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Study of the economic impact resulting from the organization of a major sporting event within a country

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Abbreviations

FIFA: International of Association Football

GDP: Gross Domestic Product

IOC: International Olympic Committee

MAR: Missing At Random

MICE: Multiple Imputation by Chained Equations

UEFA: Union of European Football Associations

URRS: Union of Soviet Socialist Republics

USA: United States of America

UK: United Kingdom

Introduction

This thesis aims at studying the economic impact resulting from the organization of a major sporting event within a country. For many decades, there have been many countries and cities that have applied to organize a mega sporting event. This kind of events can boost the tourism and bring many benefits, but they usually induce a lot of costs… This raises the question of whether these mega sporting events really have a positive economic impact. This work will attempt to answer to this question. Studies of these mega events have already been made, but most of them usually focus on only one mega sporting event. The thesis will therefore focus on three different mega sporting events: the FIFA world cup, the UEFA Euro Championship and the summer Olympic games. I chose to focus on these events as they are the most important ones of these last decades. To this end, an econometric model will capture the impact of organizing those events through a linear regression run for a period from 1980 to today. This will enable us to determine whether hosting a mega sporting event has a significant economic impact or not.

Chapter 1: Literature review

Mega sporting events have a worldwide impact. For instance, the Olympic games gather 10000 athletes from 204 different countries and are watched by billions of viewers. This is why many countries apply to host them. In addition, the Olympic games, the FIFA world cup and the UEFA Euro Championship bring many benefits to the host country. They include the short-run benefits of the tourism activities during the event, the long-run benefits arising from the event and the intangible benefits such as "the feel-good effect" (Baade & Matheson, 2016).

In addition, these mega sporting events have the capacity to gather many different agents together: participants, fans, media, organizational entities, collaborators and sponsors. This can stimulate economic and social benefits which will be detailed below (Sogas et al., 2021).

1.1. History of the mega sporting events

First, let us take a look at how these events appeared and evolved over time. One of the most best-known mega sporting events around the world is the FIFA world cup which has first taken place in 1930 in Uruguay and included thirteen different countries from three different continents. Since then, it took place every four years, except during the second world war. From 1930 to 1950, the number of participants was between thirteen and sixteen and there were between 17 and 22 matches. The next editions from 1954 to 1978 included sixteen different participants and between 26 and 38 matches. After that, the editions from 1982 to 1994 included 24 teams for 52 matches. From 1998 to 2022, 32 teams were included in the tournament for 64 matches. The next edition in 2026 will include 48 teams and 104 matches will be organized (FIFA, 2024)!

Another well famous mega sporting event is the UEFA Euro which is currently taking place this summer in Germany. The first European championship took place in 1960 on the initiative of Henri Delaunay and was held just between four nations for four matches until 1980. That year, the number of participants grew to eight nations and there were between 14 and 15 matches. Then, it grew to sixteen participants from the Euro 1996 with 31 matches. From Euro 2016,

the number of nations participating has even grown more with 24 countries for 51 matches (The Football History Boys, 2024).

The oldest mega sporting event is the Summer Olympic games whose origins date back to Antiquity, and whose first games of the modern era were held in Athens in 1896. The tradition of medal distribution began in 1904, and the first edition to include participants from all continents took place in 1912. The 1916 edition was cancelled due to the war. The next edition, in 1924, is the first one to have built an Olympic village which has been done for every edition since. The 1936 Olympics were the first to have the opening ceremony broadcasted live, contributing to its growing popularity. The next two editions were then cancelled due to the outbreak of second world war. The first ever Paralympic Games took place during the Rome 1960 edition. Previously, the Winter Olympic games were held in the same year as the Summer Games, but since 1994, they have been organized so that they no longer take place in the same year. Since its inception, the number of nations participating in the Games has increased significantly, with 206 National Olympic Committees currently involved (Sakavitsi, 2024).

All these evolutions of the mega sporting events may have altered consequently the economic impact since they are generally accompanied by higher costs. Therefore, the question of whether these mega sporting events are indeed cost-effective arises and will be analyzed later in this work.

1.2. Benefits of the mega sporting events

Mega sporting events offer several benefits. The short-run benefits include the construction boost and the tourism bump. This results in increased economic activity since the construction activities require inputs from local industries and create employment which can in turn translate in increased spending in the region. Short-run benefits also arise from the sponsorship, the ticketing and the media revenues. In addition, spectators consume food and beverages, and their festive mood is expected to influence the locals and the other visitors that do not attend the event to increase their spending in the region as well (Baade & Matheson, 2016; Barrios et al., 2016).

The long-run benefits include the legacy of sporting facilities, the improved livability of the region, the media attention that may have promoted the region and the potential promotion of the foreign direct investment. There are also the potential lower transportation costs if the road or rail network have been improved.

In addition, a host city might become a very popular tourist destination. For instance, this is the case of Barcelona which went from the 13th most popular European tourist destination to the 5th place after the 1992 Olympics. Barcelona is also a good example for the benefits of legacy infrastructure: since its renovation for the 1982 world cup, the Camp Nou has hosted numerous sporting events.

In terms of intangible benefits, major events can bring civic pride and international exposure. This can be very symbolic for the host country. In addition, the fact of bidding for a mega sporting event can signal to potential investors the capacity of the host country to get involved in major investments. In the case of the Olympic games, a city can force its government to invest in infrastructure that would otherwise have been built much later or not at all. Hosting a mega sporting event can also induce benefits in terms of international relation through the easing of visa requirements for instance. All of this may increase trade relations (Baade & Matheson, 2016; Baker, 2019; Barrios et al., 2016; Maennig & Wolfgang, 2017; Matheson, 2006).

However, some of the “benefits” can actually be negative. For instance, the sport facilities may be of little use and expensive to maintain which are commonly known as “white elephants”. Another example would be the bad reputation arising from the media if the event is associated to pollution or terrorist acts for instance. Moreover, it should be noted that not all benefits may be attributed to the host country. For instance, if the hotel is internationally owned, the profits may leave the country. In addition, if there is full or near-full employment in the host region, the latter may have to employ people from other regions. In the same spirit, part of the work may be outsourced if local resources are not sufficient. This means that money may flow out of the region (Baade & Matheson, 2016; Barrios et al., 2016; Zimbalist, 2010).

On the whole, the host country may not fully benefit from the organization of a mega sporting event, as a lot of money often goes into the pockets of international investors, non-local service providers and international sports government bodies (Baker, 2019).

The main difference between these mega sporting events is that the FIFA world cup and the Euro take place during a longer period of around one month, whereas the games last around two weeks. The football competitions can therefore generate larger revenue streams (Baker, 2019).

1.3. Costs of the mega sporting events

The bidding cities are notified of the host city usually seven years before the event by the International Olympic Committee. The host country must take care of the entire bill with the help of few funds. Hosting mega sporting events such as the games represents therefore some costs as well. These are due to the needed general infrastructure, the required sport infrastructure and the operational costs. For instance, in view of the large number of athletes and tourists, the IOC requires the host country to provide a minimum of 40000 hotel rooms for tourists and an Olympic village able to accommodate 15000 athletes and officials. In addition, the host country must invest in specialized sports infrastructures. There are also the operational costs including all the costs associated to the event management, the opening and closing ceremonies and the increasing cost of security (Baade & Matheson, 2016).

Hosting such big events requires therefore a lot of human (the employees and volunteers), financial (private and government investments) and physical (venues, accommodation, transportation, …) resources. In the case of an event organized in a city, large ones usually have more resources available than smaller ones, therefore mega sporting events usually take place in big cities. This explains also why the economic impact of organizing a major event can be higher in big cities, as the city supply resources can more easily match the event resources demand. Moreover, developed countries are therefore more prepared to organize such events, as they have more sports arena and infrastructures available, whereas developing countries have to spend a lot from the outset (Agha & Taks, 2015; Baker, 2019).

Organizing a mega sporting event requires to provide a large number of structures. First, there are the primary structures which are the structures immediately required for the event including the stadiums, arenas and special sport facilities. Then, there are the secondary structures which correspond to the Olympic or world cup village and the required infrastructures for athletes. Finally, there are the tertiary structures needed for the influx of tourism such as hotels or transportation, which can help the host city/country to become a new tourist destination (Baker, 2019).

To cover the costs, the host country can benefit from funds. These may come from the supranational organizations such as FIFA or from private or public stakeholders. But it is important to notice that the identification of the costs is quite difficult since all the costs cannot be disentangled. For example, it may be difficult to know if the infrastructure improvements are directly associated to the mega sporting event organization, given that it may have taken place even without it. In addition, there may not be full transparency about the data in case of cost overruns or corruption (Baade & Matheson, 2016; Barrios et al., 2016).

The main difference between the games and the FIFA world cup and the UEFA Euro Championship is that the games take place in only one city of a country which means that the costs are more concentrated and not spread out over different cities (Zimbalist, 2010).

1.4. The economic impact assessment of the mega sporting events

The selection of the host country for the mega sporting events is done through a bidding process. For the Olympic games, it involves a visit of the Evaluation Commission of the IOC to assess the conditions of the bidding city. In addition, the cities have to present a plan about the future proposed architectural renderings, the financial estimates and the marketing. The countries must therefore predict the costs and benefits of the organization of the mega sporting events before applying. The main problem of these studies is that it is usually commissioned by groups having a vested interest in the organization of those. This results in undervalued costs and overvalued benefits. This situation may also happen when a politician wants to gain public support for the upcoming elections. Ex-post studies are thus really important to evaluate the real impact of the mega sporting events. They assess the economic

performance of a host country compared to similar regions in which no mega sporting event has taken place (Baade & Matheson, 2016; Baker, 2019; Matheson, 2006).

When studying the impact of the mega sporting events, different elements must be taken into account. First, there is the "substitution effect" which happens when locals shift their spending from other goods in the local economy to a mega sporting event. The spending is therefore not considered as new in the economy, it is just a redistribution of existing sales. This usually leads economists to leave the expenditures from locals out of the analysis. In addition, the "couch potato" effect should be taken into account. This effect describes the reduced consumption of locals because of the event. For instance, if they work from home or even leave town to avoid disturbances caused by the event. Then, there is "the crowding out effect" which is when the organization of a mega sporting event dissuades the regular travelers from visiting the region. Indeed, travelers may want to avoid the higher prices and the congestion arising from the mega sporting event (Baade & Matheson, 2016; Barrios et al., 2016; Matheson, 2006; Zimbalist, 2010).

Another difficulty to assess the real economic impact of a mega sporting event is that there are both short-term and long-term effects and these can be direct or indirect. Moreover, the latter are usually more important than the direct effects which can be quite complex to measure. One of the most common indirect benefits of regions organizing a mega sporting event being the advertising effect (Dick et al., 2008; Zimbalist, 2010).

1.5. Impact of a major sporting event on the GDP

Major sporting events are expected to have an impact on host countries 'GDP. The latter in its expenditure approach is defined as follows (Baker, 2019):

$Y = C + G + I + NX$

Where:

- Y is the GDP.
- C is the aggregate consumption of the country's goods and services.
- G is the aggregate expenditure of the country's government.
- I is the aggregate amount of the country's investment.

- NX is the net exports of the country (Exports – Imports).

The impact of hosting a major sporting event spreads across all the components of the GDP through a multitude of chain reactions. It leads to an influx of visitors who boost the spending in the country. The event therefore generates more expenditure (higher C) which gives more resources to businesses to pay workers and results in more employment opportunities for workers and higher wages. This income increase can either result in higher consumption (increase in C) or in higher tax rate. The latter gives more money to the government (higher G) that will be spent on investments in infrastructure for instance (higher I). Due to the pre-event spending in infrastructure, the net exports will increase as well (higher NX). All of this will ultimately imply an increase in GDP and an increase in employment (Baker, 2019).

Chapter 2: Methodology

This chapter will describe the data set and the mega sporting events included in the analysis that will be used to measure the economic impact. After that, the model used and its associated assumptions will be detailed.

2.1. Data set

In order to measure the impact of organizing such events, some data will be analyzed and more precisely, the Gross Domestic Product (GDP). The model will indeed focus on the growth rate of the GDP of each country. The data set includes the annual GDP in constant local currency for each country from 1980 to 2022 which comes from the website of the worldbank. The data set includes therefore both a cross-sectional and a time series dimension and analyses the same countries across time.

The GDP "is the sum of gross value added by all resident producers in the economy plus any product taxes and minus subsidies not included in the value of the products (Worldbank, 2024)". Therefore, in the event of a mega sporting event, the GDP should increase, meaning that we should observe a higher GDP growth rate and a positive relationship between the GDP growth and the fact of hosting a mega sporting event. We will verify whether this is indeed the case throughout this work.

The data set includes missing values which could bias the model. Therefore, they should be processed to have the most accurate results. To this end, 19 countries[1] for which there were no values for the GDP growth rate until the 2000s have been removed from the analysis, as this means that these countries have more than 50% of missing values! For the remaining missing values, I used a multiple imputation technique, which involves three elemental phases: imputation, analysis and pooling. During this process, multiple copies[2] of the dataset are created with imputed values, each dataset is analyzed separately, and the results are then

[1] The removed countries from the analysis are Afghanistan, American Samoa, Cayman Islands, Curacao, Djibouti, Faroe Islands, Gibraltar, Guam, North Korea, Kosovo, Liberia, Nauru, Northern Mariana Islands, Palau, Qatar, Sao Tome and Principe, South Sudan, Timor-Leste and Turks & Caicos Islands.

[2] I have done 5 multiple copies of the dataset as Rubin suggested (Du et al., 2022).

combined in a single set of estimates. This method helps restore the natural variability of the missing values (Du et al., 2022).

The imputation approach that was used is the multiple imputation by chained equations (MICE). In this method, each variable containing missing data is imputed iteratively conditional on the others in the dataset. This allows missing values to be replaced by plausible estimates based on the observed data, considering each variable's distribution and relationships with the others. After several cycles of imputation, the final imputed dataset is generated and the parameters governing the imputations are expected to have converged, indicating stability in their distribution (Azur et al., 2011).

However, the multiple imputation technique is only valid under the Missing At Random (MAR) assumption. The MAR mechanism assumes that the probability of missing values depends on observed data but not on unobserved data. In this dataset, missing values are present primarily in the early years, and once a value appears, there are no subsequent missing values for the following years. Early years may have missing values due to collection methods, changes in reporting standards or historical availability for instance. This can therefore be explained by observed variables, supporting the MAR assumption (Du et al., 2022).

2.2. Mega sporting events included in the analysis

The study covers the FIFA world cup, the UEFA Euro Championship and the summer Olympic games from 1980 to 2022. The table below lists each edition of these events with the corresponding hosting city/country and the corresponding year (Topendsports, 2024; Worldfactsinc, 2024).

Mega sporting event	Host city (country)/country	Year of edition
Olympic games	Moscow (Russia)[3]	1980
Euro	Italy	1980
FIFA World cup	Spain	1982
Olympic games	Los Angeles (USA)	1984
Euro	France	1984

[3] Although at that time Russia was not an independent state but was part of the USSR, we will only consider the impact on Russia to simplify the analysis.

FIFA World cup	Mexico	1986
Olympic games	Seoul (South Korea)	1988
Euro	Germany[4]	1988
FIFA World cup	Italy	1990
Olympic games	Barcelona (Spain)	1992
Euro	Sweden	1992
FIFA World cup	USA	1994
Olympic games	Atlanta (USA)	1996
Euro	UK[5]	1996
FIFA World cup	France	1998
Olympic games	Sydney (Australia)	2000
Euro	Belgium & the Netherlands	2000
FIFA World cup	South Korea	2002
Olympic games	Athens (Greece)	2004
Euro	Portugal	2004
FIFA World cup	Germany	2006
Olympic games	Beijing (China)	2008
Euro	Austria & Switzerland	2008
FIFA World cup	South Africa	2010
Olympic games	London (UK)	2012
Euro	Poland & Ukraine	2012
FIFA World cup	Brazil	2014
Olympic games	Rio de Janeiro (Brazil)	2016
Euro	France	2016
FIFA World cup	Russia	2018
Olympic games	Tokyo (Japan)	2021[6]

[4] Germany was divided in two distinct countries at that time (West Germany and East Germany) and the event was actually held by West Germany; however, we consider that it was held all over Germany to simplify the analysis.

[5] As for Germany in 1988, we consider the event was held all over UK although it was held in England.

[6] The event was postponed for a year because of covid.

Euro	13 different European countries	2021[7]
FIFA World cup	Qatar	2022
Olympic games	Paris (France)	2024
Euro	Germany	2024

Figure 1: Mega sporting events organized from 1980 to today.

Some observations can be made from this table. Firstly, it can be seen that the majority of these mega sporting events took place in Europe during the last four decades with 4 (5 if Russia is considered as being part of Europe) out of the 12 last editions of the Olympic games and 4 (5 if Russia is considered as being part of Europe) out of the 11 last editions of the FIFA world cup being held in Europe. In addition, it can be observed that some countries have organized more than one mega sporting event in the last forty years: Russia has staged one edition of Olympic games and one of world cup; Italy one Euro and one world cup; Spain one world cup and one Olympic Games; USA two Olympic games and one world cup[8]; France two Euros, one world cup and one Olympic games; South Korea one Olympic games and one world cup; Germany two Euros and one world cup; the UK one Euro and one Olympic games[9] and finally, Brazil one world cup and one Olympic games.

2.3. Assumptions

The data and the model are based on certain assumptions. Firstly, the Olympic games take place in a city; however, we will be looking on the country as a whole, meaning that the economic impact is assumed to be not only for the city. Secondly, there are some mega sporting events that have been held in more than one country. Therefore, if it is the case, we will be looking at the impact on the countries separately. There is also the fact that some countries were not as they are today. This is for instance the case of the USSR which is now divided in several countries or West and East Germany which are now reunified in one unique country. In order to simplify the analysis, we will consider the impact on the territory where

[7] The event was postponed for a year because of covid.
[8] USA will host another world cup in 2026.
[9] The UK will host another Euro in 2028 with Ireland.

the mega sporting event took place and therefore on the country as it is recognized today. The analysis will go until 2018 as the mega sporting events afterwards are too recent. Besides, some recent events were postponed for a year because of covid which could bias the analysis. In addition, the 2021 edition of the euro took place in several European cities from different countries so taking into account this edition would overcomplicate the analysis. All the mega sporting events left out the analysis are in red in the table above.

2.4. Model

The model will allow us to observe the relationship between the dependent variable, the GDP growth rate, and the independent variable, the mega sporting event variable. The latter is a binary variable being equal to 1 if the country i hosted a mega sporting event in year t and 0 otherwise. For instance, Russia has the value of 1 in 2018 since the world cup took place there in 2018. In addition, the model includes country-specific fixed effects and year-specific fixed effects as it cannot be assumed that the observations are independently distributed across time. It takes into account the unobserved factors affecting the dependent variable, the GDP growth rate. The country-specific fixed effects control for unobserved heterogeneity that is constant over time within each country and can account for geographical, cultural or historical characteristics for instance. The year-specific fixed effects control for factors that vary over time, but which are constant across countries in a given year. These include economic trends or technological advancements for instance (Wooldridge, 2012).
The regression model is constructed as follows:

$$GDP\_Growth_{it} = \alpha_i + \gamma_t + \beta \,.\, MegaSportingEvent_{it} + \varepsilon_{it}$$

Where:

- GDP_Growth_{it} is the growth rate of the real GDP of country i in the year t.
- α_i captures country-specific fixed effects.
- γ_t captures year-specific fixed effects.
- $MegaSportingEvent_{it}$ is a binary variable that takes the value of 1 if a mega sporting event was held in the country i in year t and 0 otherwise.

- β measures the impact of hosting a mega sporting event on the GDP growth rate.
- ε_{it} is the error term.

β is the variable of interest of this thesis as this represents the average effect of hosting a mega sporting event on the GDP growth of a country after controlling for country-specific and year-specific fixed effects and will show whether hosting a mega sporting event actually has a positive impact on the GDP growth. This coefficient can be interpreted as follows:

- If β is positive and statistically significant, this means that hosting a mega sporting event is associated with an increase in GDP for the host country (controlling for the other factors in the model).
- If β is negative and statistically significant, this means that hosting a mega sporting event is associated with a decrease in GDP for the host country (controlling for the other factors in the model).
- If β is not statistically significant, it suggests that hosting a mega sporting event does not have a statistically distinguishable impact on GDP, after accounting for the fixed effects.

The first analysis includes countries that have hosted a mega sporting event and all other countries that have not hosted any mega sporting event over the past forty years. The objective is to assess whether GDP growth evolves differently between the countries that have hosted a mega sporting event or not, by determining if β is significant. After that, we will introduce lag and lead variables in the model to see if the effect of hosting a mega sporting event is significant in the preceding and the following years. Then, another analysis will focus only on the host countries to see if the GDP growth differs among them. This will therefore put light on the endogeneity related to the selection of hosting countries. The fifth empirical exploration will analyze the impact separately for each of the three mega sporting events to see if the results differ. Finally, the last investigation will only include the subgroup of countries with the high income and upper-middle income countries.

Chapter 3: Empirical analysis

3.1. Model with all countries

The following table includes the results of the different model variants. The p-values are indicated in brackets under the corresponding estimate.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
β	0.16 (0.88)	0.17 (0.87)	0.15 (0.88)	0.16 (0.88)	0.17 (0.87)	0.28 (0.79)	0.18 (0.86)	0.15 (0.80)
β_{T-1}		0.59 (0.58)		0.59 (0.59)		0.72 (0.50)		
β_{T-2}		0.62 (0.57)		0.61 (0.57)		0.74 (0.49)		
β_{T-3}				-0.16 (0.88)		-0.11 (0.92)		
β_{T-4}				-0.13 (0.91)		-0.1 (0.93)		
β_{T-5}						1.2 (0.29)		
β_{T-6}						1.46 (0.19)		
β_{T-7}						0.72 (0.53)		
β_{T+1}			-0.16 (0.88)		-0.16 (0.88)		-0.14 (0.9)	
β_{T+2}			0.01 (0.99)		0.01 (0.99)		0.03 (0.98)	
β_{T+3}					0.27 (0.80)		0.26 (0.81)	
β_{T+4}					0.11 (0.91)		0.12 (0.91)	
β_{T+5}							0.48 (0.65)	
β_{T+6}							0.13 (0.90)	
β_{T+7}							-0.26 (0.81)	
Joint sign.[10]		(0.88)	(0.99)	(0.98)	(0.99)	(0.88)	(0.99)	
N R^2	8213 0.088	8213 0.089	8213 0.088	8213 0.089	8213 0.088	8213 0.089	8213 0.088	946 0.264

[10] P-value of the significance test to see if β are jointly significant.

Adj. R^2	0.062	0.062	0.062	0.061	0.061	0.061	0.061	0.210
Lag[11]	No	No	Yes	No	Yes	No	Yes	No
Lead[12]	No	Yes	No	Yes	No	Yes	No	No
Host Countries[13]	No	No	No	No	No	No	No	Yes

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 1: Regression results for models with all countries, with lag and lead variables and for host countries only.

The results for the model including all the countries are shown in *column (1) of table 1*. It can be seen that the estimated coefficient β has a value of 0.16, which means that hosting a mega sporting event is associated with a small increase of 0.16 percentage points in GDP growth. However, the p-value is extremely high (0.88), meaning that the effect of hosting a mega sporting event on GDP growth is not statically significant. Furthermore, the R-squared and the adjusted R-squared are quite low, meaning that the model does not explain much of the variability in GDP growth, only 8,8% according to the R-squared and 6,2% according to the adjusted R-squared.

The results of this model do not allow us to conclude that hosting a mega sporting event is associated with a significant contemporaneous increase in GDP growth and has therefore a positive economic impact on host countries. We should therefore look at different variants of this model to see whether we obtain different results.

3.2. Model with all countries with lag and lead variables

The following models introduce lead and lag variables to see if hosting a mega sporting event has an economic impact on the years preceding and following the mega sporting event. Indeed, the literature often talks about economic impact taking place years before and after the event. According to Barrios et al. (2016), the impact of a mega sporting event on tourism lasts four years before and four years after the event. According to Firgo (2021), the period during which the investments for the Olympics are made is for a seven-year period before the event. Baker (2019) explains that host countries usually need eleven to nine years before the

[11] Indicates if there are lag variables.
[12] Indicates if there are lead variables.
[13] Indicates if the analysis is done on the subgroup of countries having hosted at least one mega sporting event.

event to assess its feasibility which is followed by the bidding process and if the mega sorting event is allocated, the construction and preparation phase begins seven years before the event. This is illustrated by the following figure:

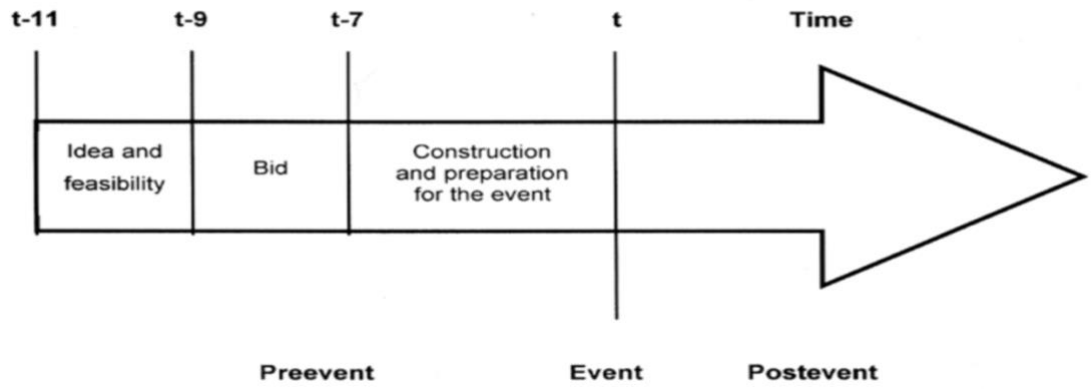

Figure 2: Timeline to organize a mega sporting event (Baker, 2019).

I will therefore look at the impact four years before and after the event and seven years before and after the event. In addition, I will look at the impact two years before as well to see if there is an impact as the event gets closer and 2 years after to see if there is an impact in the short-term.

The results of the models with lag and lead variables are included *from column (2) to column (7) of table 1*. β_{T-X} measures the impact on GDP growth rate of hosting a mega sporting event in X years while β_{T+X} measures the impact on GDP growth rate of having hosted a mega sporting event X years ago.

◊ Impact of mega sporting events on GDP growth **within a two-year period prior** the event

The results can be found in *column (2) of table 1*. The estimates show that hosting a mega sporting event is associated with a slight increase of 0.17 percentage point in GDP growth in the year of the event, of 0.59 percentage points in the year preceding the event and of 0.62 percentage points two years before the event. However, these observations cannot be validated as the corresponding p-values are too high. In addition, looking at the significance joint test, the p-value of 0.88 suggests that hosting a megaevent does not have a statistically significant joint impact on GDP growth rate for the period of two years before the event. The

R-squared and the adjusted R-squared show little explanation of GDP growth by the model as in the previous model.

◊ Impact of mega sporting events on GDP growth **within a two-year period after** the event

The results of this model are shown in *column (3) of table 1*. The estimates indicate that hosting a mega sporting event induces a slight positive increase in GDP growth two years after the event and in the year of the event, as well as a surprisingly small decrease in GDP growth the following year, however the p-values are too high for these impacts to be significant and the variation in GDP growth explained by the model remains quite low. Furthermore, we cannot conclude that the estimates are jointly significant given the extremely high p-value (0.99).

◊ Impact of mega sporting events on GDP growth **within a four-year period prior** the event

The results can be found *in column (4) of table 1*. The estimates show positive values for the year of the event, for the year preceding the event and two years before the event, while negative values three and four years before the event which is not in line with the expected positive relationship between the fact of hosting a mega sporting event and the growth in GDP. However, all these estimates are once again not significant due to high p-values. In addition, this model does not explain much variability in the GDP growth and there is no jointly significance between the variables.

◊ Impact of mega sporting events on GDP growth **within a four-year period after** the event

The results can be found *in column (5) of table 1*. Although the estimates show a positive relationship between hosting a mega sporting event and the growth in GDP during the four-year period after the event (except for the following year), the p-values are too high meaning that the estimates are not statistically significant. Furthermore, the very high p-value of the

jointly significance test means that the variables are not jointly significant. The R-squared and adjusted R-squared show once again low variability in GDP growth explained by the model.

◊ Impact of mega sporting events on GDP growth **within a seven-year period prior** the event

The results can be found *in column (6) of table 1.* We observe once again that hosting a mega sporting event should slightly increase the GDP growth rate in the two preceding years and slightly decrease it three and four years before the event, but these observations are rejected due to high p-values. For the fifth, sixth and seventh preceding years, positive relationship between hosting a mega sporting event and the GDP growth rate is observed, but although the p-values are lower in t-5 and t-6, they are once again too high for these estimates to be significant. Besides, the p-value of the jointly significance test is too high as well to conclude that the coefficients are jointly significant. The variability explained by the model does not seem to increase with very low R-squared and adjusted R-squared.

◊ Impact of mega sporting events on GDP growth **within a seven-year period after** the event

The results can be found *in column (7) of table 1.* The estimates show a negative relationship between hosting a mega sporting event and the GDP growth seven years after the event and in the year of the event, while this relationship is positive for the six years following the event, but the high p-values indicate that there is no statistically significance. This is also the case for the jointly significance test. In addition, the very low R-squared and adjusted R-squared do not provide high variability explanation in GDP growth by the model.

Overall, the six models including lag and lead variables cannot prove that hosting a mega sporting event increases GDP in host countries during the years before and after the event took place. The next section will therefore look at another model variant to see if this changes the results.

3.3. Model with only host countries

This model only includes the countries that have hosted at least one mega sporting event since 1980. This approach allows us to see if the hosting status of countries plays a significant role in the observed economic effect. In addition, there might be structural differences between countries that hosted a mega sporting event and those that did not. There might be endogenous factors that have influenced the decision of hosting a mega sporting event such as the political stability or the infrastructure capacities for instance. By focusing only on the host countries, we consider this endogeneity, and this provides us a clearer analysis of the economic impact within the host countries.

The results *in column (8) of table 1* show that hosting a mega sporting event slightly increases the GDP by 0.15 percentage points, but this is not statistically significant given its high p-value. We observe much higher R-squared and adjusted R-squared than in previous models meaning that this model including only host countries explains better the variability in GDP growth. However, the values of those provide still moderate explanation with respectively 26,4% and 21% of the explanation in variability of GDP growth.
Selecting only the host countries did not allow us to conclude on a positive contemporaneous relationship between hosting a mega sporting event and an increase in GDP. The following models will look at the impact on mega sporting events separately.

3.4. Model with separate mega sporting events

The following models will examine the economic impact of organizing a mega sporting event separately for each event. Mega sporting events have indeed some differences between each other which may influence the results. For instance, the Olympics are organized in a city while the world cup and the Euro are organized in a whole country. In addition, the world cup and the Euro last for about one month, while the Olympics last only two weeks. By analyzing the mega sporting events separately, all these differences are taken into account.

◊ FIFA World cup

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
β	-0.01 (0.99)	-0.01 (0.99)	-0.03 (0.99)	-0.04 (0.98)	-0.04 (0.98)	0.06 (0.97)	-0.03 (0.99)	0.06 (0.95)
β_{T-1}		-0.05 (0.98)		-0.08 (0.96)		0.02 (0.99)		
β_{T-2}		0.36 (0.85)		0.33 (0.86)		0.44 (0.81)		
β_{T-3}				-0.51 (0.80)		-0.39 (0.84)		
β_{T-4}				-0.8 (0.68)		-0.69 (0.73)		
β_{T-5}						1.4 (0.48)		
β_{T-6}						1.93 (0.33)		
β_{T-7}						1.29 (0.54)		
β_{T+1}			-0.44 (0.81)		-0.45 (0.81)		-0.44 (0.81)	
β_{T+2}			-0.4 (0.83)		-0.42 (0.82)		-0.41 (0.83)	
β_{T+3}					-0.38 (0.84)		-0.37 (0.84)	
β_{T+4}					-0.12 (0.95)		-0.11 (0.95)	
β_{T+5}							0.65 (0.74)	
β_{T+6}							-0.01 (0.99)	
β_{T+7}							-0.26 (0.89)	
Joint sign.		(0.99)	(0.99)	(0.99)	(0.99)	(0.98)	(1)	
N	8213	8213	8213	8213	8213	8213	8213	430
R^2	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.374
Adj. R^2	0.062	0.061	0.061	0.061	0.061	0.061	0.061	0.287
Lag	No	No	Yes	No	Yes	No	Yes	No
Lead	No	Yes	No	Yes	No	Yes	No	No
Host Countries	No	No	No	No	No	No	No	Yes

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 2: Regression results for the FIFA World Cup models with all countries, with lag and lead variables and for host countries only.

The results in *columns (1) to (7) of table 2* which include the results of regression with all countries and the ones with all countries with lag and lead variables are similar than the ones obtained in the previous models with all major sporting events considered together. Focusing only on the world cup shows however different results when considering only host countries (*column (8) of table 2*). The β estimate shows that hosting a world cup should be associated to a slight contemporaneous increase by 0.06 percentage points in host countries' GDP, however, the p-value is once again too high, meaning that this is not statistically significant. Looking now at the R-squared and the adjusted R-squared, we can see that the variability in GDP growth explained by the model has increased. Compared to the previous model considering all the events together, the R-squared went from 26,4% to 37,4% of the variability explained and the adjusted R-squared went from 21% to 28,7% of the variability explained. This means that focusing solely on the world cup explains better the variability in GDP growth for host countries.

◊ UEFA Euro

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
β	0.01 (0.99)	0.04 (0.98)	-0.01 (0.99)	0.02 (0.99)	-0.02 (0.99)	0.06 (0.97)	0.03 (0.99)	0.16 (0.88)	0.36 (0.79)
β_{T-1}		0.57 (0.74)		0.55 (0.75)		0.60 (0.73)			
β_{T-2}		0.64 (0.71)		0.62 (0.72)		0.67 (0.70)			
β_{T-3}				-0.67 (0.70)		-0.62 (0.72)			
β_{T-4}				0.01 (0.99)		0.06 (0.97)			
β_{T-5}						0.69 (0.70)			
β_{T-6}						0.98 (0.59)			
β_{T-7}						0.05 (0.98)			
β_{T+1}			-0.4 (0.81)		-0.4 (0.81)		-0.36 (0.83)		
β_{T+2}			-0.42 (0.80)		-0.43 (0.80)		-0.38 (0.82)		
β_{T+3}					-0.29 (0.86)		-0.24 (0.88)		
β_{T+4}					0.1 (0.95)		0.14 (0.93)		

β_{T+5}							0.39		
							(0.81)		
β_{T+6}							0.66		
							(0.69)		
β_{T+7}							0.46		
							(0.79)		
Joint sign.		(0.97)	(0.99)	(0.99)	(0.99)	(0.99)	(0.99)		
N	8213	8213	8213	8213	8213	8213	8213	516	2064
R^2	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.269	0.244
Adj. R^2	0.061	0.061	0.061	0.061	0.061	0.060	0.060	0.183	0.209
Lag	No	No	Yes	No	Yes	No	Yes	No	No
Lead	No	Yes	No	Yes	No	Yes	No	No	No
Host Countries	No	No	No	No	No	No	No	Yes	No
European Countries[14]	No	No	No	No	No	No	No	No	Yes

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 3: Regression results for the UEFA Euro models with all countries, with lag and lead variables, for host countries only and for Europe only.

Columns (1) to (7) of table 3 which show results from the regression with all countries and with lag and lead variables considering solely the Euro are similar to the results obtained for the two previous models (the model considering all the events and the one considering only the World cup). *Column (8) of table 3* shows that the model, like the one considering the world cup, has different result than the one considering all mega sporting events together in terms of variability explained by the model. Indeed, it explains about 27% according to the R-squared and around 18% according to the adjusted R-squared of the variability in GDP growth. However, the estimate indicates that hosting the Euro should increase the GDP by 0.16 percentage points in the host countries, but the high p-value leads us to reject it. In this section, a new model variant which includes only the European countries was considered for which the results are presented *in column (9) of table 3*. It is indeed more relevant to consider this subgroup of countries as the Euro can only be held in Europe. The results suggest that holding the Euro has no significative impact on the GDP growth rate given the high p-value. However, like the model considering only the host countries, it explains better the variability in GDP growth with about 20-25% of variability explained.

[14] Indicates if the analysis is done on the subgroup of European countries.

◊ Summer Olympic games

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
β	1.45 (0.44)	1.51 (0.42)	1.50 (0.42)	1.55 (0.41)	1.53 (0.41)	1.66 (0.38)	1.50 (0.42)	1.73° (0.09)
β_{T-1}		1.46 (0.46)		1.51 (0.44)		1.63 (0.41)		
β_{T-2}		0.99 (0.61)		1.04 (0.60)		1.16 (0.56)		
β_{T-3}				0.91 (0.64)		1.03 (0.60)		
β_{T-4}				0.50 (0.80)		0.62 (0.75)		
β_{T-5}						1.84 (0.38)		
β_{T-6}						1.56 (0.45)		
β_{T-7}						1.13 (0.59)		
β_{T+1}			0.38 (0.84)		0.41 (0.83)		0.38 (0.84)	
β_{T+2}			1.68 (0.37)		1.71 (0.36)		1.68 (0.37)	
β_{T+3}					1.37 (0.46)		1.34 (0.47)	
β_{T+4}					-0.37 (0.84)		-0.40 (0.83)	
β_{T+5}							0.35 (0.85)	
β_{T+6}							-0.70 (0.71)	
β_{T+7}							-0.65 (0.74)	
Joint sign.		(0.71)	(0.69)	(0.89)	(0.84)	(0.92)	(0.97)	
N	8213	8213	8213	8213	8213	8213	8213	387
R^2	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.326
Adj. R^2	0.065	0.064	0.064	0.064	0.064	0.064	0.064	0.223
Lag	No	No	Yes	No	Yes	No	Yes	No
Lead	No	Yes	No	Yes	No	Yes	No	No
Host Countries	No	No	No	No	No	No	No	Yes

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 4: Regression results for the Summer Olympic games models with all countries, with lag and lead variables and for host countries only.

The results from *column (1) to column (7) of table 4* which include the model with all countries and the ones with lag and lead variables show very low explanation in GDP growth by the models with less than 10% explained. Although the p-values are lower than in previous models, it is too high for the estimates to be statistically significant. Looking at *the column (8) of table 4* which includes the results when considering only the host countries, we see different results. According to the estimate, hosting the summer Olympic games should increase the GDP by 1.73 percentage points and this estimate is significant at the 10% level, indicating marginal significance. This model shows a moderate explanation for around 20-30% explanation of the variability in GDP growth, which is higher than the other model variants in *columns (1) to (7).* Given the significance of the model when considering only the host countries, an analysis of it with lag and lead variables has been made and the results are shown *in table 5*.

	(1)	(2)	(3)	(4)	(5)	(6)
β	1.74°	1.74°	1.82°	1.71°	1.82°	1.71°
	(0.09)	(0.09)	(0.08)	(0.09)	(0.08)	(0.09)
β_{T-1}	1.12		1.13		1.28	
	(0.30)		(0.30)		(0.24)	
β_{T-2}	1.08		1.09		1.28	
	(0.32)		(0.31)		(0.24)	
β_{T-3}			0.78		0.89	
			(0.47)		(0.41)	
β_{T-4}			0.63		0.64	
			(0.56)		(0.55)	
β_{T-5}					1.31	
					(0.25)	
β_{T-6}					1.61	
					(0.16)	
β_{T-7}					0.88	
					(0.44)	
β_{T+1}		0.34		0.34		0.35
		(0.74)		(0.74)		(0.73)
β_{T+2}		1.92°		1.92°		1.89°
		(0.06)		(0.06)		(0.07)
β_{T+3}				1.09		1.01
				(0.28)		(0.33)
β_{T+4}				-0.27		-0.28
				(0.79)		(0.79)
β_{T+5}						0.16
						(0.88)

β_{T+6}						-0.23 (0.82)
β_{T+7}						-0.72 (0.51)
Joint sign.	(0.17)	(0.09)°	(0.32)	(0.17)	(0.29)	(0.41)
N	387	387	387	387	387	387
R^2	0.330	0.333	0.332	0.336	0.340	0.337
Adj. R^2	0.224	0.227	0.221	0.226	0.223	0.220
Lag	No	Yes	No	Yes	No	Yes
Lead	Yes	No	Yes	No	Yes	No

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 5: Regression results for the models with only high income and upper-middle income countries with lag and lead variables.

It can be seen that in addition to the contemporaneous increase in GDP, hosting the Olympics results in an increase of GDP two years after, but the significance is marginal as well given that the p-value is significant at the 10% level. In addition, the model for the two-year period after the event shows jointly significance of the variables at the 10% level. This means that hosting the Olympics implies an immediate economic boost with longer-term benefits arising two years after through the improved infrastructure and the sustained tourism for instance. The six model variants *from column (1) to column (6) of table 5* explain around 33% of the variability in GDP growth according to the R-squared and around 22% according to the adjusted R-squared. The provided explanation is therefore moderate but still higher than the model variants considering all countries together and not only the host countries.

When considering the major sporting events separately, the results are very similar when taking into account all countries and when introducing lag and lead variables to the results obtained previously. Although, explaining better the variability in GDP growth, the models focusing only on host countries and on the mega sporting events separately cannot conclude that hosting a mega sporting event results in an increase in GDP, except for the Olympics for the year of the event and two years after but with marginal significance. The next section will look at a model including only high and upper-middle income countries.

3.5. Model with high income and upper-middle income countries

The following model focuses exclusively on the high income and upper-middle income countries. These countries generally have more developed infrastructures and greater financial resources to host such events. By focusing on this subset of countries, the model allows to control potential disparities in economic means among the different countries. The table below shows the regression results obtained when considering all events together *in column (1),* the world cup *in column (2)*, the Euro in *column (3)* and the Olympics in *column (4)*. The results of the models with lag and lead variables can be found *in table 8 in the appendices*, but as they are similar to the ones obtained previously, they will not be commented.

	(1)	(2)	(3)	(4)
β	0.35 (0.75)	0.19 (0.92)	-0.16 (0.92)	0.77 (0.70)
N	5074	5074	5074	5074
R^2	0.123	0.120	0.120	0.121
Adj. R^2	0.095	0.091	0.092	0.092
World Cup[15]	Yes	Yes	No	No
Euro[16]	Yes	No	Yes	No
Olympics[17]	Yes	No	No	Yes

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 6: Regression results for models with only high income and upper-middle income countries.

We observe similar results than in the previous models. The estimates show a positive relationship between hosting a mega sporting event and the GDP growth except for the model

[15] Indicates if the analysis is done only for the World cup.
[16] Indicates if the analysis is done only for the Euro.
[17] Indicates if the analysis is done only for the Olympics.

considering only the Euro. However, those estimates are once again not significant given the high p-values. These models seem to explain little variability in GDP growth given the low R-squared and adjusted R-squared.
These models could be done for the same reasons, focusing solely on developing countries. However, the number of developing countries having hosted a mega sporting event remains low so this model would not be relevant.

Overall, none of the models analyzed allowed to find statistical significance in GDP growth resulting from hosting a mega sporting event. The next section will attempt to explain this finding.

3.6. Possible reasons for the results found

Different reasons may explain why we found no statistical significance of positive economic impact for hosting a mega sporting event.
Firstly, there is the fact that the total spending involved in hosting a mega sporting event represents only a small proportion of the GDP. Let us look at the Euro 2016 in France and the world cup 2018 in Russia. The total spending of France for Euro 2016 is 835 million euros on a total GDP of about 2223 billion euros, which represents only 0,0375% of the GDP (Statista, 2016). The total spending in 2018 for the world cup is 678 billion rubles on a total GDP of 89636 billion rubles, representing only 0,7565% of the GDP (Dunbar, 2018).
Another reason is that most of the benefits are on the short term and therefore dissipate quickly. Most of the literature has found similar results and also found that the substitution effect and the crowding out effect described above in this work may have attenuated the positive impact coming from the mega sporting event.
Then, there may be no visible economic impact due to the eviction effect. The spending for the mega sporting event may have displaced spending in other sectors. Indeed, the government has limited budget and has therefore had to reduce spending in other sectors to finance the mega sporting event which resulted in no significant change in GDP.
Finally, most benefits are intangible and difficult to assess economically and are not captured in the GDP such as the media attention or national pride. Further analysis could be more precise and try to capture those elements.

Chapter 4: Empirical analysis for consumption

As already explained in the section 1.5., hosting a mega sporting event has an impact on all components of GDP. It would be interesting to compute the impact of a major sporting event on one component as it can be more significant for some components than others. The GDP's component that is analyzed here below is the final consumption expenditure. The latter is "the sum of household final consumption expenditure and general government final consumption expenditure" (Worldbank, 2024). Consumption is a component that should be highly positively impacted when hosting a major event as it has been described in section 1.5. Therefore, this component should increase in the event of a major sporting event and a positive relationship between major sporting event and the consumption growth rate is expected.

The data were found on the website of the worldbank and are in constant local currency. As for the GDP analysis, data are collected from 1980 to today for all countries. However, countries with more than 50% of missing values were left out of the analysis. For the remaining countries having missing values, the multiple imputation technique was used as for the previous empirical analysis.

The same model as for the GDP including country-specific fixed effects and year-specific fixed effects is used to compute the impact of a mega sporting event on the consumption growth rate. The analysis is done for the models that were the most relevant in the previous chapter. The first model variant is done for all countries, the second for the host countries only and the three last ones for the event separately including only the host countries. The results are shown in the table below. The results for the model variants with lag and lead variables are shown in table 9 and the results for the events considered separately with all countries in table 10. However, the results show no significance and low explanation in variability of consumption growth and can be found in the appendices.

	(1)	(2)	(3)	(4)	(5)
β	0.60	0.49	-0.11	0.69	0.65
	(0.51)	(0.34)	(0.90)	(0.42)	(0.47)

N	5504	946	430	516	387
R^2	0.071	0.237	0.331	0.237	0.324
Adj. R^2	0.042	0.181	0.239	0.147	0.222
Host countries	No	Yes	Yes	Yes	Yes
World Cup	Yes	Yes	Yes	No	No
Euro	Yes	Yes	No	Yes	No
Olympics	Yes	Yes	No	No	Yes

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 7: Regression results for the consumption model with all countries, host countries, and for the event considered separately.

The results in *column (1)* taking all countries into account show as for the GDP's model no significance and low explanation in consumption variability. However, when considering only the host countries *(column (2)),* there is once again no significance, but the variability in consumption explained by the model increases with around 20% of explanation. Focusing now on the events separately and considering only the host countries, the results from *column (3) to column (5)* show no significance for the estimates, but the variability in consumption explained by the model has even more increased than in the previous model variant, except for the model focusing solely on the Euro. Overall, the analysis cannot conclude that hosting a mega sporting event positively influences the consumption, which means that the impact on consumption is too low to be significant.

Conclusion

This work aimed at looking at the economic impact of hosting a mega sporting event. To do so, a regression model was run, and different variants of this model have been analyzed. However, none of these analyses have allowed to conclude that hosting a mega sporting event results in a positive economic impact by an increased GDP. The reasons for this finding have been explained and the one that stands out most in the literature is that most of benefits from hosting a mega sporting event are on a short period meaning that it boosts the economy only on the short run. Besides, the mega sporting events represent only a small part of the GDP, which means that no significant impact could be found by analyzing this variable. Further analysis should be made in the future since those mega sporting events evolve over time and can imply different economic impact. For instance, the next edition of the world cup hosted in the United States, Mexico and Canada will be the biggest knockout tournament the world of soccer has ever known, going from 32 teams in the final phase to 48 teams (The Athletic staff, 2024)! This could drastically change the economic impact either positively or negatively. Besides, hosting a mega sporting event implies more and more costs so further analyses would be relevant in the future.

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Appendices

Appendice 1: Regression results of the model with only high income and upper-middle income countries with lag and lead variables.

	(1)	(2)	(3)	(4)	(5)	(6)
β	0.36	0.35	0.35	0.38	0.46	0.41
	(0.74)	(0.75)	(0.75)	(0.72)	(0.67)	(0.71)
β_{T-1}	0.69		0.68		0.82	
	(0.53)		(0.54)		(0.46)	
β_{T-2}	0.57		0.57		0.69	
	(0.61)		(0.61)		(0.53)	
β_{T-3}			-0.10		-0.06	
			(0.93)		(0.96)	
β_{T-4}			-0.26		-0.23	
			(0.82)		(0.84)	
β_{T-5}					1.28	
					(0.28)	
β_{T-6}					1.34	
					(0.26)	
β_{T-7}					0.69	
					(0.56)	
β_{T+1}		0.22		0.22		0.25
		(0.84)		(0.84)		(0.82)
β_{T+2}		0.46		0.48		0.50
		(0.67)		(0.66)		(0.64)
β_{T+3}				0.49		0.48
				(0.65)		(0.66)
β_{T+4}				0.29		0.29
				(0.79)		(0.79)
β_{T+5}						0.57
						(0.61)
β_{T+6}						0.44
						(0.69)
β_{T+7}						-0.53
						(0.64)
Joint sign.	(0.87)	(0.96)	(0.98)	(0.99)	(0.90)	(0.99)
N	5074	5074	5074	5074	5074	5074
R^2	0.123	0.123	0.123	0.123	0.124	0.123
Adj. R^2	0.094	0.094	0.094	0.094	0.094	0.093
Lag	No	Yes	No	Yes	No	Yes
Lead	Yes	No	Yes	No	Yes	No

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 8: Regression results for the model with only high income and upper-middle income countries with lag and lead variables.

Appendice 2: Regression results of the model for consumption with lag and lead variables.

	(1)	(2)	(3)	(4)	(5)	(6)
β	0.60	0.61	0.57	0.61	0.70	0.65
	(0.51)	(0.51)	(0.53)	(0.50)	(0.45)	(0.48)
β_{T-1}	0.36		0.37		0.50	
	(0.70)		(0.70)		(0.60)	
β_{T-2}	0.81		0.79		0.93	
	(0.39)		(0.40)		(0.33)	
β_{T-3}			-0.62		-0.55	
			(0.52)		(0.57)	
β_{T-4}			-0.13		-0.11	
			(0.90)		(0.91)	
β_{T-5}					1.03	
					(0.30)	
β_{T-6}					1.67°	
					(0.09)	
β_{T-7}					0.80	
					(0.43)	
β_{T+1}		0.10		0.11		0.15
		(0.91)		(0.91)		(0.87)
β_{T+2}		-0.24		-0.25		-0.21
		(0.79)		(0.79)		(0.82)
β_{T+3}				-0.10		-0.10
				(0.91)		(0.92)
β_{T+4}				0.19		0.21
				(0.83)		(0.82)
β_{T+5}						0.53
						(0.57)
β_{T+6}						0.33
						(0.73)
β_{T+7}						-0.06
						(0.95)
Joint sign.	(0.73)	(0.92)	(0.89)	(0.99)	(0.64)	(0.99)
N	5504	5504	5504	5504	5504	5504
R^2	0.072	0.071	0.072	0.071	0.072	0.071
Adj. R^2	0.042	0.041	0.041	0.041	0.042	0.041
Lag	No	Yes	No	Yes	No	Yes
Lead	Yes	No	Yes	No	Yes	No

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 9: Regression results for the consumption model with lag and lead variables.

Appendice 3: Regression results of the model for consumption for each event separately with all countries.

	(1)	(2)	(3)
β	0.35	0.54	0.27
	(0.83)	(0.71)	(0.87)
N	5504	5504	5504
R^2	0.072	0.071	0.069
Adj. R^2	0.042	0.042	0.039
World Cup	Yes	No	No
Euro	No	Yes	No
Olympics	No	No	Yes

****p<0.001, **p<0.01, *p<0.05, °p<0.1*

Table 10: Regression results for the consumption model for World cup, Euro and Olympics with all countries.