamma_7 debt_{it} + \gamma_8 wto_{it} + \omega_{it} \quad (5)$$

where ln(*sizeofeconomy*$_{it}$) is the size of the economy, expressed by the logarithm of the country's GDP *i* for the year *t*; ln(*ecdevel*$_{it}$) is the level of economic development of the country *i* for the year *t*, measured by the logarithm of GDP per capita; ln(*trade_open*$_{it}$) is an indicator of trade openness; *infl*$_{it}$ is the growth rate of consumer prices in the country *i*

for the year *t*; $gdpgrowth_{it}$ is the annual growth of the economy, calculated as the growth rate of GDP per capita in country *i* for the year *t*; $balance_{it}$ is the balance of the country's trade balance *i* for the year *t*; $debt_{it}$ is the level of public debt in country *i* for the year *t*, as % of GDP; wto_{it} is a dummy variable reflecting the membership of country *i* in the WTO (GATT) in year *t* (assumes the value 1 if the country was a member of the WTO (GATT) in the corresponding year and 0 otherwise).

According to the theoretical model, we expect positive signs of the coefficients γ_1, γ_2, γ_3, and γ_5, and a negative value of γ_4, γ_7. The sign of the coefficients γ_6 and γ_8 could be either positive or negative depending on whether foreign direct investment and trade are substitutes or complementaries.

The impact of the major sports events on the economic growth and foreign direct investment inflows of the country is estimated on the basis of the collected data on the major events, namely the Summer and Winter Olympics, the World Cup and the European Football Championship. The choice of these events as major events corresponds to established practice in well-known studies and is due to the fact that these events are the largest and most visited in the world. During the considered period, 15 developed countries hosted or will host 33 mega-events. The number of events taken by countries with developing or transitional economies is more than half the same for advanced economies and is 15. The number of countries hosting events is 9. It should also be noted that starting in 2010, out of the 12 mega-events 8 were hosted by countries with developing or transition economies.

The test hypothesis of this research is that major sports events have different impact on economic growth in developed and developing countries for some reasons. Firstly, the organization of such events in developing countries requires significantly higher indirect costs associated with the construction of auxiliary infrastructure facilities (roads, hotels, etc.). Thus, the process of organizing major sports events in developing countries makes a greater contribution to GDP growth than in developed countries. Secondly, since the developed economies are close to the border of their productive capacities, investments in the creation of new technologies, rather than investments in infrastructure, should serve as an instrument for ensuring economic growth. In developing countries, investment in infrastructure could improve the efficiency of the economy and stimulate the launch of economic growth mechanisms. Thirdly, developing countries, as a rule, have much greater potential for export growth, foreign direct investment and tourist flows compared to developed ones. Holding major sports events in developing countries could be an impetus for the long-term growth of these indicators, which could have a stronger impact on the dynamics of national GDP than in developed countries.

The second test hypothesis is that holding major sport events positively affects the inflow of foreign direct investment into the country. Formulating this hypothesis, we are based

on the following. On the one hand, holding major sport event stimulates economic activity in the host country, which can serve as a factor in attracting foreign capital to the country. On the other hand, as a result of the major sport event, a large number of foreign tourists visit the country. They could personally get to know the country and form their own judgment on the risks of doing business in this country. Thirdly, the presence of a positive relationship between the holding of major sport events and such indicators of the economy openness as the volume of foreign trade and the number of foreign tourists identified in various works may support the hypothesis of a positive relationship between the major sport event and the inflow of FDI.

The database for empirical estimation of the major sport events effects on economic growth comprises the indicators of 50 countries from 1970 to 2015, obtained from the World Bank, UNCTAD and IMF statistical portals. Of these countries, 30 are advanced economies and 20 are emerging economies or economies in transition.

We estimate the model for developed and developing countries with the use of three econometric methods: ordinary least squares (OLS), panel regression with random effects, and panel regression with fixed effects. Important indicator of the econometric model quality is the coefficient of determination R^2 which is the highest in the panel regression with fixed effects. Moreover, in order to determine the optimal model for interpreting the results, standard tests were carried out. The Wald test, comparing simple regression model with fixed effects model, showed that regression model with fixed effects is better suited for describing data than simple regression model. Based on the Breusch-Pagan test, which compares the simple regression model to the random effects model, it is concluded that the regression model with random effects gives more reasonable results than the simple regression model. The Hausman test, which compares the model with fixed and random effects, shows that regression model with fixed effects is more effective for estimation than a model with random effects. Thus, to interpret the results we will use a panel regression model with fixed effects.

4 Findings

Table 3 and 4 present the results of estimating equation (4) using panel regression with fixed and random effects for both developed and developing (transition) economies. All variables are significant at 1% confidence level and have expected signs. The estimates of the cross-section regression do not fully correspond to the theoretical model: the accumulation of gross capital is insignificant for a group of developed countries, and the coefficient for the variable ln $(n + g + \delta)$ is positive.

Table 3 Results of econometric analysis with regards to economic growth for the developed economies

Explanatory variables	OLS	Panel data with fixed effects	Panel data with random effects
ln (*s*)	–0.109 (0.083)	0.201*** (0.047)	0.205*** (0.041)
ln (*n*+*g*+*δ*)	0.211*** (0.020)	–0.042*** (0.008)	–0.045*** (0.011)
ln (*HC*)	1.255*** (0.083)	1.143*** (0.040)	1.141*** (0.038)
β_1	4.654*** (0.405)	5.716*** (0.208)	5.826*** (0.185)
R^2	0.22	0.10	0.51
Number of observations	1380	1380	1380

R^2 is determination coefficient. Coefficients marked with «***», are significant at 1 % level. Standard errors are indicated in parentheses.

Source: calculated by authors

Table 4 Results of econometric analysis with regards to economic growth for the developing and transition economies

Explanatory variables	OLS	Panel data with fixed effects	Panel data with random effects
ln (*s*)	0.189***(0.066)	0.583***(0.045)	0.602***(0.046)
ln (*n*+*g*+*δ*)	0.225***(0.035)	–0.235***(0.021)	–0.253***(0.023)
ln (*HC*)	1.131***(0.087)	0.564***(0.043)	0.547***(0.043)
β_1	4.618***(0.395)	7.746***(0.231)	8.008***(0.209)
R^2	0.28	0.61	0.61
Number of observations	920	920	920

R^2 is determination coefficient. Coefficients marked with «***», are significant at 1 % level. Standard errors are indicated in parentheses.

Source: calculated by authors

On the next step of analysis nine dummy variables were constructed, with its use the impact of major sports events on economic growth was assessed. These dummy variables indicate different time frames for the expected effect of the event (see Table 5).

Dummy variable is equal to 0, if in this year there is no supposed effect from the event, and it is equal to 1, if the effect of the event is supposed. For example, the variable d22 is equal to 1 four years before the event and eight years after the event in the corresponding country, and equal to 0 in the remaining time intervals. For the dummy variables d31, d32 and d33, different time periods were used for the Olympic Games and the World and European Championships. This is due to the fact that the host country for

these events is chosen at different times: 7 years before the event in the case of the Olympic Games, and 9 years before the event in the case of the World and European Football Championships.

Table 5 Dummy variables for the estimation of impact of major sports events on economic growth

n / m	1		2		3	
1	d_{11}	[0;4]	d_{12}	[0;8]	d_{13}	[0;12]
2	d_{21}	[–4;4]	d_{22}	[–4;8]	d_{23}	[–4;12]
3	d_{31}	[–8;4]	d_{32}	[–8;8]	d_{33}	[–8;12]

n=1,2,3 – the number of four-year periods after the event,
m=1,2,3 – the number of four-year periods before the event.

Source: calculated by authors

Table 6 The coefficients of different dummy variables in the economic growth model

Dummy variables	Developed economies	Developing and transition economies
d_{11}	0.001 (0.019)	0.147*** (0.045)
d_{12}	0.013 (0.016)	0.196*** (0.037)
d_{13}	0.034** (0.015)	0.259*** (0.033)
d_{21}	0.005 (0.016)	0.108*** (0.036)
d_{22}	0.021 (0.015)	0.176*** (0.034)
d_{23}	0.049*** (0.016)	0.247*** (0.032)
d_{31}	0.006 (0.015)	0.157*** (0.033)
d_{32}	0.029 (0.015)	0.250*** (0.033)
d_{33}	0.057*** (0.016)	0.241*** (0.032)

Coefficients marked with «***», are significant at 1 %level, coefficients marked with «**», are significant at 5 % level. Standard errors are indicated in parentheses.

Source: calculated by authors

Each dummy variable was included in turn in the before tested model of economic growth (4). Results for the developed and developing countries are presented in Table 6. For developed countries, the variables d23 and d33 turned out to be significant at the 1% level, and the variable d13 is significant at the 5% level. For the group of developing countries all dummy variables turned out to be significant at the 1% level. Inclusion of dummy variables in the model has not changed the significance of the remaining explanatory variables.

In order to assess whether the addition of new variables to the economic growth model is justified, the information quality criteria of Akaike and Schwartz were calculated. These

criteria assess the "penalty" of the model for increasing the number of variables. If these criteria in the model with added variables are lower than in the model without adding new variables, then adding this variable is considered justified, and the model with this variable is better than without it. The results show that only the addition of variables d23 and d33 improves the model of economic growth for a group of developed countries. At the same time, the fact of insignificance of 6 out of 9 dummy variables indicates the instability of the results obtained for this group of countries (see Table 6). For a group of emerging and transition economies, adding any of the 9 dummy variables associated with major sports events significantly improves the quality of the model. Thus, it can be concluded that holding major sports events positively and significantly affects the economic growth of developing countries and countries with transition economies. The lowest values of information criteria for developing economies are observed in the model with a dummy variable d13. The results show that the increase in GDP per capita in the host country of major sport event occurs not only at the stage of its preparation, but also after the event itself. This effect is long-term and is observed for 12 years after the event. In our opinion, the influence of the major sport event on economic growth during the period following the event is more important than in the period preceding it; in the first case, we observe effects not related to GDP growth as a result of investments in infrastructure.

Following the same logic we go to estimation of the model of foreign direct investment inflows (5). In this part of the study, we expand the database up to 195 countries in the same period. Part of the observations was not evaluated, because the logarithmic function is defined only on a positive range of values. Table 7 presents the model estimation data by the methods of OLS, panel regression with random effects, and panel regression with fixed effects. In order to avoid the multicollinearity problem, before the evaluation we tested that the pair correlation between the regressors of the model does not exceed 0.5.

Table 7 Results of econometric analysis with regards to foreign direct investment inflows

Explanatory variables	OLS	Panel data with random effects	Panel data with fixed effects	Panel data with fixed effects
Size of economy	– 0,067*** (0,131)	0,179*** (0,035)	1,702*** (0,112)	1,565*** (0,019)
GDP per capita	0,115*** (0,019)	0,149*** (0,045)	– 1,417*** (0,131)	– 1,232*** (0,122)
Trade openness	1,370*** (0,045)	1,655*** (0,065)	1,303*** (0,075)	1,339*** (0,659)
Inflation	– 0,000 (0,000)	– 0,000*** (0,000)	– 0,000*** (0,000)	– 0,000*** (0,000)
Economic growth rate	0,032*** (0,004)	0,020*** (0,003)	0,018*** (0,003)	0,019*** (0,003)

Trade balance	– 0,000*** (0,000)	– 0,000 (0,000)	– 0,000 (0,000)	– 9,043*** (0,238)
Governmental debt	– 0,001 (0,000)	– 0,001*** (0,001)	– 0,000 (0,000)	
Membership in the WTO	0,331 (0,005)	– 0,170*** (0,067)	– 0,047 (0,070)	
β_0	– 4,139*** (0,127)	– 6,465*** (0,237)	– 9,045*** (0,279)	– 9,043*** (0,238)
R^2	0.29	0.24	0.27	0.27
Number of observations	5191	5191	5191	5191

R^2 is determination coefficient. Coefficients marked with «***», are significant at 1 % level. Standard errors are indicated in parentheses.

Source: calculated by authors

The performed tests of Wald, Breusch-Pagan and Hausman showed that the regression model with fixed effects is better suited for evaluating the available database than the model with random effects and the cross-sectional regression. Analyzing the signs of the coefficients when estimating the model by the fixed-effects method, we conclude that all the variables included in the model have expected signs, except for the variable GDP per capita. The variables "trade balance", "public debt" and "membership in the WTO" were not significant. After the exclusion from the model "WTO membership" and "public debt", the variable trade balance became significant with the expected sign.

Table 8 The coefficients of different dummy variables in the FDI inflows model

Dummy variables	Panel data with fixed effects
d_{11}	0,248*** (0.019)
d_{12}	0,092 (0.085)
d_{13}	0,128 (0.003)
d_{21}	0,259 (0.083)
d_{22}	0,125 (0.082)
d_{23}	0,114* (0.087)
d_{31}	0,306*** (0.080)
d_{32}	0,224*** (0.084)
d_{33}	0,193** (0.090)

Coefficients marked with «***», are significant at 1 % level, coefficients marked with «**», are significant at 5 % level. Standard errors are indicated in parentheses.

Source: calculated by authors

On the next step, we use a similar procedure with sequential inclusion in the regression model of 9 dummy variables reflecting different time intervals of the major sport events influence on the inflow of foreign direct investment. The values of the coefficients for the dummy variables are given in Table 8. At the 1% confidence interval, the variables d11,

d31, d32 turned out to be significant, the d33 variable on the 5% confidence interval, and the d23 variable on the 10% confidence interval. The inclusion of dummy variables in the model has preserved the significance of the remaining explanatory variables.

To assess the quality of the constructed models, the Akaike and Schwartz information criteria were calculated. The results indicate that the most reliable model is the inclusion of the dummy variable d31. In other words, holding major sport event positively affects the inflow of foreign direct investment into the country in a time interval starting 8 years before and ending 4 years after the event.

5 Conclusions

Usefulness of carrying out major sports events, namely the Olympic Games and the World and European Championships in football, is the subject of scientific discussion. On the one hand, holding major sports events is often unprofitable for the host countries. In addition, local residents are often opposed to holding such events. On the other hand, the effects of major sports events go far beyond the direct financial result. Existing studies highlight the effects associated with economic growth in general, as well as growth in exports, foreign direct investment, tourist flows, employment, etc. At the same time, many of the sports events effects are difficult to measure.

This article analyzes the impact of major sports events on the economic growth and foreign direct investment inflows of the host country. As a result of the empirical analysis, statistically significant positive effect of major sports events on economic growth for a group of countries with developed and developing economies was revealed, this effect is long-term and it is observed not only in the period before the event, but, more importantly, during 12 years after its holding. A stable relationship between the holding of major sports events and economic growth in the developed countries was not revealed. Evaluating the impact of holding major sport events on inflows of foreign direct investment, we find positive effects both for the entire stage of preparation for the event, and for the 4 years period after the event.

The results of this study could be interpreted as arguments in favor of major sports events. At the same time, the analyzed topic is multidimensional and gives many directions for further research. Firstly, the influence of major sports events on such indicators as employment, budget deficit, inflation etc. is not sufficiently investigated by the current moment. Secondly, it is important to consider the influence of major sports events on such social indicators as population involvement in sports, the pride of the population for the country, the image of the country abroad. Finally, it is of significant interest to consider the effects at the regional level.

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