Louvain School of Management

Mega sporting event effects on the host country's economy : empirical evaluation of past tournaments on GDP, Employment, FDI and Trade.

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Declaration regarding AI Tool usage in Master’s Thesis

During the preparation of this master’s thesis, the author utilized ChatGPT, DeepL and NotebookLM for the following purpose:

1. Content summary and literature review: After gathering information from reliable and external sources, AI tools helped me organize and summarize those information to provide a clear structure.

2. Translation and text enhancement: AI tools assisted me in formulating my sentences, finding synonyms and translating my ideas into English.

3. Code generation: AI tools helped me in generating the code used in R studio to conduct my statistical analysis.

After using ChatGPT, DeepL and NotebookLM, I diligently reviewed and edited the content produced by the tool. I take full responsibility for the final content presented in this thesis.

By signing this declaration, I affirm that the content of this master’s thesis reflects my original work, augmented by the responsible use of AI.

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Foreword

First and foremost, I would like to express my sincere gratitude to all the people who supported me throughout the writing of this Master’s thesis and during my academic journey at the Université Catholique de Louvain, from bachelor to master.

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— Victor Berg.

Abstract

The purpose of this research is to investigate the relationship between hosting a mega event, and specifically a football World Cup or Olympic Games, and the effects on the host country's economy. While previous studies have typically focused on a single economic dimension, this research addresses a gap by adopting a more holistic approach, analyzing the effects of hosting on four economic indicators: GDP per capita growth, employment rate, FDI inflow, and exports. Data from 1990 to 2023 were collected to examine, not only the impact of hosting a mega event, but also the impact of the infrastructure costs associated with the event, and the difference in effect between developed and developing countries.

To explore these questions, a panel data analysis is conducted using linear regression models across several model specifications. Models (1) to (3) cover different subsamples, host and candidate countries, hosts only, and developed countries. Models (4) to (6) include lag and lead variables to capture anticipation and legacy effects, while covering respectively the same subsamples as the first three models. A total of 24 regressions were therefore performed, 6 on each of the 4 economic indicators acting as the dependent variables. The explanatory variables in the regression models include hosting a major tournament, a term interaction with hosting if the country is developed, infrastructure costs and control variables to limit omitted variable bias.

The findings reveal mixed results, depending on the country's level of development, the timing of the measurement, and the indicator in question. Firstly, there appears to be a negative impact on a host country's GDP per capita, particularly for developing countries. For the employment rate, there is a large and positive significant effect, especially for developed countries. The benefits in terms of FDI are significantly positive, and often greater for less advanced countries. Lastly, the implications for the host country's trade balance of hosting the competition have been mixed, but seem to greatly improve exports for developed countries. Overall, the results highlight that the economic impact of hosting mega events is neither automatic nor uniform. Effects vary across time, country type, and indicator, suggesting that benefits are conditional on broader structural factors and policy readiness.

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Acronyms

CPI = Consumer Price Index

DID = Difference-In-Differences

ER = Employment Rate

EU = European Union

FDI = Foreign Direct Investment

FIFA = Fédération Internationale de Football Association

FOB = Free On Board

GDP = Gross Domestic Product

GNI = Gross National Income

IC = Infrastructure Costs

IMF = International Monetary Fund

IOC = International Olympic Committee

MICE = Multiple Imputation by Chained Equations

OECD = Organization for Economic Cooperation and Development

OLS = Ordinary Least Square

PMM = Predictive Mean Matching

SADC = Southern African Development Community

SCM = Synthetic Control Method

SUR = Seemingly Unrelated Regressions

USA = United States of America

WC = World Cup

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1. Introduction

The Summer and Winter Olympic Games, the Football World Cup, the Rugby World Cup, F1 Grand Prix, etc. are all major sporting events that unleash the passions and the crowds because they are so eagerly awaited. These events can have substantial economic spin-offs, from tourism to massive infrastructure construction (Maennig, 2007; Al-Dosari, 2020; Thabi, 2024). However, fewer and fewer countries are bidding to host these “mega” tournaments. Nowadays, countries are even bidding jointly, as in the case of the 2026 (USA, Canada and Mexico) and 2030 (Spain, Morocco, Portugal) football World Cups. Among them are countries that were once capable of hosting the World Cup on their own. So why do they decide to share the cake? It would appear that the considerable cost of these events is deterring some countries from bidding for them, and is increasingly limiting the number of possible candidates. The quality standards expected by the International Olympic Committee (IOC) to host the Olympic Games, and by the Fédération Internationale de Football Association (FIFA) to organize the World Cup, indeed continue to rise. Nevertheless, the public remains extremely enthusiastic about this type of tournaments, since they are increasingly followed around the world. However, economic spin-offs are often poorly communicated to the public, or even blurred for the most part.

The purpose of this thesis is to answer the following question : to what extent does hosting a mega sporting event affect a country's economic performance, and how can historical data inform the potential future benefits and risks for countries considering applying for these tournaments ? More precisely, the study's primary objective is to investigate the effects of past competitions on the Gross Domestic Product (GDP) growth rate, trade balance, employment rate, and foreign direct investment (FDI) inflow of the host nation. The second is to use a cost variable to better understand its role in economic success or failure so that policy makers can make well-informed decisions about the potential applications of their country. Finally, the model will assist us in determining whether developed and developing nations have different spinoff magnitudes.

Previous research have already studied the effects of World Cups and Olympics on regional and local economies. In terms of empirical findings, some authors have studied a specific aspect of spillovers, such as trade (Rose et Spiegel, 2009), GDP (Firgo, 2019; Fett, 2021; Chen, 2023), job creation (Mabugu & Mohamed, 2010; Al-Dosari, 2020; Thabi 2024), Foreign Direct Investments (Soussane & Ibourk, 2024), or even stock markets and sustainable growth (Gopane & Mmotla, 2019; Ferris et al., 2022). Some research even studied the distinction in terms of effect between developed and developing countries (Zimbalist, 2010; Ren & Li, 2019; Al-Dosari, 2020; Fett, 2021; Chen, 2023). Other studies have focused on the cost side (Flyvbjerg & Stewart, 2012; Zimbalist, 2015; Baade & Matheson, 2016). Although the majority of scientific literature concludes that there are benefits, there are also more critical views and questions about the economic virtue of mega sporting events (Zimbalist, 2015; Baade & Matheson, 2016; Barrios et al., 2016; Viana et al., 2018).

Nevertheless, a growing research gap exists: previous studies tend to focus on singular aspects of the economic impacts of hosting mega sporting events, such as trade, GDP growth, or FDI inflows, rather than adopting a comprehensive and holistic approach. This fragmented perspective limits the ability to fully assess the potential economic benefits and risks, leaving policymakers without a well-rounded understanding to guide their decisions about hosting such events. Moreover, by considering both the economic impacts and the costs, a more balanced understanding can emerge to better inform the potential future benefits and risks for countries considering applying for these tournaments.

Given the variety of tournaments available, the study will focus on mainly two major sport events: the FIFA World Cup and Summer Olympic Games. These two competitions were chosen because they are the ones that require the host countries to put together the most solid bidding documents, a long preparation period and a huge amount of investment. For this thesis, a quantitative methodology has been chosen. Built on literature-based hypotheses, four statistical models have been designed to understand the impact on four different economic variables : GDP growth rate, exports, employment rate and net FDI inflow. Data and statistics from previous competitions have been gathered to inform about macroeconomic effects of these tournaments. Using linear regression models, a panel data analysis was conducted across several model specifications. Different subsamples are covered by models (1) through (3) : host and candidate countries, hosts only, and developed countries only. Models (4) through (6) cover respectively the same subsamples, but they add lag and lead variables to account for anticipation and legacy effects. As a result, 24 regressions were run, 6 on each of the dependent variables. At the same time, literature has provided a theoretical basis for the thesis and has drawn up guidelines on the major and most widely-identified impacts and costs of mega sporting competitions. More details will be provided in Chapter 3.

The main findings of the research conducted suggest that macroeconomic impacts vary significantly depending on the country's level of development, the timing of the measurement, and the indicator in question. Regarding the GDP per capita growth rate dependent variable, the study concludes to a negative impact of hosting, particularly for developing nations. As for the employment rate, there is a significant and large positive effects of hosting a major tournament, and even more so for developed countries. When it comes to FDI net inflow, the conclusion is that hosting has a positive and significant impact. Lastly, the study shows mixed results on countries' exports. However, it seems that hosting a mega-event has a very strong positive and significant effect on the trade balance of developed economies.

The paper begins with an overview of the theoretical and empirical scientific literature on economic impacts and spillovers of previous World Cups and Olympics. It will then dive more into details of the methodology applied and data used to carry out this research. The following section will present the results and findings of the research as well as interpreting them. This thesis will then present a chapter dedicated to the discussion of these results. Last but not least, there will be a final chapter to conclude the thesis.

2. Literature Review

Major sporting events are watched by millions of people around the world. If these people are interested in the tournament, the economic spin-offs and budgetary implications are such that governments and researchers regularly study the short- and long-term effects of these events to understand their potential benefits, challenges, and overall impact on the host country's economy.

But first and foremost, what is a “mega sporting event” ? Several definitions exist, each adding its own element to the general meaning of the word. While Maennig & Zimbalist (2012) define it simply as a “large or great sporting event”, Parent (2009) adds a few conditions: these “must-see” events typically attract worldwide publicity, involve over one million participants in athletes, volunteers, viewers, etc. and have capital costs exceeding $500 million. Moreover, they play a crucial role in urban development strategies, place promotion, and attracting mobile capital and people (Hall, 2006). In addition, mega events leave behind social, economic, and physical legacies that affect host communities long after the event concludes (Hall, 2006; Preuss, 2015).

This section will explore the studies that have already been carried out, looking in particular at the theoretical models employed, the empirical findings resulting from research, and, finally, the hypotheses that this paper will cover.

2.1 Theoretical Models

The objective of this section is to examine the methodology, models and conclusions of a few relevant studies whose results, among others, will be discussed in the next section.

Rose & Spiegel (2009) have studied what they call the “Olympic Effect”. The aim was to understand the impact not only of hosting but also of simply bidding to host the Olympics on a country's trade balance. Based on the assumption that hosting the Olympics puts the country in the spotlight and therefore stimulates global demand for its exports, they used the “gravity” model of international trade. The goal of the latter is to represent the flow of bilateral trade between two nations as a function of their respective economic "masses" and distance from one another :

$$ln(X_{ijt}) = \beta_0 + \beta_1 ln(D_{ij}) + \beta_2 ln(Pop_{it}) + \beta_3 ln(Pop_{jt}) + \beta_4 ln(GDPpc_{it}) + \beta_5 ln(GDPpc_{jt}) + \beta_6 Cont_{ijt} + \beta_7 CU_{ijt} + \beta_8 Lang_{ij} + \beta_9 RTA_{ijt} + \beta_{10} Border_{ij} + \beta_{11} Islands_{ij} + \beta_{12} Area_{ij} + \beta_{13} ComCol_{ij} + \beta_{14} Colony_{ijt} + \beta_{15} EverCol_{ij} + \beta_{16} SameCtry_{ijt} + \gamma_O Olympics_{it} + \gamma_S Summer_{it} + \gamma_W Winter_{it} + \varepsilon_{ijt}.$$

where *i* represents the exporting country, *j* represents the importer, *t* represents time, *ln(·)* represents the natural logarithm operator and the variables are defined in Table 1 – Appendix 1.

The research was conducted on 196 territories with annual observations between 1950 and 2006. The goal is to estimate the “Olympic Effect” either by estimating the effects of the Summer and Winter games on their own, in which case $\gamma_O = 0$ is set, or by estimating a single common effect of hosting either type of games, in which case $\gamma_S = \gamma_W = 0$ is set. The conclusion of their study is that the "Olympic Effect" does exist, is significant and economically large. Countries that have hosted the Summer Olympic Games see a permanent 36% increase in their exports. This does not seem to be the case for the Winter Games, as the results are not significant.

Another interesting study is the one conducted by Firgo (2019). In his research, he analyzed the effect of hosting the Summer or Winter Olympics on the regional GDP per capita in the short- and long-run. The first thing Firgo does to estimate this impact is to use the ratio of GDP per capita in region *i* relative to national GDP per capita of country *c* that region *i* belongs to:

$$GDP_{it} = (GDP\ reg_{it} / GDP\ nat_{ct}) \times 100$$

In the study, the group of treated regions are the Olympics hosts while the unsuccessful candidate regions are the control group. The econometric model used in the analysis is as follows:

$$GDP_{iot} = \alpha_i + \sum_{\substack{\tau=-5 \\ \tau \neq 0}}^{12} \beta_\tau\, Hosting_{io} \times Phase_{o\tau} + \sum_{\substack{\tau=-5 \\ \tau \neq 0}}^{12} \gamma_\tau\, Phase_{o\tau} + \delta_{ot} + X'_{iot}\theta + \epsilon_{iot}$$

where i denotes region, o specific Olympic Games, and t year. The dummy variable $Hosting_{io}$ is equal to 1 if region i is host of one of the Olympic Games o and is zero otherwise. $Phase_{o\tau}$ is equal to 1 if region i is a host or applicant of Olympics o and the period equals τ . In this model, the region fixed effect is α_i. γ_τ is a phase fixed effect and there is an individual fixed effect, δ_{ot}, for each Olympic Games by year. Additional controls is included in X_{iot} and θ is the corresponding vector of parameters to be estimated while ϵ_{iot} is an error term. The reason why the sample is restricted between $\tau = -5$ and $\tau = 12$ is that it corresponds to 5 years before the election of the host and 5 years after the event has taken place which ensures that the sample contains a reasonable minimum number of host and control regions.

While hosting the Winter Olympics doesn't have any positive effect on *GDP*, the result of the study shows that, the year before and the year in which the event takes place, hosting Summer Olympic Games significantly raises *GDP* by 3.3 and 3.6 %-points. As for the longer-term effect, the study found similar coefficients but not significant ones.

The first two studies presented only looked at the impact of the Olympic Games, but in the research carried out by Chen (2023), both the Olympics and the FIFA Football World Cup are analyzed. The model is also based on GDP as the main dependent variable and is presented as "the most intuitive economic indicator used to measure economic changes". The regression is based on a Difference-in-Differences (DID) model where the treatment group consists of countries hosting the event, and the control group consists of neighboring countries that did not host:

$$Growth_{it} = \alpha_0 + \alpha_1 WorldCup/Olympics + \alpha_2 Control_{it} + Year_t + v_i + \mu_{it}$$

where i represents the country and t the year in which the event is held. Under *Growth* there is GDP, which measures local economic growth. The independent variable is WorldCup/Olympics that equals 1 if a country hosts the WC/Olympics and equals 0 for neighboring countries that did not host it. Several control variables are selected in the study such as *Population* (percentage of urban population), *GNI* (average purchasing power), *Service* (percentage of the tertiary sector) and *Employment* (employment rate). Chen (2023) designed a second equation in order to account for the mediating impacts of increased employment rates and the development of the service industry:

$$Growth_{it} = \alpha_0 + \alpha_1 WorldCup/Olympics*Employment/Service + \alpha_2 Control_{it} + Year_t + v_i + \mu_{it}$$

Following the analysis, two main conclusions are drawn by the author. The first one is that local GDP is positively and significantly impacted by both the Olympics and the World Cup. The second one is that, for the Olympics, the economic impact is much greater in developing nations. But when it comes to the World Cup, the outcomes are the opposite.

Viana et al. (2018) also conducted a study based on the impact of hosting the FIFA World Cup on GDP per capita, using the synthetic control method. However, compared to other studies, their conclusion is that the event is not statistically associated with economic development and growth. The statistical equation presented in the research is as follows:

$$Y_{ct} = \alpha_0 + \alpha_1 * WC_{ct} + \Theta X_{ct} + \lambda_c + \lambda_t + \mu_{ct}$$

where c denotes the country and t denotes time. Therefore, Y_{ct} is the economic outcome for country c at time t and WC is a dummy variable equal to 1 if the country has hosted the World Cup. X_{ct} is a vector of controls while λ_c and λ_t are country and time fixed effects, designed to control for country unobservable characteristics and for yearly differences between the outcome of interest. The parameter of interest, α_1, is defined as "the average gain over time in the countries not hosting a World Cup minus the average gain over time in the country hosting the World Cup".

The advantage of this model is that it prevents the covariance $COV(WC_{ct}, \varepsilon_{ct}) \neq 0$ by utilizing data from several different nation that did not host a World Cup in the years preceding or following the tournament. The goal is to use them as counterfactuals for the country being researched. Thanks to the difference-in-differences (DID) setup, bias that could arise from permanent distinctions between the World Cup host nation and other nations used as counterfactuals would be removed. And the same would apply to bias from comparisons over time within the World Cup host nation that might be the consequence of time trends unrelated to the event itself.

However, one issue remains. In order to ensure the validity of the approach, one main hypothesis must hold true : both treated and control countries must have exactly the same trends in the absence of the event. To overcome this gap in the research, Viana et al. (2018), in their reasoning, took advantage of the Synthetic Control Method (SCM) developed by Abadie et al. (2010). This method, presented shortly, makes a distinction between Y_{ct}^N which is the outcome observed for region c at time t in the absence of the World Cup and Y_{ct}^I which is the outcome observed when the World Cup is organized, called the intervention. The effect of the intervention is measured by $\alpha_{ct} = Y_{ct}^I - Y_{ct}^N$ while D_{ct} is an indicator that takes value one if unit c is exposed to the intervention at time t, and zero otherwise. Therefore, this equation of the observed outcome follows : $Y_{ct} = Y^N_{ct} - \alpha_{ct}D_{ct}$. One challenge remains in estimating Y^N_{ct}, which can be done with the following model :

$$Y^N_{ct} = \delta_t + \theta_t Z_c + \lambda_t \mu_c + \varepsilon_{ct}$$

Additionally, Fett (2021) also studied the economic boost that countries can get from hosting a FIFA World Cup. More specifically, the research is centered around the question of whether the effect is different for emerging countries or developed ones. The statistical analysis is based on the impact of the WC on the annual GDP per capita growth rate y or its three-year-moving geometric average $\bar{y}$. The regressions presented are :

$$(1)\ y_{i,t} = \mu + \alpha_i + \Phi FIFA\ Host_{i,t} + \varphi z FIFA\ Host_{i,t} + \beta D_{i,t} + z\theta D_{i,t} + \gamma X_{i.t} + z\pi X_{i.t} + \nu_t + \varepsilon_{i,t}$$
$$(2)\ \bar{y}_{i,t} = \mu + \alpha_i + \Phi FIFA\ Host_{i,t} + \varphi z FIFA\ Host_{i,t} + \beta D_{i,t} + z\theta D_{i,t} + \gamma X_{i.t} + z\pi X_{i.t} + \nu_t + \varepsilon_{i,t}$$

where t denotes the year and i denotes the country. The particularity of this paper is that it includes an interaction term z which is 1 if the country's economy is considered as advanced and 0 if it is considered as developing. While μ is the constant, α_i and ν_t are respectively the country- and time-specific effects. The independent variable $FIFA\ Host_{i,t}$ is equal to 1 if country i organizes the World Cup in year t, 0 otherwise. Therefore, the World Cup effect is displayed by Φ. If the country is regarded as "developed", then z=1 and φ gets into action. The effects of the pre- and post-event phases on the GDP per capita growth rate are shown by the coefficients β and θ, respectively for the developing and advanced countries. Finally, coefficient vectors γ and π represent the effects of the continuous variables.

The results of the study, based on data from 1986 to 2019, show that the advanced countries see a World Cup effect of +0.72 percentage points on their annual average GDP per capita growth rate while developing economies suffer a -0.9 decrease in percentage points.

2.2 Empirical Findings on Economic Spinoffs

Many studies have examined the short-term and long-term impacts of hosting mega sporting events in a country. The results of these studies diverge, not only in terms of the magnitude of the effects, but also in terms of their nature. While researchers frequently highlight significant economic windfalls, some academic studies, particularly ex-post evaluations, offer more cautious or even negative assessments. This section reviews the findings across various studies, examining the short-term and long-term economic effects, the influence of the host country's development level, the cost of hosting these events and the methodological challenges inherent in the research.

2.2.1 Short-term economic momentum

Arguments supporting the hosting of mega-sporting events often anticipate a boost in short-term economic activity. These events are expected to draw large numbers of visitors which will eventually lead to increased spending and temporary job creation (Mabugu & Mohamed, 2010;

Al-Dosari, 2020; Thabi 2024). The preparatory phase itself involves significant investment in infrastructure and facilities, stimulating the construction industry and related employment. Activities directly associated with the event, such as the construction of sporting facilities, development of public spaces, and accommodation for visitors, are considered key elements that drive increased spending by visitors, create employment opportunities, and generate tax revenue (Al-Dosari, 2020). Moreover, a country simply announcing his candidacy to host the Olympic Games can also experience a temporary positive economic impact (Brückner & Pappa; 2011).

Regarding the short-term economic spin-offs, Firgo (2019) discovered that regional GDP per capita increases by 3 to 4% in the year of the event and the year prior. Tourist spending could also be added to the category of immediate benefits (Baade & Matheson, 2016). Thabi (2024) agrees, finding that these events frequently produced notable immediate economic advantages, such as higher earnings from tourism and the creation of jobs. For example, the study on the anticipated impacts of the 2022 FIFA World Cup in Qatar suggested the event was likely to raise employment levels and lead to growth in income and business expansion, especially in tourism industries, due to the expected influx of foreign visitors (Al-Dosari, 2020). Bibolov et al. (2024), while also studying the 2022 World Cup, found that the short-term economic benefits were similar to those studied for previous World Cups, i.e. 1% of GDP. Results show that visitor spending and broadcast revenues are two of the main sources of income. Long-term contributions were also highlighted in the study, especially the improvement in high-level infrastructures and the visibility brought by the World Cup. Another case study is the 2010 Football World Cup in South Africa. Peeters et al. (2014) studied the impact on tourism in South Africa immediately following the WC. Approximately 220,000 additional people from non-Southern African Development Community (SADC) nations arrived in South Africa during the event, and 300,000 more did so throughout the year. However, these figures are less than what the event's organizers had anticipated. Mabugu & Mohamed (2010) have also examined the consequences of this competition. Thanks to an ex ante analysis using a fiscal social accounting matrix model, they found that the South African GDP and imports should have been positively influenced. It also appears that the government's 2010 FIFA WC expenditures benefited capital owners more than labor owners.

The economic effects on investment and stock markets were also studied. Ferris et al. (2022) found that the host country’s equity market is positively influenced in the short run by the announcement of the Olympic Games. However, although these effects have a favorable effect on GDP, they usually fade quickly after the event, indicating that economic momentum is just temporary. Gopane & Mmotla (2019) also studied the stock market reaction to hosting major sport competition. They compared South Africa's successful bid with Morocco's unsuccessful bid to host the 2010 FIFA WC. Their results indicate that the stock market reacted negatively to the bid loser (Morocco) and favorably for the bid winner (South Africa). Regarding short run inward FDI impact, Soussane & Ibourk (2024) found that there is a significant average increase of $4.33 billion stemming from the World Cup. The findings show that while well-governed nations draw foreign direct investment (FDI) in secondary and tertiary sectors, poorly governed nations draw inward FDI mainly in primary sectors.

However, some studies indicate that the costs incurred in the short term are often significantly greater than the revenue generated during the event itself (Baade & Matheson, 2016; Agrawal, 2025). A review by Barrios et al. (2016) found that increased economic activity resulting from the event is routinely dwarfed by additional public budgetary commitments. Additionally, arguments regarding multiplicative effects and increased revenues tend to be exaggerated according to Matheson (2006) and Barrios et al. (2016). On their side, Moss et al. (2019) failed to show the existence of a tangible tourism effect of hosting the Olympics in the short run. In summary, despite expectations of increased economic activities, these increases are sometimes smaller than predicted in ex-ante studies, and their magnitude can depend on specific factors related to the host region and the event's timing (Peeters et al., 2014; Barrios et al., 2016).

2.2.2 Long-term economic benefits

The potential for long-term economic benefits, often referred to as "legacies", is a key justification for hosting mega-sporting events (Baade & Matheson, 2016). These benefits are typically expected to arise from improved infrastructure, increased trade and investment, enhanced national image, and sustainable growth in tourism (Mabugu & Mohamed, 2010; Al-Dosari, 2020; Alalawneh et al., 2021; Agrawal, 2025). The development of infrastructure, such as new stadia, transportation systems, and accommodation, is seen as a potential lasting asset that can contribute to economic growth (Liu, 2013; Patrik, 2017; Alalawneh et al., 2021).

Hosting the Olympics, for instance, has been associated with an increase in exports of over 20 percent in a research conducted by Agrawal (2025). Indeed, the organization of a tournament of this magnitude could potentially signal a country's management capability and pave the way for future investment and trade. Rose & Spiegel (2009) found that not only hosting, but also bidding for major sporting events has a positive effect on a country's exports. Those who hosted the Olympics saw a permanent 30% increase in trade. They therefore conclude that it is the signal sent when bidding to host the Games that induces the positive effects. Brückner & Pappa (2015) draw a similar conclusion, saying that investment, consumption and output in a candidate country increase 9 to 7 years before the event, regardless of whether the country organizes the competition.

The employment rate and the development of public sector are also positively influenced according to Chen (2023). Hosting the Olympic Games can also generate positive repercussions on investment, consumption, and output responses not only during, but even long before the hosting of the Games (Brückner & Pappa, 2011). Regarding tourism, the sector sees an increase and a positive impact of the Olympic Games, provided the organization is well thought-out, with long-term planning and effective promotional strategies (Tsiotsou & Gouri, 2010). In a study on the 2006 WC, Alalawneh et al. (2021) studied the nexuses between infrastructure spending growth, tourism revenues, and foreign direct investment. Results showed that these factors have a long-term cointegrating connection.

Several case studies of past mega events point in the same direction. For example, the 2000 Olympics in Sydney were analyzed by Madden (2002). More specifically, the research focused on a forecast of increase in economic activity in the New South Wales region over a 12-year period. Based on data from the Games, the conclusion materialized in a potential GDP growth of 0.3%. However, the effect on other states of Australia is yet to be demonstrated. Moreover, the degree to which the Olympics encouraged tourism and the response of the labor market has an impact on post-event growth. In 2021, Alalawneh et al. looked at how Germany's economy grew in response to hosting the FIFA World Cup in 2006. This competition was also the subject of research by Maennig (2007). Both studies concluded that Germany experienced a boost in retail, tourism and employment as a result of the tournament, but not in any really significant way in the longer run. Nevertheless, stadiums' novelty effect, enhanced national perception, and feel-good impact are factors that had a tremendous positive effect on Germans' willingness to pay and consumption.

However, the realization of these long-term benefits is heavily contingent on the host country's ability to effectively capitalize on the opportunities presented by the event, which many countries fail to do (Agrawal, 2025). Some studies indicate that while short-run positive effects on host regions' GDP per capita might occur, the long-run effects are not always statistically robust (Firgo, 2019). Viana et al. (2018) reached a similar conclusion following their study of the GDP of countries that hosted the WC : “World Cups are not statistically associated with development and economic growth”. The study by Ferris et al. (2022), which examined a large sample of events over 34 years, found that host countries of the Summer Olympics experienced higher GDP growth rates in the three years prior to the event compared to the rest of the world or competitors, but this effect rapidly diminished after the event without sustainable growth in subsequent years. Zimbalist (2015), meanwhile, is also highly critical, finding that no net economic gain comes from hosting a World Cup or Olympic Games. Others believe that, although there are obvious short-term benefits, there is no positive influence in the longer term, notably because of cost overruns and underutilized infrastructure (Thabi, 2024). Overall, the empirical evidence often struggles to substantiate a clear, consistent long-term positive relationship between hosting mega-events and increased economic activity or sustainable growth (Barrios et al., 2016).

2.2.3 The importance of context: developed and developing countries

The economic impacts of hosting mega-sporting events appear to vary significantly depending on the economic context of the host country. In some studies, a distinction in terms of benefits is therefore made between developed and developing countries. Indeed, under some conditions, hosting important sport competitions might boost developing nations' economies more (Chen, 2023). Ren & Li (2019) come to the same conclusion, saying that “countries with weak economic fundamentals significantly benefit more from hosting mega sporting events”, a statement supported by Zimbalist (2010). Ferris et al. (2022) propose that hosting a mega-event could signal institutional improvement for these countries, a factor known to be critical for economic growth.

However, research by Fett (2021) goes in the opposite direction, suggesting that developing countries that hosted the World Cup saw their GDP growth rate decreased by 0.9 percent, while developed countries saw an increase of 0.6 percent. Developing countries indeed may face greater economic challenges compared to their developed counterparts (Al-Dosari, 2020). The high costs associated with necessary infrastructural developments, especially for countries lacking pre-existing facilities, can be particularly burdensome for developing economies (Burgo & Cromartie, 2018). Müller & Gaffney (2018) indeed found that the political and economic contexts have the most influence on mega-event impacts. As an example, countries with more market-led economies were better equipped to use the event for urban development. Ren & Li (2019) also support this view, stating that a strong legal and regulatory framework is necessary to maintain the events' beneficial legacy effect. Moreover, well-governed countries experience an average increase in inward FDI of $10.5 bn, while the overall average is $4.33 bn (Soussane & Ibourk, 2024).

2.2.4 Cost of hosting mega sporting events

Although these major sporting events unleash passions, they are often accompanied with high costs. Baade & Matheson (2016) categorized them into 3 groups : general infrastructure (housing, transportation, etc.), sport infrastructure, and operational costs (security, ceremonies, administration, etc.). Although upgrading infrastructure is often the largest part of the budget (Barrios et al., 2016; Al-Dosari, 2020), the costs of acquiring land and manufacturing goods and services for the event should not be forgotten either (Al-Dosari, 2020). All these expenses can represent an opportunity cost and a potential detour of public funds that would have been better allocated to other sectors of the economy (Al-Dosari, 2020; Thabi, 2024; Agrawal, 2025). Li (2013) also points out that, in the literature, few studies take into account the impact of facilities construction and physical legacies.

Overall, organizing such events is extremely costly as they very regularly go over the budgets initially allocated to them. It has even been demonstrated that every Olympics since 1960 has exceeded its budget (Flyvbjerg & Stewart 2012). China, for example, spent no less than $40 billion on the 2006 Beijing Olympics (Zimbalist, 2015). This is less than the Winter Games in Sochi, which cost Russia $50 billion. On their side, Flyvbjerg et al. (2020) have gathered data on the costs of hosting the Olympics and reported that the Games in Rio and London each amount to around $14 billion. In 2014, Brazil reportedly spent $20 billion on the FIFA World Cup (Fett, 2020). But all these figures bear no comparison with the $220 billion invested by Qatar to host the 2022 FIFA World Cup (Bibolov et al., 2024).

2.2.5 Methodological challenges in research

Analyzing the economic impact of mega-sporting events is fraught with methodological challenges, leading to the mixed findings observed in the literature (Ferris et al., 2022; Thabi, 2024). One significant challenge is accurately measuring the incurred benefits that would not have occurred in the absence of the event (Agrawal, 2025). Some studies also note that "soft" benefits like enhanced international recognition, expanded business networks, or exposure to new ideas are hard to quantify and are often not captured in economic impact studies (Ferris et al., 2022).

Different studies employ various methodologies, contributing to the variation in results. Some studies utilize ex-ante analyses, which predict potential impacts, often criticized for exaggerating benefits (Matheson, 2006; Rose & Spiegel, 2009). Others conduct ex-post evaluations to assess actual impacts after the event (Matheson, 2006; Barrios et al., 2016). Methodologies range from descriptive research designs and case studies (Al-Dosari, 2020; Baim et al., 2024) to quantitative approaches like univariate and multivariate analyses for GDP growth (Ferris et al., 2022), Difference-in-Differences models (Chen, 2023), fiscal social accounting matrix models (Mabugu & Mohamed, 2010), and synthetic control methods (Viana et al., 2018).

2.3 Research Hypotheses

Despite the sometimes contradictory nature of previous studies, 3 hypotheses, based on the literature review in the field, were chosen to conduct the research of this paper:

Hypothesis 1 : Hosting mega sporting events generates economic benefits, including increases in GDP growth rate, exports, FDI inflow, and employment rate.

This hypothesis is based on the ideas and research of Rose & Spiegel (2009), Tsiotsou & Gouri (2010), Brückner & Pappa (2011, 2015), Firgo (2019), Bibolov et al. (2024), Chen (2023), Thabi (2024) and Soussane & Ibourk (2024).

Hypothesis 2 : Mega sporting events generate greater economic benefits for developing countries compared to developed countries.

This hypothesis is based on the ideas and research of Zimbalist (2010), Ren & Li (2019), Ferris et al. 2022) and Chen (2023).

Hypothesis 3 : Hosting mega sporting events requires substantial investments and carries significant economic risks. Nonetheless, infrastructure investments can positively impact GDP, employment rates, FDI inflows, and even exports. Therefore, while lower hosting costs, enabled by pre-existing infrastructure and efficient event management, enhance the likelihood of achieving net economic benefits, strategic infrastructure development can also generate positive macroeconomic spillovers.

This hypothesis is based on the ideas and research of Tsiotsou & Gouri (2010), Flyvbjerg & Stewart (2012), Li (2013), Zimbalist (2015), Baade & Matheson (2016), Barrios et al. (2016), Matheson (2018) and Thabi (2024).

3. Methodology and Data

3.1 Research Objectives

The aim of this paper is to better understand the economic impact of hosting a mega sporting event and more specifically, a FIFA World Cup or the Olympic Games. In order to do so, 4 economic indicators were chosen to act as dependent variables to better understand the overall economic spinoffs. A quantitative methodology will be used to investigate the implications of those events on the host country's GDP growth rate, trade balance, employment rate and FDI inflow, before and after the grand opening. Statistical regression models and analysis of results will be carried out using the Rstudio modelling tool.

These events are increasingly scrutinized by the whole world, but require immense costs to host, and it seems that fewer and fewer countries are willing to take up the challenge. Therefore, the overall objective is to analyze if these events have a positive, and long-lasting, effect on economic balance, through these four indicators.

The question that this thesis seeks to answer is : "To what extent does hosting a mega sporting event affect a country's economic performance, and how can historical data inform the potential future benefits and risks for countries considering applying for these tournaments ?". More specifically, the first objective of this study is to take a more holistic view and explore impacts of previous tournaments on host country's GDP, employment rate, FDI inflow, and trade balance. The second one is to use the cost variable to better understand the role that it plays in terms of economic success or failure, in order to help policy makers make informed decisions about their country's potential applications. Lastly, the model will help us to figure out if there are differences in terms of magnitude of spinoffs between developed and developing countries.

3.2 Statistical Model

Four similar statistical models were designed to understand the effect of hosting a FIFA World Cup or Summer Olympics on the dependent variables : GDP, employment rate, FDI and trade. The choice of these variables is not only designed to give a more global view of the economic impact of a mega-event, but is also based on previous literature and studies in the field. The relationship between these major competitions and GDP has been studied at length, notably by Mabugu & Mohamed (2010), Viana et al. (2018), Firgo (2019), Fett (2021), Bibolov et al. (2022) and Chen (2023), who took it as the central dependent variable in their models. Although the impact on the employment rate is not often used as a dependent variable, it does appear as an inherent issue in many research (Maennig, 2007; Li & Blake, 2008.; Hagn & Maennig, 2009; Langer et al., 2017; Chen, 2023; Thabi 2024). Additionally, Foreign Direct Investment inflows have been studied by numerous researchers, including Brückner & Pappa (2011), Baade & Matheson (2016), Alalawneh et al. (2021) and Soussane & Ibourk (2024). A natural logarithm is applied on this variable allowing for a more consistent and interpretable relationship with the other variables. Finally, the Trade variable, representing a country's exports, comes from the statistical regression employed by Rose

& Spiegel (2009). As it was done in their study, a natural logarithm is also applied to the variable to reduce its large variability across countries and over time. The models are presented as follows:

$$GDP_{it} = \beta_0 + \beta_1 Hosting_{it} + \beta_2 (Hosting_{it} \text{ x } Dev_i) + \beta_3 ln(IC_{it}) + \beta_4 Controls_{it} + \epsilon_{it}$$

$$ER_{it} = \beta_0 + \beta_1 Hosting_{it} + \beta_2 (Hosting_{it} \text{ x } Dev_i) + \beta_3 ln(IC_{it}) + \beta_4 Controls_{it} + \epsilon_{it}$$

$$ln(FDI_{it}) = \beta_0 + \beta_1 Hosting_{it} + \beta_2 (Hosting_{it} \text{ x } Dev_i) + \beta_3 ln(IC_{it}) + \beta_4 Controls_{it} + \epsilon_{it}$$

$$ln(Trade_{it}) = \beta_0 + \beta_1 Hosting_{it} + \beta_2 (Hosting_{it} \text{ x } Dev_i) + \beta_3 ln(IC_{it}) + \beta_4 Controls_{it} + \epsilon_{it}$$

Where *i* denotes the country and *t* denotes the year.

Dependent variables :

- GDP : Gross Domestic Product per capita growth rate
- ER : Employment to population ratio, population over 15 years old
- FDI : Foreign Direct Investment net inflow in millions USD 2023
- Trade : Real FOB exports in millions USD 2023

Explanatory variables :

- Hosting : Equal to 1 if the country has hosted the WC or Summer Olympics, 0 otherwise
- Dev : Equal to 1 if the country is considered as developed, 0 otherwise
- IC : Infrastructure (general and sport) costs
- Controls : Vector of controls
- ϵ : Error term

As for the explanatory variables, they will enable us to understand, among other things, the role played by the infrastructure costs of the tournaments on these economic indicators. The impact of costs is often poorly understood and analyzed, as demonstrated by Li (2013), which is why it is important to include them in our model. The separation between costs is based on the work of Baade & Matheson (2016). Although they classified them into 3 groups, the model excludes operating costs to avoid multi-collinearity with the hosting variable but combines general and sports infrastructure into a single category due to insufficient data to keep the classification intact.

The explanatory variables will also allow us to understand whether there is a difference between developed and developing countries. This difference has been central to many studies and authors who have investigated the impact of major sporting competitions (Zimbalist, 2010; Ren & Li, 2019; Fett, 2021; Ferris et al., 2022; Chen, 2023). Given that these studies sometimes have contradictory results on the benefits brought to developing countries, it is important to investigate in our model whether there is a significant difference between the two. The interaction term *Dev* is based on ideas developed by Fett (2021). It is equal to 1 if the country is considered as "advanced". If that is the case, then β_2 comes into effect and displays the impact of hosting a mega sporting event in a developed country. In short, β_1 represents the effect of hosting for developing countries and $\beta_1 + \beta_2$, the total effect of hosting for developed countries.

Lastly, a vector of controls incorporate other relevant variables to take into consideration factors that influence the dependent variable but which are not under study. This vector of controls is generally included in the statistical models of previous research and in particular those of Viana et al. (2018), Firgo (2019) and Fett (2021).

3.2.1 Hypotheses tests

Consequently, and based on the variables in our model, the statistical tests of the hypotheses presented in the previous section can be written as follows:

H1 : The goal of this statistical test is to see whether there is an Olympic and World Cup effect. If $H_{0,1}$: $\beta_1 = 0$ can be rejected at a significant level (10, 5 or 1%), then there is, at a minimum confidence level of 90%, a definite economic effect on the dependent variables of these competitions.

H2 : The aim of the statistical test associated with this hypotheses is to see if there is a difference between developed and developing countries. If $H_{0,2}$: $\beta_2 = 0$ cannot be rejected at a significant level of at least 10%, there is no significant difference in economic impact between the two types of country.

H3 : The test has been designed to assess the impact of costs on the economic success of a sporting event. The hypothesis is that the costs are likely to have an effect on the 4 macroeconomic indicators. At a confidence level of at least 90%, if $H_{0,3}$: $\beta_3 = 0$ can be rejected, there is a significant impact of the costs variables on the economic outcomes of the events.

3.2.2 Treatment method

While Olympic and FIFA World Cup hosts are the group of treated regions, the unsuccessful candidate countries make up the group of control regions. The rationale behind this method is that when self-selection in the bidding process is not taken into consideration, significant selection bias occurs in the empirical analysis, as demonstrated by Billings and Holladay (2011), Maennig and Richter (2012), and Langer et al. (2018). This paper will therefore compare the host countries, the treated group, with the unsuccessful applicant countries. These countries will constitute the control group and will enable us to circumvent possible biases, given that they are countries with similar capacities and similar expectations in terms of economic spin-offs, and which have also made significant efforts to be selected as hosts. This approach has been used in previous research (Rose & Spiegel, 2009; Firgo, 2019). According to Firgo (2019), regions that withdrew their applications should not be included in the control group, as they could have corrected their cost/benefit analysis during the selection process. In this paper, these countries will therefore be excluded from the analysis, as they may not have made as much effort as the other candidate countries to host the event.

As bidding for the Olympics and the FIFA World Cup is a public process, data on the bidding countries is publicly available, especially on the IOC and FIFA website. For a detailed view of each FIFA World Cup host and the candidates to host it, see Table 2 – Appendix 2. For those of the Summer Olympic Games, see Table 3 – Appendix 2.

To estimate the model, we employ the Ordinary Least Squares (OLS). This is a widely used method for linear regression analysis in the context of panel data. This approach is consistent with the methodology used by Rose & Spiegel (2009) and Fett (2021) in their studies on the economic impact of hosting mega-events.

3.2.3 Different model specifications

To assess the robustness and depth of the relationship between hosting and various explanatory variables, this study will estimate several model specifications. Labeled from (0) to (6), they can be found in Table 4. Specification (0) includes only the control variables to establish a baseline and observe the explanatory power (R^2) of the model in the absence of key variables of interest. Model (1) to (3), often referred to, later in the research, as the "classic" models, are built on the same regressions presented above, except that the associated dataset changes. Model (1) includes both host and candidate countries and serves as the main specification. Model (2) focuses only on countries that have hosted at least one mega-event, which allows the statistical research to assess correlations within a more homogeneous sample that has experienced hosting. On the other hand, model (3) restricts the analysis to developed host and candidate countries. This specification enables us to explore whether the dynamics differ in high-income contexts, where institutional, financial, and political environments may be more stable and comparable.

As for the "lag and lead" models, as they are often referred to in this research, they mirror models (1), (2), and (3) respectively in terms of specifications but introduce lagged and lead variables. A lag variable is a binary variable that equals 1 in the years preceding the hosting of the event, therefore corresponding to a pre-event phase. The same applies for lead variables, except that they test the post-event phase. Models that analyze the pre- and post-event phases have already been tested in the literature, notably by Maennig & Richter (2012), Nitsch & Wendland (2017), Firgo (2019) and Fett (2021). These variables are based on the idea that not all benefits and effects necessarily materialize in the year of the event, but may appear before or after it. According to Barrios et al. (2016), the impact of a mega sporting tournament can materialize from four years before to four years after. Even though the host application announcement can already have a signaling effect (Rose & Spiegel, 2009; Brückner & Pappa, 2015), in this study, as in Firgo's (2019) research, the treatment period will range from 7 years before to 5 years after the year of the competition. The lag variables coefficient estimate therefore range from β_{t-7} to β_{t-1}. On the other hand, the lead variables range from β_{t+1} to β_{t+5}. The beginning of our lag variables represents the election year of the host country for a World Cup or Olympics. The reasoning behind this treatment period is that investment-induced effects may already be present during the (usually) seven-year period between the host city election and the actual event, since investment in infrastructure occurs during this time. Likewise, the indication of being chosen as the host city may lead to pre-event increases in trade, tourism, FDI, and consumption (Firgo, 2019). Overall, this temporal structure allows testing for anticipation effects, while the 5-year post-event period enables analysis of legacy effects, whether hosting a mega-event has an observable impact in the years that follow. Altogether, these different specifications provide robustness to the findings and help uncover both static and dynamic relationships between hosting and its potential determinants and consequences.

Table 4 : Table of different model specifications

Model	Host and applicant countries	Host countries only	Developed countries only	Lag and lead variables
(0)	YES			
(1)	YES			
(2)		YES		
(3)			YES	
(4)	YES			YES
(5)		YES		YES
(6)			YES	YES

Source : Table prepared by the author

3.3 Data Collection

The data collection will align with the availability of reliable and comparable data for the chosen variables. The first World Cup to be included in the analysis will be that of 1990 in Italy, while the first Summer Games will be those of 1992 in Barcelona. This period marks a significant improvement in the quality and availability of economic and financial data from international organizations like the International Monetary Fund (IMF) and World Bank. Additionally, events before 1990 may reflect outdated contexts as increased globalization and the prominence of mega sporting events in their modern form accelerated around this period. Different trade patterns, labor market structures, or levels of globalization could make comparisons with more recent events less meaningful and represent an obsolete economic environment. This sample size was also used in the study by Firgo (2019). Indeed, according to Short (2018), Olympic Games have generally been linked to significant regional change from the 1980s onwards, including the construction of new venues or the renovation of old ones as well as significant infrastructure investment. The commercialization of the Olympic event and growing worldwide mass and media coverage also started around the 1980s.

Most of the databases used in this research go up to the year 2023. As a result, this study will bring together economic data from 1990 to 2023, for 32 host and candidate countries, and will analyze a total of 9 FIFA World Cups and 8 Olympic Games. It should be noted, however, that the 2024 edition of the Olympic Games in Paris will not be taken into consideration as these Olympics are too recent for the databases used.

3.3.1 GDP data

The measure of GDP will be represented by the GDP per capita growth rate in annual percentage. This variable, derived from data provided by the World Bank, offers a clear indicator of economic performance over time. Nonetheless, some GDP per capita data for certain countries are not available. This is the case for Azerbaijan and the Czech Republic in 1990, and for Serbia in 1990, 91, 92, 93, 94 and 95. These data rows are therefore not included in the analysis.

3.3.2 Employment Rate data

The employment rate is another key dependent variable in this study and represents the proportion of a country's working-age population that is employed. This data is sourced from the *World Development Indicators* database of the World Bank, which provides consistent and comprehensive information on global labor markets. In reality, this is a ratio of employees to the population for people aged 15 and over. Including the employment rate is particularly relevant for this analysis as hosting mega sporting events often involves large-scale infrastructure projects, temporary job creation, and potential shifts in labor market dynamics. Unfortunately, World Bank employment data is only available from 1991 onwards. In the statistical models in which the dependent variable is the employment rate, the 1990 World Cup in Italy is therefore not included.

3.3.3 FDI data

Foreign Direct Investment (FDI) net inflow, expressed in millions USD 2023, is one more essential dependent variable in this study. The data is sourced from the database of the United Nations Trade and Development (UNCTAD). Increased visibility, infrastructure development, and enhanced business opportunities are all reasons arising from the hosting of a major sporting event that could explain an increase in FDI. Unfortunately, some data are missing from the World Bank database. These will therefore not be included in the analysis. This is the case for the FDI net inflow of Azerbaijan from 1990 to 1994 included, Belgium in 2002, 2003 and 2004, Brazil in 2000, Czech Republic in 1990, 91 and 92, Serbia from 1990 to 2007 included, Russia in 1990, 1991 and 1992 and Uzbekistan from 1990 to 1992. On the other hand, Cuba has no data available on this variable. This country will therefore be excluded in these models.

3.3.4 Trade data

With the trade dependent variable, the model will analyze whether there has been a significant change in FOB (Free-On-Board) exports from a country that has hosted the World Cup or the Olympic Games. This data is sourced from the Direction of Trade Statistics (DOTS) database of the IMF, which provides reliable and standardized information on international trade flows. Some data are missing from this database, such as those for Azerbaijan 1990 and 1991, Belgium from 1990 to 1996 inclusive, Czech Republic 1990, 91 and 92, Russia 90 and 91, Serbia from 1990 to 2005 inclusive, South Africa from 1990 to 1997 inclusive and Uzbekistan 1990 and 1991.

3.3.5 Distinction between developed and developing economies

The distinction between a country that is considered as "advanced" or "developed" and a country considered as "developing" or "emerging" is based on the World Economic Outlook of the International Monetary Fund (2023). Even though the classification can evolve over time, IMF data allows for a standardized approach as much as it allows meaningful comparisons on how the benefits and risks of hosting may differ across economic contexts. For a detailed list of countries categorized as developed or developing, please refer to Table 5 – Appendix 3.

3.3.6 Infrastructure costs data

Infrastructure costs are crucial independent variables in this study, representing the financial investments made by host countries to organize mega sporting events. These costs include expenditures related to venue construction, infrastructure upgrades, and other associated activities. The data is collected from the dataset on Olympic Games and Football World Cup aggregated by Müller et al. (2022). and is expressed in 2018 US dollars. Including these variables is particularly relevant as they provide insight into the potential impact on the overall economic outcomes. By incorporating infrastructure costs into the analysis, this study aims to better understand the relationship between financial commitments and the economic success or failure of hosting mega sporting events. The data for each event can be found in Table 6 – Appendix 4.

In our dataset, infrastructure costs will be divided equally over a 7-year period, including the year of the competition. 7 years generally corresponds to the length of the period between the election of the host and the year in which the event takes place, whether for the Olympics or the World Cup. And it is throughout this timeframe that the majority of infrastructure investments take place (Viana et al., 2018; Firgo, 2019). Some competitions will therefore have longer data horizons, going back to before 1990, in order to spread infrastructure costs over a period of 7 years prior to the event. This is the case for the 1990 and 1994 World Cups in Italy and the USA respectively, and the 1992 and 1996 Olympic Games in Spain and the USA. Moreover, the 2002 World Cup was held in two countries: Japan and South Korea. In the absence of more precise data, the total costs of the event will be divided equally between these two countries.

However, as the dataset does not include the last World Cup in Qatar and the two last Olympics, it will be completed with different data sources. For the 2020 Olympics, the final figures were revealed by the IOC after it published the final financial report detailing revenues and expenditures from the event. The costs data of the 2024 Olympic Games in Paris are based on the average scenario of the ex-ante study conducted by CDES (Centre de Droit et d'Economie du Sport, 2024). Although these Games are not taken into account in the analysis, as World Bank and IMF economic data are not available for 2024, infrastructure costs will be taken into account up to 2023, the maximum year for which data are available. They may, in fact, have had an effect on economic indicators before 2024, the year of the event. On the other hand, the 2022 FIFA World Cup in Qatar is excluded from the cost analysis due to the lack of precise and reliable data on infrastructure costs. While multiple sources estimate the total cost of the tournament at approximately $220 billion (Craig, 2022; Silic, 2022; Zimbalist, 2022), a substantial portion of this expenditure was allocated to permanent infrastructure projects. These investments, including airports, roads, and metro systems, were part of Qatar's broader National Vision 2030 plan and cannot be attributed solely to the World Cup. As a result, including the 2022 tournament costs would risk distorting the analysis and undermining its comparability with other events.

Additionally, to ensure consistency, the costs of these competitions will be expressed in 2023 US dollars, the year from which our GDP, FOB exports, FDI and Employment rate data are taken. This is achieved using U.S. Bureau of Labor Statistics Consumer Price Index (CPI) data from 2018 and 2023. In December 2018, the CPI was 251.233, compared with 306.746 in December 2023. This gives a ratio of 1.22 which, multiplied by the cost data in USD 2018, gives us the final costs in USD 2023.

3.3.7 Vector of controls

The vector of controls is a set of additional independent variables incorporated into the model to account for factors that may influence the dependent variable but are not the primary focus of this study. These variables help isolate the causal effect of the main variables by reducing omitted bias. Without including these controls, the model risks attributing changes in the dependent variable to the hosting of a mega sporting event, when such changes could be driven by other underlying factors. By incorporating control variables, the analysis aims to provide a more precise and unbiased estimation of the economic impact of hosting these events.

Control variables were chosen on the basis of previous studies (Rose & Spiegel, 2009; Viana et al., 2018; Firgo, 2019; Fett, 2021; Chen, 2023). These variables were identified as significant determinants of the dependent variables and are included to enhance the robustness of the analysis. Table 7 – Appendix 5 provides an overview of the control variables included in the study, along with their definitions and sources.

However, the vector of control variables contains some missing values. To address this issue, the Multiple Imputation by Chained Equations (MICE) method was applied in RStudio. This technique generates multiple versions of the dataset, where missing values are imputed based on observed data and statistical modeling. Each imputed dataset is analyzed separately, and the results are combined to produce more robust estimates. This technique helps in reducing potential biases caused by missing data and reestablishing the missing values' inherent variability (Du et al., 2022). MICE operates by iteratively imputing missing values for each variable using regression models that leverage the relationships between observed variables. The imputation method is chosen based on the type of variable: for instance, Predictive Mean Matching (PMM) is typically used for continuous variables. This iterative process continues until convergence is achieved, meaning the distributions of imputed values stabilize over multiple cycles (Azur et al., 2011). By incorporating uncertainty into the imputation process, MICE ensures that the final dataset better reflects the underlying data structure and variability.

3.4 Data Description

3.4.1 Summary statistics

The final dataset consists of four different files, in which each row corresponds to data by country and by year. The first file contains 1,092 observations of GDP per capita growth rates. The employment rate dataset consists of 1,056 observations and represents the employment-to-population ratio for individuals aged 15 or older. Regarding FDI, there are 1,020 observations of the natural logarithm of FDI net inflows (in millions of 2023 USD). Finally, the natural logarithm of real FOB exports (in millions of 2023 USD) file contains 1060 lines. The descriptive statistics corresponding to the 4 datasets can be found in Table 8. They include the mean, median, standard deviation (SD), minimum value (Min) and maximum value (Max).

Table 8 : Independent variables summary statistics

Variable	Mean	Median	SD	Min	Max
GDP	1.95	1.95	4.38	-24.26	33.03
Employment	55.86	56.82	9.31	37.38	88.75
FDI	11.56	11.73	1.88	2.19	16.37
Trade	11.46	11.84	1.77	5.08	15.10

Source : Table prepared by the author

Among the descriptive statistics of GDP per capita growth rates, the mean and median values, both approximately 1.95%, indicate a relatively symmetric distribution across countries and years. However, the standard deviation of 4.38% is larger. Both minimum and maximum value belonged to Azerbaijan, in 1993 and 2006 respectively and may correspond to economic crises or rapid recoveries. This variability underscores the importance of controlling for external factors when assessing the impacts of hosting mega sporting events.

Regarding employment rate, the mean is 55.86% with a median of 56.82%. The standard deviation of 9.31% reflects variability across countries and years. The minimum value is 37.38% and was observed in Greece in 2013, following the country's economic crisis. The maximum value is 88.75% and was recorded in Qatar in 2023, right after the 2022 World Cup. This wide range underscores the diversity in labor market participation due to varying economic structures.

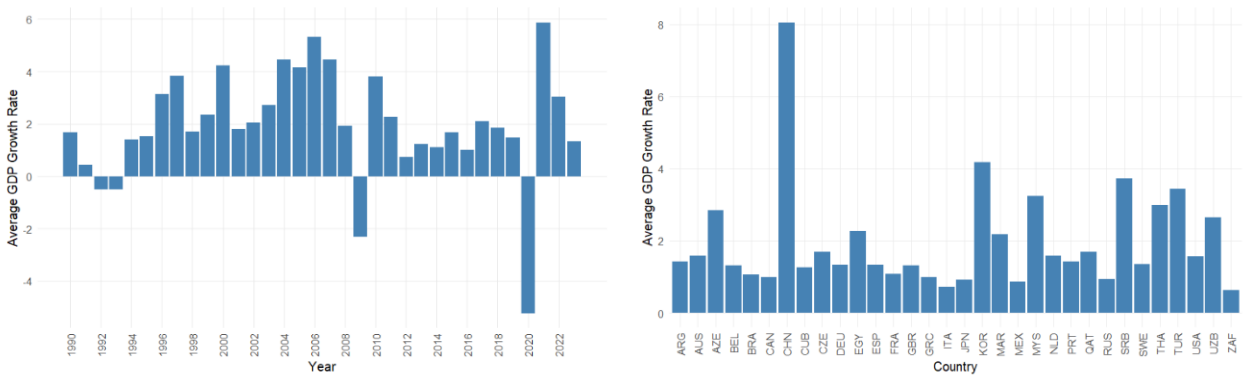
The mean logged FDI inflow is 11.56, with an almost identical median of 11.73. Furthermore, by using the natural logarithm, we can guarantee a more stable distribution while also lessening the effect of extreme values, which is highlighted by the low standard deviation. The minimum logged FDI inflow is 2.19 (Uzbekistan in 1992), while the maximum is 16.37 (USA in 2021). This is likely due to the US role as a financial hub and its favorable tax and investment climate.

Finally, the average logged export value is approximately 11.46, with a median of 11.84 which indicates a slight left-skewness in the distribution. The minimum and maximum values range from 5.08 to 15.10. These last two values highlight differences in export performance among countries even though the use of the natural logarithm helps mitigate the impact of extreme values.

3.4.2 Temporal and cross-country trends

Figure 1 reveals notable fluctuations over time. For instance, the pronounced dip in 2009 corresponds to the global financial crisis and the sharp decline in 2020, the COVID-19 pandemic. The subsequent recovery in 2021 highlights the economic rebound. Periods of steady growth, such as from 2002 to 2007, align with pre-crisis economic expansion. This temporal variation underscores the importance of accounting for global shocks when analyzing the economic impacts of mega events as they have the potential to overshadow them. On the other hand, countries like China exhibit exceptionally high average growth rates. In contrast, several advanced economies, such as Japan and Italy, report lower rates as they have more mature economic structures.

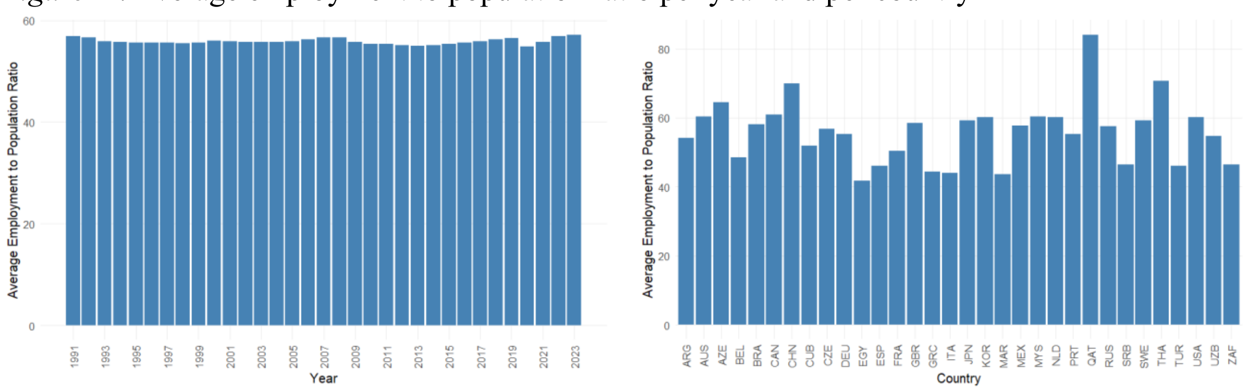
Figure 1 : Average GDP per capita growth rate per year and per country



Source : Figure prepared by the author

Additionally, Figure 2 exhibits low variation in the average employment rate per year. On the other hand, Figure 2 reveals significant variation across nations. Among developing countries, some, such as Qatar, Thailand, and China exhibit high employment rates. Conversely, other developing nations, including Egypt and Morocco, record low rates. More advanced countries present mixed results as well, with the US, South Korea and Canada achieving high employment rates, whereas countries such as Italy and Greece lag behind. This could reflect structural issues but also complex interplay of economic, demographic, and policy factors shaping employment outcomes.

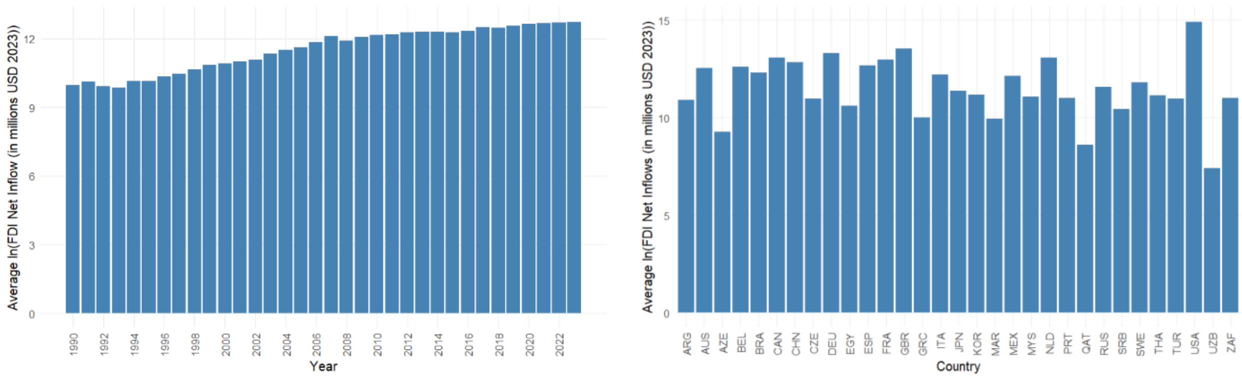
Figure 2 : Average employment to population ratio per year and per country



Source : Figure prepared by the author

Figure 3 provides insights into the patterns of logged FDI net inflows across time and countries. The graph displays a steady increase over time. This overall upward trend may be attributed to growing economic globalization and increased investor confidence. It should be noted, however, that the logarithm applied to our dependent variable attenuates and reduces the variation in the data. On the other hand, focusing on the average FDI net inflow per country reveals large disparities between nations. Western and developed countries like the US, United Kingdom and Germany stand out as major attractors of foreign investment. In contrast, countries such as Azerbaijan, Qatar and Uzbekistan exhibit low reliance on FDI as a development strategy.

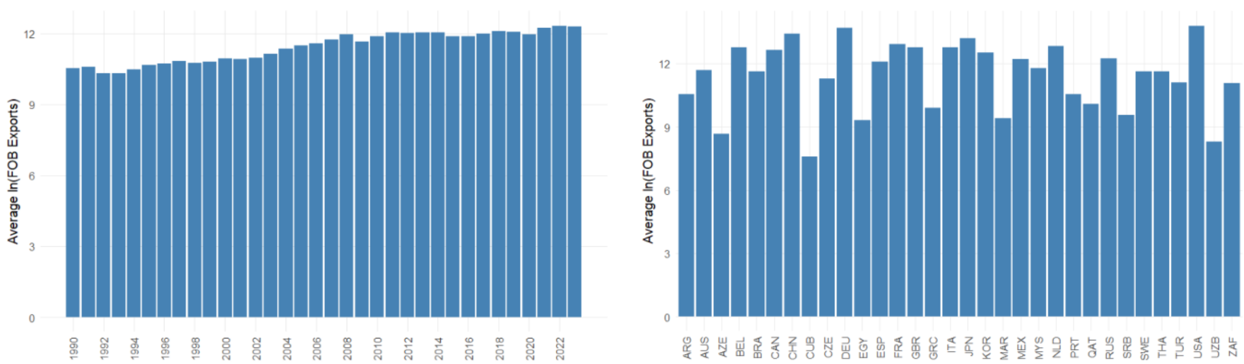
Figure 3 : Average of the logarithm of FDI net inflow (millions USD) per year and per country



Source : Figure prepared by the author

Figure 4 displays the average of the natural logarithm of real FOB exports per year and per country. The first of the two graph shows, like the FDI analysis, slow growth with slight variations over the years. At the country level, the highest export rates are observed in China, the US, and Germany, reflecting their major roles in global trade. Other significant exporters include Belgium, Canada, Japan and the United Kingdom. Conversely, smaller economies such as Cuba and Uzbekistan exhibit lower average exports which highlights differences in industrial capacity and international trade integration. Furthermore, as a country's export profile seem to be strongly shaped by its economic structure, it may affect how it leverages the visibility of hosting events to expand trade.

Figure 4 : Average of the logarithm of real FOB Exports (millions USD) per year and per country



Source : Figure prepared by the author

4. Research Results

In this part of the research, the results of the study and the various linear regressions are presented. The first part of this section will compare the different model types. As a reminder, six models were produced for each of the four indicators. Secondly, this section will go into more detail in analyzing the differences for each of the indicators individually.

4.1 Comparison of Model Types

When it comes to comparing the quality of different models, the adjusted R-squared is a very good indicator. Model (0) is one with only the control variables, in order to understand what is the real impact of these when no other variables are inserted. (1) is the classic model with an intercept, the Hosting variable, the term interaction between Hosting and Developed, and the Infrastructure Costs, and it includes all host and candidate countries. In (2), only nations that have hosted at least one major event are included. This method enables us to determine if there is structural variations between nations that hosted and those that did not host a major sport event. The decision indeed may have been influenced by endogenous factors, such as infrastructure capabilities or political stability. In model (3), only developed countries are taken into account. These nations 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. Finally, models (4), (5) and (6) respectively have the same countries analyzed, the difference consists in 7 lag variables that are implemented to understand the anticipation effects of mega events and 5 lead variables to take into account post-tournament spillovers.

Table 9 : Adjusted R-squared from the different models

Indicators	(0)	(1)	(2)	(3)	(4)	(5)	(6)
GDP	33.90%	33.86%	43.04%	54.34%	33.54%	42.83%	54.32%
Employment	42.71%	42.61%	64.08%	51.30%	43.81%	65.55%	51.21%
FDI	52.19%	53.24%	52.23%	55.47%	53.79%	51.67%	55.98%
Trade	55.92%	57.37%	43.50%	42.39%	58.5%	42.59%	42.99%

Source : Table prepared by the author

The first observation to note is that the adjusted R-squared of the model with only the controls is quite high and often similar to the other models for each of the variables. This means that most of the explanatory power in the models comes from the control variables rather than the event of hosting itself. Moreover, the control variables already capture economic, political, and demographic factors. Therefore, they might be the main determinants of GDP growth, employment rate, trade, and FDI, rather than the event itself.

Regarding the GDP variable, its R-squares are relatively decent and are similar between the classic models and the lag and lead models. However, the model with only developed countries increases the R-squared, which suggests that GDP growth is more predictable in these nations. On the other hand, growth might be harder to explain in developing economies as they face greater volatility. The models with Employment Rate have the same pattern but with R-squared being much higher for models with only host countries. This could indicate that hosting the event directly influences labor markets and possibly through infrastructure projects or tourism. In contrast, in non-hosting countries, employment dynamics may be driven by broader economic trends which makes the relationship less predictable. On the other hand, the R-squared of the models analyzing FDI net inflow is relatively similar despite the different specifications. But when it comes to the Trade variable, R-squared drops by around 15% when only host or developed countries are taken into account. As exports are often dependent on global supply chains and trade agreements, this might imply that including a wider set of countries captures more variation in trade dynamics.

Additionally, another useful analysis of model quality comparison is to look at the correlations between variables. Figure 5 – Appendix 6 shows the correlation coefficients in a model where all countries are taken into account. The first observation is the positive correlation of 0.33 between Hosting and IC, infrastructure costs. Although the correlation is not very high, it makes sense since only host countries invest in their infrastructure over several years. The highest correlation coefficient goes to the control POL, which measures a country's degree of democracy on a scale of 1 to 10, and Dev, a binary variable which is worth 1 if the country is developed. This suggests that the higher a country's level of democracy, the more likely it is to be an advanced country. Another observation is the negative correlation (-0.39) between the control variables CONS, which measures population consumption, and POP, which measures population growth rate. This suggests that when the population has a high growth rate, consumption decreases.

Similar analyses emerge from Figure 6 – Appendix 6, which compares correlations among variables from countries that have already hosted a mega event at least once. However, we can add that a large positive correlation coefficient (0.62) appears between the POL and CONS control variables. It would therefore seem that among this dataset of countries, the level of democracy in a country increases consumption in that country, and vice-versa. CONS is also positively correlated with GOV (0.36) and Dev (0.44).

Finally, among developed countries only (Figure 7 – Appendix 6), the high correlation coefficients linked to Dev are no longer present. However, as in previous analyses, it is worth noting the positive correlation between Hosting and IC (0.31) and between the control variables DIG, which measures the rate of digitization, and FIN, which measures openness to financial markets, of 0.41. This is also the case between POL and GOV (0.43).

4.2 Analysis of GDP Statistical Results

It is both important and relevant to study the impact of sporting events on GDP per capita growth rate as it is a primary indicator of a country's macroeconomic health and growth. The central research question of this thesis directly addresses the macroeconomic impacts of hosting major sporting events, making GDP growth rate a key dependent variable to assess the overall economic spin-offs. Furthermore, the literature review highlights divergent findings regarding the effect of these events on GDP, with some studies suggesting positive impacts (Tsiotsou & Gouri, 2010 ; Brückner & Pappa, 2011, 2015; Firgo, 2019, Chen, 2023 and Thabi 2024), while others are more critical (Zimbalist, 2015; Baade & Matheson, 2016; Barrios et al., 2016; Viana et al., 2018). Understanding the real impact on GDP is therefore crucial for policymakers to determine if the considerable costs are justified by actual economic growth. The relevance of the study and the models is partly verified by a consistently low p-value for all models which indicates that the overall regression is statistically significant. It means that the independent variables, taken together, help explain variations in GDP per capita growth. This suggests that the model provides a meaningful representation of the underlying relationships in the data. The full set of statistical results on GDP per capita growth rates can be found in Table 10. In this table, the p-values of each coefficient estimate are shown below them, in brackets. Moreover, and this will be the case for all results tables, one star next to a coefficient indicates significance at the 10% level. Two stars correspond to the 5% level and three stars to the 1% significance level.

Taking the first three models, we can see that Hosting has a negative impact on the growth rate of GDP per capita for non-developed countries. It is -1.949 in model (1), which represents almost a 2% drop for a country in a year when it hosts a mega event. In model (2), the effect is – 1.646%. It aligns with existing concerns regarding the economic feasibility of hosting major sporting events. However, this goes against our hypothesis 2 and the research carried out by Zimbalist (2010), Ren & Li (2013), Ferris et al. (2022) and Chen (2023), who concluded that developing countries benefit more economically from hosting these events. On the other hand, the hosting effect is positive for developed countries. In model (1), the effect is +0.232% of GDP in a year of hosting a major sporting event for developed countries ($\beta_1 + \beta_2$). It falls slightly to +0.157% in the model with only host countries (2). This confirms the findings of some studies that not only the host countries, but also the candidate countries, see positive economic spin-offs (Rose & Spiegel, 2009; Brückner & Pappa, 2011). But it is in model (3), with the best R-squared and which includes only developed countries, that it is the highest: +0.405%. This suggests that wealthier nations may be better equipped to leverage such events for economic gains. This idea is supported in a study conducted by Fett (2021), which results in an increase in GDP for developed host countries and a decrease for developing host countries. Several authors also conclude to GDP economic short-term benefits when hosting a World Cup or the Olympics (Firgo, 2019; Bibolov et al., 2022 Chen, 2023; Thabi, 2024). However, it should be noted that none of the coefficients mentioned above is significant, even at the 10% level, as their p-values are always higher. The lack of significance across all models implies that the several impacts remain uncertain and possibly dependent on other unobserved factors. It also means that hypotheses H1 and H2 are not verified. Indeed, the test hypotheses $H_{0,1}$ and $H_{0,2}$ cannot be rejected at a significant level. We can therefore not conclude that our Hosting variable has a significant effect on a country's GDP growth rate.

As for infrastructure costs, these have small positive effects in all 3 models, but are not statistically significant. Therefore, although it does support our third research hypothesis, H3 is not verified either. We cannot significantly reject the hypothesis $H_{0,3} : \beta_3 = 0$ and conclude that infrastructure costs have an effect on a country's GDP when hosting a major tournament.

In the models with the lag and lead variables, statistical results are different. In (4) and (5), respectively with host and candidate countries, and then only host countries, the Hosting effect is negative for both developed and developing countries. However, the negative impact is even greater for the latter. In both models, the β_1 coefficients are both significant at the 5% level, indicated by two stars next to the coefficient. This means that H1 is verified and can be statistically rejected: there is indeed a hosting effect on a country's GDP. Nonetheless, as the effect is negative, this goes against our first study hypothesis but is a result supported by the research of Baade & Matheson (2016), Barrios et al. (2016) and Viana et al. (2018). The value of β_3 is also significant in both models, which is in line with the hypothesis test H3 and confirms that the infrastructure costs of hosting these events do have a role to play in the GDP of the host country. The coefficient is 0.095 in (4) and 0.104 in (5). It would therefore seem that the more money is invested in infrastructure, the greater the economic benefits on GDP, which goes in the same direction as our research hypothesis 3. Moreover, the finding that infrastructure costs are significantly associated with GDP in the lag and lead models (4) and (5) but not in the classic models might suggest that the economic impact of infrastructure spending may be more dynamic over time rather than showing an immediate effect. In model (6), which has an R-squared of 54.32%, much higher than the two previous models (33.54% and 42.83% respectively), the results for these variables are not significant. This may indicate that the GDP effects of hosting an event are more predictable in high-income countries because economic conditions are more stable and event-related investments are more efficiently utilized. However, the absence of estimates significance in (6) weakens this conclusion, highlighting the need for further analysis.

If we delve a little deeper into the lag and lead variables, we see that in (6) none of them is significant. In (4), β_{t-4} is significant at the 5% level (0.02 p-value) with an estimate of -2.587. This variable, which represents the fourth year before a major tournament is held in the host country, is also negative at -2.477 and significant at the 1% level in model (5). This suggests a negative relationship between GDP and the fourth year before the event. Furthermore, in the model with host countries only (5), the fifth year (β_{t-5}) is also associated with a significantly value-destructive relationship (-1.751). A potential explanation is that GDP growth slows down as the country prepares for the event. This could be attributed to the redirection of public funds toward infrastructure and event-related costs, which may crowd out other productive investments. Perhaps it is also around this time that the bulk of the investment for the event takes place and it is still too early to see the economic spin-offs.

In conclusion, the statistical analysis reveals that the impact of hosting a major sporting event on GDP per capita growth varies depending on the country's development status and the model specification. In the classic models, Hosting has a negative but non-significant effect for non-developed countries, and developed countries experience a slight but also non-significant positive effect. However, in the lag and lead models, the negative impact of Hosting becomes statistically significant, and particularly for non-developed countries. The presence of significant negative effects four to five years before the event indicates potential economic disruptions in the lead-up to hosting. Additionally, infrastructure costs appear to play a significant role in GDP outcomes in two of these models, though not in the classic approach. A summary of statistical observations can be found in Table 11 - Appendix 7.

Table 10 : GDP statistical results

	(0)	(1)	(2)	(3)	(4)	(5)	(6)
Intercept		12.84***	13.29***	7.72***	13.05***	13.6***	7.818***
		(2e-16)	(2e-16)	(2.18e-4)	(2e-16)	(2e-16)	(1.86e-4)
β_1		-1.949	-1.646	0.405	-3.272**	-2.902**	0.274
		(0.19)	(0.195)	(0.485)	(0.046)	(0.038)	(0.745)
β_2		2.181	1.803		2.101	1.76	
		(0.222)	(0.236)		(0.242)	(0.25)	
β_3		0.013	0.027	0.005	0.095*	0.104**	0.008
		(0.504)	(0.195)	(0.704)	(0.054)	(0.014)	(0.831)
β_{t-7}					0.571	0.878	0.695
					(0.528)	(0.258)	(0.257)
β_{t-6}					-0.992	-0.873	0.028
					(0.394)	(0.38)	(0.974)
β_{t-5}					-1.82	-1.751*	-0.35
					(0.118)	(0.078)	(0.688)
β_{t-4}					-2.587**	-2.477***	-1.369
					(0.02)	(0.009)	(0.105)
β_{t-3}					-1.385	-1.251	0.333
					(0.212)	(0.187)	(0.692)
β_{t-2}					-1.011	-0.799	0.551
					(0.367)	(0.404)	(0.515)
β_{t-1}					-1.414	-1.225	0.486
					(0.23)	(0.224)	(0.582)
β_{t+1}					-0.232	0.019	-0.261
					(0.786)	(0.979)	(0.638)
β_{t+2}					0.407	0.633	0.567
					(0.644)	(0.4)	(0.308)
β_{t+3}					-0.056	0.231	-0.14
					(0.951)	(0.765)	(0.809)
β_{t+4}					-0.378	0.018	-0.091
					(0.676)	(0.981)	(0.876)
β_{t+5}					0.03	0.39	0.161
					(0.974)	(0.614)	(0.781)
Only with host countries		no	yes	no	no	yes	no
Only with developed countries		no	no	yes	no	no	yes
Lag and lead variables		no	no	no	yes	yes	yes
Observations	1092	1092	522	555	1092	522	555
Adj R-squared	0.339	0.3386	0.4304	0.5434	0.3354	0.4283	0.5432

Source : Table prepared by the author

4.3 Analysis of Employment Rate Statistical Results

Hosting a mega event typically requires substantial short-term employment in construction, infrastructure development, and service industries. Additionally, the influx of tourism and economic activity during the event itself can create temporary job opportunities in sectors like hospitality, retail, and transportation. Statistical results further justify this focus as the strong model statistical significance suggests that the employment-to-population ratio is systematically influenced by the variables included in the model. Furthermore, both classic and lag and lead models that consider only host countries capture a significant amount of the variability in employment within this subset of countries. It also suggests that the employment impact is more directly linked to hosting itself rather than candidate country effects. Statistical results can be found in Table 12, in which each coefficient estimate is represented with its p-value in brackets below.

In the first 3 models without lag and lead variables, the value of the Hosting estimate varies. In (1), it is 0.944% for developing countries and 0.467% for developed countries. Although positive in both cases, the effect seems greater for less advanced economies. This is also the findings of studies by Zimbalist (2010), Ren & Li (2019) and Chen (2023) in which the conclusion is that hosting major athletic events benefits nations with weaker economic foundations more. In model (3) with only developed countries, the value of the coefficient is similar: 0.431. On the other hand, in model (2), the coefficient is -0.711 for non-developed countries and 0.779 for the others. It would therefore seem that, when restricted to countries that have already hosted at least one major sporting event, the more advanced countries are better placed to reap economic benefits and generate jobs in the year of a tournament. However, we must qualify this analysis by noting that none of these coefficients has a p-value that makes it significant. The same conclusion was drawn by Maennig (2007), who studied the 2006 WC in Germany and determined that the nation experienced a boost in employment, but not in any really significant way.

Moreover, in each of the models, infrastructure costs have a very slight positive effect, but in each case they are not significant. So while this confirms our study hypothesis on costs, the non-significance diminishes this result. In summary, it would seem that employment-related dynamics are not common to all models, depending on their specifications. It may therefore be worth looking at the lag and lead models to gain a better understanding of pre- and post-event effects.

In models (4), (5) and (6), the p-value for Hosting is significant at 5, 10 and 5% levels respectively. We can therefore significantly reject $H_{0,1}$ and conclude that Hosting has an effect on a country's employment rate in the year it hosts the event. Looking at the coefficients, we see that they are much higher than in the three classic models. In (4), with host and candidate countries, it is 8.84 for developed countries, 8.3 for non-developed. In (5), a model with only host countries and the largest R-squared, it is 7.82 for advanced countries and 5.532 for the least developed. Finally, in (6), with only developed countries, the estimate is 5.539. This confirms our first study hypothesis: the impact of hosting is positive for a country's employment rate. Moreover, the statistical significance of the hosting coefficient in these models lends further support to the hypothesis that holding an important tournament has a beneficial influence on job. And these impacts are even rather large, ranging from an 8.84% increase in the 15+ working population to 5.532% for the lowest significant estimate. In a study on GDP, Chen (2023) also drew a similar conclusion, finding that the employment rate and the development of public sector are also positively influenced. On the other hand, our second research hypothesis is not confirmed, since the benefits are higher for advanced countries. Furthermore, $H_{0,2} : \beta_2 = 0$ cannot be significantly rejected. While the employment impact of hosting is significant and positive across models, the expected difference between developed and developing countries in terms of benefits from hosting is not confirmed.

Regarding infrastructure costs, their estimates are significant at the 1% level in each lag and lead model. Their economic spinoffs on a country's employment rate is therefore statistically confirmed and $H_{0,3}$ can be rejected. Their coefficients are negative every time and the decrease in % of employed population is valued at -0.477, -0.417 and -0.295 respectively. This may seem surprising and goes against our third study hypothesis. The reasoning behind this hypothesis was that the construction of stadiums, fan and athlete villages, but also tourist and transport infrastructures led to the creation, albeit temporary, of jobs. One explanation could be that the negative relationship, although unexpected, may be indicative of labor market inefficiencies or the possibility that infrastructure spending might not create sustainable job opportunities. The negative relationship might also strain labor markets by displacing other economic activities.

Taking a closer look at lag and lead variables, none of the lead variables has a significant impact in the three models. The holding of a major sports tournament therefore has no confirmed post-event impact. On the other hand, in all three models, all lag variables, with the exception of β_{t-7}, are significant at the 1% level, and in rare cases at the 5% level. We can therefore conclude that the pre-event phase almost certainly has an effect on a host country's employment rate. Moreover, the estimates are positive and often represent a substantial increase in the ratio of employees to the 15+ population. In model (4), growth ranges from +10.639% 6 years before the event to +9.818% the year before. In model (5), the increase stabilizes at around 8%, depending on the year. Finally, in model (6), growth hovers around 6%. The consistent pre-event positive effects in employment further underscore that hosting a major event often results in anticipatory economic activities and preparations, with a translation into job creation. This finding is supported by the research of Thabi (2024), in which he concludes that mega events frequently produced notable immediate economic advantages, such as short-term creation of jobs. But the same study also concluded that, because of cost overruns and underutilized infrastructure, there is no positive economic influence in the longer term, which is confirmed by our non-significant lead variables. In addition, the presence of a pre-event influence has also been studied and confirmed by Brückner & Pappa (2011).

In summary, the employment effects of hosting a major sporting event are mixed in the first three models (Table 13 – Appendix 8). The statistically insignificant impact sometimes has slightly larger effects in non-developed countries and sometimes negative influence, depending on the model. However, in lag and lead models, the analysis confirms that hosting a major sporting event has a statistically significant and positive impact on a country's employment rate in the year of the event. This effect is more pronounced in developed countries and can be considered large, ranging from +5% to almost +9% in employment rates. Lag effects indicate that employment benefits begin several years before the competition, with significant increases in the employment-to-population ratio. However, no significant post-event effects are observed, suggesting that jobs gains are not linked to long-term structural changes. Slightly negative infrastructure costs impacts, while statistically significant, highlight inefficiencies in job creation from the event investments.

Table 12 : Employment rate statistical results

	(0)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept		88.87***	97.35***	26.14***	87.44***	95.2***	25.36***
		(2e-16)	(2e-16)	(2.79e-7)	(2e-16)	(2e-16)	(6.55e-7)
β_1		0.944	-0.711	0.431	8.3**	5.532*	5.339**
		(0.75)	(0.785)	(0.765)	(0.01)	(0.051)	(0.013)
β_2		-0.477	1.49		0.54	2.288	
		(0.895)	(0.638)		(0.88)	(0.462)	
β_3		0.035	0.005	8.67e-3	-0.477***	-0.417***	-0.295***
		(0.381)	(0.886)	(0.782)	(2.3e-6)	(2.72e-6)	(0.004)
β_{t-7}					2.781	2.034	1.135
					(0.129)	(0.207)	(0.46)
β_{t-6}					10.639***	8.949***	6.174**
					(2.85e-05)	(5.79e-05)	(0.015)
β_{t-5}					10.217***	8.735***	6.191***
					(2.93e-05)	(4.39e-05)	(0.008)
β_{t-4}					9.184***	7.671***	5.741**
					(1.13e-4)	(2.27e-4)	(0.014)
β_{t-3}					8.895***	7.522***	5.884***
					(9.34e-05)	(1.55e-4)	(0.007)
β_{t-2}					9.53***	8.163***	6.201***
					(3.44e-05)	(4.95e-05)	(0.004)
β_{t-1}					9.818***	8.331***	5.703**
					(4.42e-05)	(7.63e-05)	(0.012)
β_{t+1}					2.388	2.046	0.189
					(0.156)	(0.178)	(0.886)
β_{t+2}					-0.144	0.455	0.360
					(0.934)	(0.771)	(0.785)
β_{t+3}					-0.403	-0.198	-0.56
					(0.821)	(0.902)	(0.684)
β_{t+4}					-0.367	-0.493	-0.777
					(0.836)	(0.759)	(0.573)
β_{t+5}					-0.08	0.016	-0.049
					(0.964)	(0.992)	(0.971)
Only with host countries		no	yes	no	no	yes	no
Only with developed countries		no	no	yes	no	no	yes
Lag and lead variables		no	no	no	yes	yes	yes
Observations	1056	1056	462	528	1056	462	528
Adj R-squared	0.4271	0.4261	0.6408	0.513	0.4381	0.6555	0.5121

Source : Table prepared by the author

4.4 Analysis of FDI Statistical Results

Mega events typically lead to infrastructure development, global visibility, and improved investor confidence, which can influence capital inflows and attract investors. Major sporting events indeed often serve as a signal of economic stability and growth potential. In the FDI models, the R-squared values remain fairly stable, ranging between 51% and 55%, suggesting a consistent explanatory power across specifications. Notably, the highest R-squared values are found in models (3) and (6), which focus solely on developed countries. This suggests that the mechanisms driving FDI inflows may be more structured and predictable in advanced markets. Table 14 groups together all the statistical results of the various models with FDI net inflow as the dependent variable. As a reminder, each coefficient estimate is shown in the table with its p-value right below it.

If we start with the 3 classic models, we first see that the intercept is around 8. As a reminder, this measures the natural logarithm of FDI inflow in a given year for a given country. In these models, we can say that host developing countries see an increase in FDI inflow in the year of the tournament. The conclusion is less straightforward for advanced countries and depends on the model. In (3), the effect is positive. However, in (1), the total effect of Hosting for developed countries ($\beta_1 + \beta_2$) is -0.173. In (2), it is lower than for less advanced economies, but remains positive overall: 0.037. Nevertheless, these conclusions need to be measured, as none of the estimates for the hosting variable and the term interaction between Hosting and Dev are significant.

In contrast, the coefficients of β_3 are significant in models (1) and (2). Their p-values are 9.35e-6 and 0.02 respectively. We can therefore conclude that H3 has to be rejected, and that the effect of IC on FDI is almost certain in the first two models. The coefficients are positive, but relatively low, at 0.032 and 0.178. In model (3), although non-significant, the estimate is 0.001. This may seem logical, given that the construction of infrastructure capable of hosting a mega event often represents huge budgets. It is therefore sometimes necessary to call on capital to raise these funds, in the form of FDIs. Not surprisingly, we can conclude of a positive relationship and to the confirmation of our third study hypothesis.

In the lag and lead models, the coefficients of the Hosting variable are all positive. In the model (4), the estimate of β_1 is 1.044 and its p-value (0.077) is significant at the 10% level. This represents the natural log increase in FDI inflow in a year of hosting a major sporting event for a developing country. For a developed country, growth is positive, but not as much as for a less advanced country ($\beta_1 + \beta_2 = +0.35$). In this model, our first and second research hypotheses are confirmed. However, while $H_{0,1}$ can be rejected at 90% confidence level, we cannot conclude that there is a significant difference between the two types of country. When restricted to host countries only, although the magnitude of the effects differs, the conclusions are similar. β_1 is indeed equal to 0.601 and β_2 to -0.08. However, it should be noted that none of the estimates is significant at even 10%, which reduces the power of our conclusions and does not allow us to reject H_0 test hypotheses. In model (6), β_1 estimate is 1.491 and its p-value is 0.001. Hosting's impact on FDI in developed countries is therefore positive and highly significant. $H_{0,1} : \beta_1 = 0$ can then be rejected, and the magnitude of the coefficient confirms our research hypotheses. It should also be noted that in this model, the effect, in addition to being significant, is much broader than in previous models. This observation could be interpreted as a reflection of the generally higher institutional quality, regulatory stability, and market transparency in developed economies. Those factors might make these nations more attractive for foreign investors, especially in the context of large-scale event planning.

Regarding the influence of infrastructure costs, these are positive but not significant in (4) and negative but also far from significant in (5). Nevertheless, in model (6), these are highly significant (p-value = 8.49e-4), which leads to the rejection of $H_{0,3}$ at a very high level of confidence. The coefficient estimate is -0.07, which may be surprising or even counter-intuitive. The assumption behind our third research hypothesis was that infrastructure investment required capital injection, which could potentially boost FDI inward. What is even more surprising is that in models (1) and (2), β_3 was also significant (and even largely so in the first model), but the estimate was positive. One potential interpretation is that, in developed economies, large infrastructure expenditures may crowd out private investment. Alternatively, foreign capital may already be sufficiently present in these markets, reducing the marginal attractiveness of additional investment.

As for the variables lag and lead, in model (4), β_{t-3} is significant at the 10% level. This is the only significant lag variable, although β_{t-2} is very close to the 10% level. On the other hand, β_{t+1}, β_{t+2} and β_{t+3} are all significant, with coefficients of 0.657, 0.632 and 0.596. It would therefore seem that there is a post-event effect in the 3 years following the event. These significant results are not really confirmed in model (5), where the dataset is restricted to host countries. But in model (6), more significant results are obtained. At a 99% confidence level, there is evidence of a pre-event effect spanning from six years prior up to the year immediately before the event. Moreover, the estimated coefficients are relatively high, ranging from 1.604 (β_{t-1}) to 1.313 (β_{t-3}). These values are comparable to the estimate of β_1, which stands at 1.491 in this model. This suggests a substantial positive influence of hosting a major tournament on FDI in the pre-event phase. Nevertheless, it is important to note that, in this model, the estimated coefficient for infrastructure costs was statistically significant but negative. Therefore, the observed pre-event increase in FDI cannot be attributed to infrastructure investment. A possible interpretation is that the announcement of hosting such a high-profile event draws international attention to the host country, thereby attracting investors in sectors not necessarily related to sports infrastructure. Being selected as a host signals international recognition and may prompt early investment inflows.

Overall, the analysis reveals that hosting a major sporting event has a generally positive, but context-dependent, effect on FDI net inflows (Table 15 – Appendix 9). While coefficient estimates for the hosting variable are positive in nearly all models, their statistical significance varies. This result is in line with research by Soussane & Ibourk (2024), who found a significant average increase of $4.33 billion in inward FDI when hosting a World Cup. In models including all countries, the effect is more pronounced for developing nations, though not always significant. In contrast, model (6), which focuses exclusively on developed economies, shows a strong and highly significant positive impact. Soussane & Ibourk (2024) came to the conclusion that the increase in FDI is always greater for developed and well-governed nations. Infrastructure costs show a significant and positive relationship with FDI in models (1) and (2). However, in model (6), IC remains significant but surprisingly negative. Regarding lag and lead effects, the most robust anticipation impact is found in model (6), where FDI increases significantly up to six years prior to the event. This finding is supported by research on pre-event phases from Brückner & Pappa (2011). Post-event effects are positively and significantly supported only in model (4).

Table 14 : FDI statistical results

	(0)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept		8.518***	7.825***	8.466***	8.426***	7.66***	8.28***
		(2e-16)	(2e-16)	(3.37e-13)	(2e-16)	(2e-16)	(8.41e-13)
β_1		0.677	0.201	0.266	1.044*	0.601	1.491***
		(0.21)	(0.713)	(0.396)	(0.077)	(0.321)	(0.001)
β_2		-0.85	-0.164		-0.694	-0.08	
		(0.189)	(0.802)		(0.282)	(0.903)	
β_3		0.032***	0.178**	0.001	0.001	-0.009	-0.07***
		(9.35e-6)	(0.02)	(0.885)	(0.939)	(0.623)	(8.49e-4)
β_{t-7}					0.594*	0.374	0.144
					(0.076)	(0.279)	(0.674)
β_{t-6}					0.692	0.559	1.445***
					(0.117)	(0.215)	(0.004)
β_{t-5}					0.585	0.494	1.339***
					(0.184)	(0.272)	(0.008)
β_{t-4}					0.642	0.644	1.442***
					(0.12)	(0.128)	(0.002)
β_{t-3}					0.677*	0.593	1.313***
					(0.099)	0.158	(0.005)
β_{t-2}					0.645	0.525	1.447***
					(0.117)	(0.212)	(0.002)
β_{t-1}					0.475	0.508	1.604***
					(0.272)	(0.252)	(0.001)
β_{t+1}					0.657**	0.322	0.335
					(0.033)	(0.309)	(0.258)
β_{t+2}					0.632**	0.294	0.235
					(0.046)	(0.366)	(0.425)
β_{t+3}					0.596*	0.243	0.253
					(0.068)	(0.467)	(0.413)
β_{t+4}					0.511	0.097	0.271
					(0.116)	(0.772)	(0.383)
β_{t+5}					0.455	0.106	0.299
					(0.162)	(0.75)	(0.334)
Only with host countries		no	yes	no	no	yes	no
Only with developed countries		no	no	yes	no	no	yes
Lag and lead variables		no	no	no	yes	yes	yes
Observations	1019	1019	506	538	1019	506	538
Adj R-squared	0.5219	0.5324	0.5223	0.5547	0.5379	0.5167	0.5598

Source : Table prepared by the author

4.5 Analysis of Trade Statistical Results

Hosting a mega event can enhance a country's international visibility, improve trade relationships, and generate interest in domestically produced goods, all of which can translate into higher exports. In terms of explanatory power, models with only control variables as well as models (1) and (4), which include all countries, exhibit relatively high R-squared values ranging from 55% to 58%. This indicates that a considerable portion of the variability in export performance can be explained when broad country samples are included. However, the R-squared drops to around 42% in models restricted to host countries or developed economies. This suggests that additional unobserved factors may play a more substantial role in explaining export variations within more homogeneous groups such as developed or host-only samples. Such unobserved factors could include pre-existing trade openness, industry composition, or institutional quality. All statistical results can be found in Table 16.

In model (1), the one with the highest R-squares, the coefficient estimates for β_1 and β_2 are 0.492 and -0.586 but are insignificant. In (2), when the R-squared drops, these coefficients are very weakly estimated at 0.024 and 0.014 and are, again, non-significant. This dramatic reduction in the magnitude of coefficients implies that the effect of hosting on exports may be highly sensitive to the country composition of the sample, and that pooling diverse economies could mask heterogeneity in response. Finally, in (3), β_1 is 0.114 for a p-value of 0.68, making our estimate insignificant at the 10% level. In all models, $H_{0,1}$ and $H_{0,2}$ cannot be rejected. Moreover, the results of the first model, while confirming our second research hypothesis, run counter to the first. This contradiction may suggest that the act of hosting itself does not universally increase exports.

In contrast, infrastructure costs are significant in each model at thresholds of 1, 5 and 10% respectively. The associated estimated coefficients are 0.035, 0.013 and 0.011. Not only can we reject $H_{0,3}$ and conclude that there is an effect of infrastructure costs on exports, but these effects are positive and in line with our research assumptions. The broader economic effects of those investments, such as improvements in logistics, transportation, and communication networks, seem to therefore facilitate greater international trade. It reinforces the idea that these infrastructure improvements have a tangible economic return in the form of increased export capacity.

In model (4), the analysis is similar to that in (1). For a developing country, the Hosting variable causes an increase in the natural logarithm of exports of 0.433, while for advanced countries it causes a decrease of -0.029. This the model that explains most of the variability in the data, however, none of the estimates is significant. In (5), the results are completely different. The influence of Hosting is negative for both developing and developed countries, although to a lesser extent for the latter. The first significant result is found in model (6), with β_1 at the 1% level. Additionally, its estimate is very high, at 1.155. We can see that when we restrict the dataset to advanced economies, $H_{0,1}$ can be rejected. There is therefore a definite effect on a country's exports and this one is rather high compared with the other models. This result aligns well with the theoretical rationale by which major events increase media exposure and diplomatic ties. Those in turn reduce trade frictions and increase foreign demand for domestic goods. Rose & Spiegel (2009) had similar results in their study. Their conclusion was that host and applicant countries saw an increase of 30% in trade. They therefore come to the conclusion that the signal sent during the Games bidding process is what causes the beneficial effects.

For the infrastructure costs of these models, the results are more interesting. Similarly to the first 3 models, they are significant at the 5% level in (4) and at the 1% level in (6), leading to the rejection of our $H_{0,3}$ hypothesis test. As for coefficient estimation, it is 0.032 in model (4) and therefore very similar to model (1). Although not significant, the analysis is the same for model (5), where the estimate is positive and very similar to that of (2). On the other hand, in (6), surprisingly, the estimate is -0.05. Consequently, higher infrastructure spending might reflect diminishing returns or inefficiencies in the allocation of resources. It may also suggest that in advanced economies, the marginal benefit of additional infrastructure is limited or offset by other costs. This deviation underlines the importance of contextualizing infrastructure investments within a country's development stage and pre-existing capacity. This idea is supported by findings from Li (2013) and Matheson (2018) who note that the impact of facility construction costs and physical legacies is not well considered in the literature and are determinant for economic success.

Additionally, it may be interesting to look at potential pre or post-event influences. In the fourth model, the only significant lag variable is β_{t-7} with a positive estimate of 0.784. But even more interesting, all lead variables are significant at a 1 or 5% level. Given that the R-squared of this model is high, this supports the idea that, as far as exports and international trade are concerned, there is a real post-event effect. All coefficient estimates are positive, ranging from 0.818 for β_{t+1} to 0.649 for β_{t+5}. These results are superior to those of β_1 and β_1+β_2, indicating that, in this model, it is the post-event phase that is most important. This reinforces the idea that the benefits of hosting are not immediate but accumulate over time as the visibility and credibility gained by the host nation translate into increased foreign demand and market access in the years following the event. On the other hand, none of the lag and lead results in model (5) are significant. Therefore, they do not really help us to confirm or refute our results. Conversely, in the sixth and final model, although the lead variables are all positive, none is significant at the 90% confidence level. On the other hand, all lag variables, with the exception of β_{t-7}, are significant. As a result, we find that, when only developed countries are considered, the pre-event phase is the most important, a statement supported by Brückner & Pappa (2011). Moreover, like β_1, the estimates are rather high, ranging from 1.288 for the highest to 1.126 for the lowest. This pre-event export boom rather than a sustained post-event trajectory may reflect the front-loading of trade expectations in developed economies, where international exposure and promotional efforts ramp up before the event.

In summary, while our research hypothesis was that hosting a major sporting event has potential to boost a country's exports, the empirical evidence from our regressions presents a nuanced picture. First, the infrastructure costs associated with hosting are significantly and, most of the time, positively related to exports. Second, only in model (6), is a strong and significant positive effect of hosting identified, captured by β_1. One explanation is that developed nations may be better equipped to convert hosting into export growth. In model (4), the post-event (lead) variables are all significant and positive which indicates that the export boost materializes after the event.

Conversely, in model (6), it is the pre-event (lag) variables that are significant. Overall, the findings mainly support the hypothesis that infrastructure investments linked to hosting stimulate exports, while the broader impact of hosting depends on a country's level of development and the timing of measurement. The summary table of the results can be found in Table 17 – Appendix 10.

Table 16 : Trade statistical results

	(0)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept		13.1***	12.81***	16.12***	13.07***	12.8***	15.97***
		(2e-16)	(2e-16)	(2e-16)	(2e-16)	(2e-16)	(2e-16)
β_1		0.492	0.024	0.114	0.433	-0.076	1.155***
		(0.309)	(0.955)	(0.68)	(0.408)	(0.875)	(0.004)
β_2		-0.586	0.014		-0.462	0.03	
		(0.313)	(0.978)		(0.422)	(0.955)	
β_3		0.035***	0.013**	0.011*	0.032**	0.019	-0.05***
		(1.9e-8)	(0.034)	(0.061)	(0.041)	(0.192)	(0.007)
β_{t-7}					0.784***	0.332	0.381
					(0.007)	(0.218)	(0.19)
β_{t-6}					0.184	-0.061	1.273***
					(0.623)	(0.858)	0.002
β_{t-5}					0.028	-0.121	1.202***
					(0.939)	(0.724)	(0.004)
β_{t-4}					0.142	-0.047	1.211***
					(0.692)	(0.886)	(0.003)
β_{t-3}					0.204	-0.015	1.126***
					(0.566)	(0.964)	(0.005)
β_{t-2}					0.205	-0.002	1.213***
					(0.569)	(0.995)	(0.003)
β_{t-1}					-0.164	-0.272	1.288***
					(0.665)	(0.434)	(0.002)
β_{t+1}					0.818***	0.199	0.393
					(0.003)	(0.432)	(0.138)
β_{t+2}					0.765***	0.208	0.319
					(0.007)	(0.426)	(0.228)
β_{t+3}					0.636**	0.158	0.06
					(0.029)	(0.557)	(0.829)
β_{t+4}					0.634**	0.136	0.177
					(0.028)	(0.612)	(0.522)
β_{t+5}					0.649**	0.016	0.222
					(0.025)	(0.952)	(0.421)
Only with host countries		no	yes	no	no	yes	no
Only with developed countries		no	no	yes	no	no	yes
Lag and lead variables		no	no	no	yes	yes	yes
Observations	1060	1060	512	546	1060	512	546
Adj R-squared	0.5592	0.5737	0.435	0.4239	0.585	0.4259	0.4299

Source : Table prepared by the author

5. Overall Discussion and Limitations

Having described and analyzed the statistical results on our 4 dependent economic variables, it would be useful to examine the potential reasons behind our results. Firstly, one of the potential causes of the insignificance of our coefficient estimates is that spendings related to these events, while large, often represent only a small proportion of the host country's GDP. As an example, the Paris 2024 Olympic Games cost France around 5 billion euros. Some would say that this is a huge amount, and even too high to organize a sporting competition, but if we put it in perspective, this total cost only represents around 0.179% of France's total GDP over the year 2024 (CEDEF, 2024). Especially in large or high-income countries, absolute spendings may represent only a tiny fraction of total economic activity. As a result, their marginal effect on macro variables like GDP or exports may be statistically hard to detect.

Secondly, public investments in infrastructure and event operations may divert resources from other productive areas such as education, health or private investment. This loss of productivity and potential investment in other sectors can sometimes lead to limited or even negative net macroeconomic gains. Some host, or candidate, countries may be putting too many resources, money, effort and time into these events, to the detriment of industries or societal issues that would require immediate substantial investment. Additionally, in developing countries, new infrastructure may stimulate growth because it fills a gap. In contrast, in developed countries, additional infrastructure may be redundant or generate lower returns. This could explain sometimes negative results from the statistical models for the dependent variables. Furthermore, if facilities built for the event are not reused or integrated into local economic strategies, the long-term return on investment may be low or even negative.

Another potential reason for the disparity in statistical results is that the effectiveness of event-related investments can depend heavily on the country's ability to manage projects efficiently. Corruption or mismanagement may reduce the positive impact of spending and, even though democracy level was one proxy variable included in the vector of controls, it can be difficult in a statistical study to really take this aspect into account.

With regard to the pre-event phase, which is often statistically more significant than the post-event phase, there could also be a kind of temporary “bubble effect” in which hosting may generate early optimism such as pre-event spikes in FDI or exports. But sometimes not all expected benefits finally materialize as investors might pull back later.

Last but not least, in the lag and lead models, we often observe greater statistical significance for the hosting variable due to the expanded temporal scope introduced by these additional variables. While the classic models include only a single dummy for the year of the event, resulting in just 17 data points where Hosting = 1 among the more or less 1000 data lines, the lag and lead models capture effects over a broader time horizon. This wider coverage improves the model’s ability to detect statistically significant patterns related to the event's economic impact.

Consequently, it is important to consider the limitations and weaknesses of the study that has been carried out. First and foremost, as already mentioned, with only 17 host-country cases, statistical power is limited. This small sample may bias estimates or make significant results harder to detect. As a matter of fact, despite interesting patterns in coefficients, several effects were not statistically significant, limiting the ability to draw strong conclusions or generalize findings. Some models even show conflicting directions for the same variable. This could reflect model sensitivity or contextual differences and could reduce robustness.

In addition, although the model contains control variables, it may lack relevant factors and trends such as tourism flows, media exposure, or institutional reforms occurring at the same time. Those omitted variables may have an impact on our economic indicators and are not taken into account in our models.

Moreover, the infrastructure costs can, in a sense, not be standardized across countries. Indeed, it is possible that infrastructure investments to host a sporting event are part of a broader economic development plan. While some countries build facilities just for the event, others build resilient and reusable infrastructures whose cost will be offset by returns over several years, such as transport and telecommunications infrastructures. The literature even shows that one of the determining factors in the economic success of mega-events is the long-term use of the infrastructure built for the occasion (Matheson, 2018; Bibolov et al., 2022; Thabi, 2024).

Subsequently, the analysis was only conducted at the national level. This broad national perspective, while beneficial for better understanding state decisions to host mega-events, can mask local or sector-specific dynamics. For example, it is possible that only the city hosting the Olympic Games will see a positive impact on its GDP per capita due to a tourist boom, while the rest of the country could experience a decline occurring at the same time. In this configuration, the model may not represent the positive local impact, but a negative national impact that is not necessarily due to the hosting. The same applies to certain sectors, for which a mega event would be highly beneficial in terms of growth, but whose benefits are masked by the model.

Finally, it must be said that using a binary variable to capture country development level may oversimplify a more continuous and nuanced reality. First, in the context of mega events, institutional quality or regional integration seem to matter more (Müller & Gaffney, 2018; Ren & Li, 2019; Soussane & Ibourk, 2024). And secondly, the IMF classification (2023) of certain countries sometimes seems a little outdated. For example, China, one of the world's largest economies, is still considered a non-developed country. This over-simplistic and sometimes ambiguous classification can diminish the power of our statistical conclusions.

6. Conclusion

This thesis aimed to examine how hosting major sporting events affects key macroeconomic indicators such as GDP growth, FDI inflows, employment rate, and exports. By leveraging historical data from previous tournaments and applying panel data regressions, the research sought to investigate the economic impact of hosting, the infrastructure costs related and the difference between developed and developing countries, especially in light of growing skepticism around the costs and benefits of such events. In terms of method, six linear regressions were performed on four macroeconomic dependent variables, making a total of 24 regressions in this study. The last three models differ from the first three only in that seven lag variables and five lead variables have been added. What then distinguishes each model from the others is the number of countries included in the analysis. In the first and fourth models, all countries that have hosted a mega event are included, as well as countries that have already been candidate hosts. In the second and fifth models, only countries that have already been hosts are included. And finally, in the third and sixth, only developed countries, host or not, are included.

The results suggest that macroeconomic impacts vary significantly depending on the country's level of development, the timing of the measurement, and the indicator in question. Regarding the GDP per capita growth rate dependent variable, no significant impact was found in the first three classic models. However, when introducing lag and lead variables, the study concludes to significant negative impact of hosting, particularly for developing nations. In these models, however, statistical analysis revealed a significant positive effect of infrastructure costs.

As for the employee-to-population ratio among residents aged 15 and over, the results are again insignificant in the first three models, with the exception of the intercept. In contrast, the lag and lead models reveal a very positive significant impact of hosting, sometimes more than 8% on the dependent variable, and greater for developed countries. The statistical study also concludes that infrastructure costs have a surprisingly negative effect on the employment rate, and that this effect is extremely significant. More interestingly, one of the research findings is that the pre-event phase has a systematic and significant benefit on a country's employment rate. The results are not confirmed after the hosting year, however.

Once again, in models analyzing FDI inflow, significance arrives mostly in the last three regressions. The study concludes that hosting has a positive impact on both developed and developing countries. As for the difference between the two, the conclusion depends on the model. Infrastructure costs are significant in the first two models and in the sixth. Their coefficient estimate is positive except for the last model. Statistical research also points to a significant and extremely profitable pre-event phase for developed countries. For less advanced countries, no significance emerges from the regression. However, it would appear that there is a three-year post-event beneficial phase on FDI inflow when all countries are taken into account.

And finally, the findings of the study on the dependent variable Trade, which represents a country's exports, show that Hosting has a very strong significant effect for developed countries in the lag and lead model. In this same model, infrastructure costs are significant with a small negative estimate, whereas in all the other models, they are shortly positive and almost always significant, at least at the 10% level. Similarly to the FDI analysis, model (4) shows a significant and positive post-event phase, although Hosting itself is not significant. With model (6), we can conclude that there is a pre-event phase for developed countries. This extends from six years before the tournament to the year before, and has a very beneficial impact, almost as high as the hosting year.

Based on the statistical analysis, the first research hypothesis, that hosting a major sporting event has a positive effect on macroeconomic indicators, is only partially confirmed. While no significant effect is found in the classic models, the lag and lead regressions reveal strong evidence of positive impacts and particularly for employment and FDI, and in some cases for trade in developed countries. However, in those models, the study concludes to negative impact of hosting on the GDP per capita rate. Therefore hosting is not a guaranteed economic boost and may not always translate into significant macroeconomic change. Subsequently, the hypothesis that developing countries benefit more from hosting is not consistently supported by the data. In many cases, developed countries indeed appear to capture larger and more significant economic benefits. Lastly, the third research hypothesis that infrastructure costs have a positive impact on macroeconomic outcomes yields mixed results as well. Although infrastructure costs are often significant, their effect is not uniformly positive. They are associated with positive outcomes for GDP, FDI and exports. However, it should be noted that, for the same variables, they have a negative effect in developed countries. And for employment rate, ICs are significantly negative for each lag and lead model which suggests potential inefficiencies or diminishing returns on such investments.

The results highlight that the economic impact of hosting a mega sporting event is highly context-dependent and varies significantly by country type, timing, and the specific indicator under analysis. Importantly, effects are often more pronounced in the pre-event phase which might reflect anticipatory investments and market responses to the announcement of the event. These findings suggest that policymakers should not only assess the expected returns in the year of hosting, but also account for the longer preparatory phase and post-event period when evaluating the potential benefits. Moreover, the evidence that infrastructure costs may not always yield positive macroeconomic outcomes underlines the need for careful prioritization of investments. Especially in countries where existing infrastructure is already sufficient, the reuse and long-term planning of facilities is crucial to their economic success. In addition, strong institutional planning, long-term legacy vision and economic openness matter and are required to turn a World Cup or Olympic Games into a real strategic economic opportunity.

Ultimately, this thesis contributes to a more comprehensive understanding of the economic effects of hosting mega sporting events by adopting a multidimensional approach. By analyzing four distinct macroeconomic indicators, GDP, employment, FDI, and trade, the study offers a broader perspective than many previous works which focused on a single outcome. This holistic approach provides policymakers and researchers with a more nuanced basis for evaluating the potential benefits and risks associated with hosting these high-profile international tournaments.

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Appendices

Appendix 1

Table 1 : Table of variables of Rose & Spiegel's (2009) model

Variable	Description
X	real FOB exports from i to j, measured in millions of dollars
D	distance between i and j
Pop	population
GDPpc	annual real GDP per capita
Cont	binary variable which is unity if i and j share a land border and zero otherwise
CU	binary "dummy" variable which is unity if i and j use the same currency at time t
Lang	binary variable which is unity if i and j have a common language
RT A	binary variable which is unity if i and j have a regional trade agreement at t
Border	binary variable which is unity if i and j share a land border
Islands	number of island countries in the pair (0/1/2)
Area	log of the product of the areas of the countries
ComCol	binary variable which is unity if i and j were both colonized by the same country
Colony	binary variable which is unity if i colonizes j at time t (or vice versa)
EverCol	binary variable which is unity if i ever colonized j (or vice versa)
SameCtry	binary variable which is unity if i is part of the same country at time t (or vice versa)
β	vector of nuisance coefficients
Olympics/Summer/Winter	binary variables which are unity if i hosted a post-war Olympics games/Summer games/Winter games at or before time t, and zero otherwise
ε	omitted other influences on bilateral exports, assumed to be well behaved

Source : Table prepared by the author

Appendix 2

Table 2 : World Cup hosts and applicants

Edition	Host(s)	Applicants that have not withdrawn
2022	Qatar	United States, South Korea, Japan, Australia
2018	Russia	Portugal & Spain, England, Belgium & The Netherlands
2014	Brazil	/
2010	South Africa	Morocco, Egypt
2006	Germany	South Africa, England, Morocco
2002	Japan & South Korea	Mexico
1998	France	Morocco
1994	United States	Morocco, Brazil
1990	Italy	Soviet Union
1986	Mexico	USA, Canada
1982	Spain	/
1978	Argentina	/
1974	West Germany	/
1970	Mexico	Argentina
1966	England	West Germany
1962	Chile	Argentina
1958	Sweden	/
1954	Switzerland	/
1950	Brazil	/
1938	France	Argentina, Germany
1934	Italy	/
1930	Uruguay	/

Source : FIFA (2022), table prepared by the author

Table 3 : Summer Olympics hosts and applicants (modern Olympics)

Edition	**Host**	**Applicants that have not withdrawn**
2024	Paris	Los Angeles (selected as 2028 host)
2020	Tokyo	Istanbul, Madrid, Baku, Doha
2016	Rio de Janeiro	Madrid, Tokyo, Chicago, Baku, Doha, Prague
2012	London	Paris, Madrid, New York, Moscow, Leipzig, Rio de Janeiro, Istanbul, Havana
2008	Beijing	Toronto, Paris, Istanbul, Osaka, Bangkok, Cairo, Havana, Kuala Lumpur, Seville
2004	Athens	Rome, Cape Town, Stockholm, Buenos Aires, Istanbul, Lille, Rio de Janeiro, St. Petersburg, Seville, San Juan
2000	Sydney	Beijing, Manchester, Berlin, Istanbul, Brazilia, Milan, Tashkent
1996	Atlanta	Athens, Toronto, Melbourne, Manchester, Belgrade
1992	Barcelona	Paris, Belgrade, Brisbane, Birmingham, Amsterdam
1988	Seoul	Nagoya
1984	Los Angeles	/
1980	Moscow	Los Angeles
1976	Montreal	Moscow, Los Angeles
1972	Munich	Detroit, Madrid, Montreal
1968	Mexico City	Detroit, Lyon, Buenos Aires
1964	Tokyo	Detroit, Vienna, Brussels
1960	Rome	Lausanne, Brussels, Budapest, Detroit, Mexico City, Tokyo
1956	Melbourne	Buenos Aires, Mexico City, Chicago, Detroit, Los Angeles, Minneapolis, Philadelphia, San Francisco, Montreal
1952	Helsinki	Los Angeles, Minneapolis, Amsterdam, Detroit, Chicago, Philadelphia, Athens, Lausanne, Stockholm
1948	London	Baltimore, Lausanne, Los Angeles, Minneapolis, Philadelphia
1936	Berlin	Barcelona, Alexandria, Budapest, Buenos Aires, Cologne, Dublin, Frankfurt, Helsinki, Lausanne, Nuremberg, Rio de Janeiro, Rome
1932	Los Angeles	/
1928	Amsterdam	/
1924	Paris	/
1920	Antwerp	/
1912	Stockholm	/
1908	London	/
1904	St Louis	/
1900	Paris	/
1896	Athens	/

Source : IOC (2024), table prepared by the author

Appendix 3

Table 5 : Distinction between developed and developing economies

Developed countries	Developing countries
Andorra Australia Austria Belgium Canada Croatia Cyprus Czech Republic Denmark Estonia Finland France Germany Greece Hong Kong SAR Iceland Ireland Israel Italy Japan Korea Latvia Lithuania Luxembourg Macao SAR Malta The Netherlands New Zealand Norway Portugal Puerto Rico San Marino Singapore Slovak Republic Slovenia Spain Sweden Switzerland Taiwan Province of China United Kingdom United States	Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Azerbaijan, The Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Comoros, Democratic Republic of the Congo, Republic of Congo, Costa Rica, Côte d'Ivoire, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kuwait, Kyrgyz Republic, Lao P.D.R., Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Samoa, São Tomé and Príncipe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, Somalia, South Africa, South Sudan, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Syria, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Türkiye, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, West Bank and Gaza, Yemen, Zambia, Zimbabwe

Source : IMF (2023), table prepared by the author

Appendix 4

Table 6 : FIFA World Cups and Olympic Games costs data

Event	**Infrastructure costs (USD 2018)**	**Operational costs (USD 2018)**	**Source**
2024 OLYMPICS IN PARIS	USD 2 066 084 602	USD 3 149 066 224	CDES (2024)
2022 WC IN QATAR	/	/	/
2020 OLYMPICS IN TOKYO	USD 1 545 207 539	USD 3 433 794 531	IOC (2022)
2018 WC IN RUSSIA	USD 3 268 792 409	USD 1 824 000 000	Müller et al. (2022)
2016 OLYMPICS IN RIO	USD 2 302 301 924	USD 2 865 936 005	Müller et al. (2022)
2014 WC IN BRAZIL	USD 2 693 024 533	USD 2 358 996 454	Müller et al. (2022)
2012 OLYMPICS IN LONDON	USD 7 750 871 315	USD 3 277 479 952	Müller et al. (2022)
2010 WC IN SOUTH AFRICA	USD 3 602 097 118	USD 1 828 693 160	Müller et al. (2022)
2008 OLYMPICS IN BEIJING	USD 2 050 356 057	USD 3 246 474 044	Müller et al. (2022)
2006 WC IN GERMANY	USD 2 192 342 961	USD 1 188 001 722	Müller et al. (2022)
2004 OLYMPICS IN ATHENS	USD 4 960 521 559	USD 2 589 614 783	Müller et al. (2022)
2002 WC IN JAPAN AND SOUTH KOREA	USD 6 421 653 534	USD 855 157 867	Müller et al. (2022)
2000 OLYMPICS IN SYDNEY	USD 1 661 946 805	USD 1 703 960 415	Müller et al. (2022)
1998 WC IN FRANCE	USD 928 896 676	USD 652 736 793	Müller et al. (2022)
1996 OLYMPICS IN ATLANTA	USD 791 245 506	USD 1 963 995 903	Müller et al. (2022)
1994 WC IN THE US	USD 8 470 416	USD 835 183 020	Müller et al. (2022)
1992 OLYMPICS IN BARCELONA	USD 1 529 678 996	USD 998 663 592	Müller et al. (2022)
1990 WC IN ITALY	USD 2 002 516 344	USD 173 849 295	Müller et al. (2022)

Source : Table prepared by the author

Appendix 5

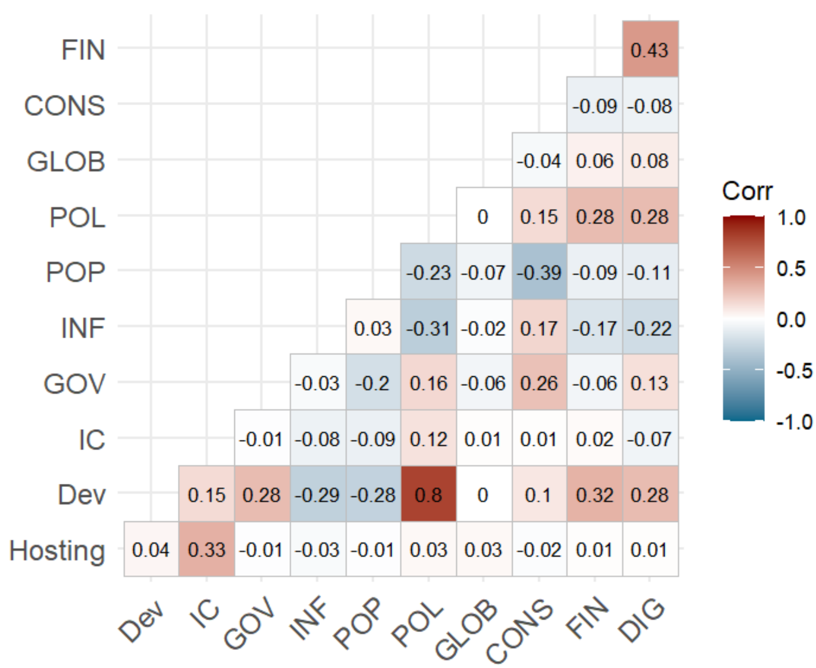
Table 7 : List of economic controls and their descriptions

Variable	Description	Source
CONS	Private Consumption as a share of GDP (%)	World Bank (2023)
DIG	Individuals using the Internet (% of population)	World Bank (2023)
FIN	Stocks traded, total value (% of GDP)	World Bank (2023)
GOV	Government Consumption as a share of GDP (%)	World Bank (2023)
GLOB	Previous year's global GDP per capita growth rate	World Bank (2023)
INF	Inflation rate	World Bank (2023)
POL	Democracy index, from 0 (authoritarian regimes) to 10 (full democracies)	Economist Intelligence Unit (2023)
POP	Population growth rate	World Bank (2023)

Source : Table prepared by the author

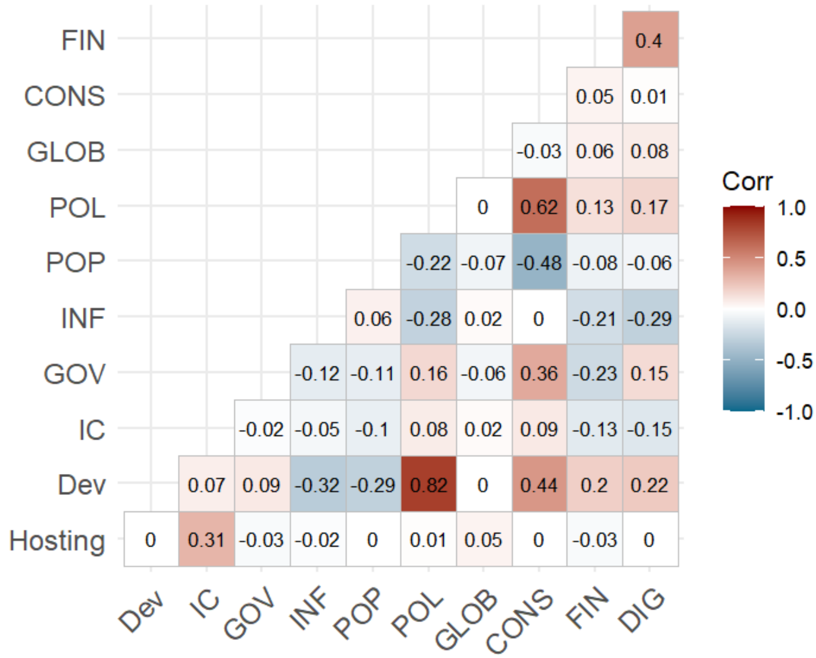
Appendix 6

Figure 5 : Correlation matrix with every countries



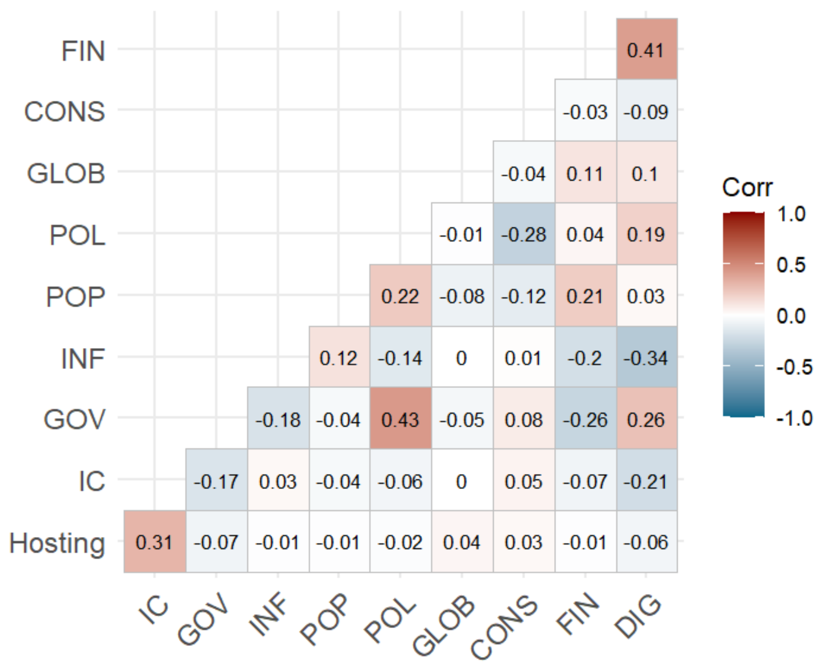
Source : Figure prepared by the author

Figure 6 : Correlation matrix only with host countries



Source : Figure prepared by the author

Figure 7 : Correlation matrix only with developed countries



Source : Figure prepared by the author

Appendix 7

Table 11 : GDP results summary

Variable	Models	Impact	Significance levels	Research hypothesis confirmation
Hosting (developing countries)	(1), (2), (4), (5)	Negative	β_1: 5% in (4) β_1: 5% in (5)	
Hosting (developed countries)	(1), (2), (3), (6)	Positive		*Hypothesis 1* confirmed but non-significantly
	(4), (5)	Negative	β_1 : 5% in (4) β_1: 5% in (5)	
IC	(1), (2), (3), (4), (5), (6)	Positive	β_3: 10% in (4) β_3: 5% in (5)	*Hypothesis 3* confirmed
Pre-event	(4), (5)	Negative	β_{t-4}: 5% in (4) β_{t-5}: 10% in (5) β_{t-4}: 1% in (5)	
	(6)	Mixed		
Post-event	(5)	Positive		
	(4), (6)	Mixed		

Source : Table prepared by the author

Appendix 8

Table 13 : Employment rate results summary

Variable	Models	Impact	Significance levels	Research hypothesis confirmation
Hosting (developing countries)	(1), (4), (5)	Positive	β_1: 5% in (4) β_1: 10% in (5)	*Hypothesis 1* confirmed
	(2)	Negative		
Hosting (developed countries)	(1), (2), (3), (4), (5), (6)	Positive	β_1: 5% in (4) β_1: 10% in (5) β_1: 5% in (6)	*Hypothesis 1* confirmed *Hypothesis 2* confirmed only in (1) but non-significantly
IC	(1), (2), (3)	Positive		*Hypothesis 3* confirmed but non-significantly
	(4), (5), (6)	Negative	β_3: 1% in (4) β_3: 1% in (5) β_3: 1% in (6)	
Pre-event	(4), (5), (6)	Positive	β_{t-6}: 1% in (4), (5), 5% in (6) β_{t-5}: 1% in (4), (5), (6) β_{t-4}: 1% in (4), (5), (6) β_{t-3}: 1% in (4), (5), 5% in (6) β_{t-2}: 1% in (4), (5), (6) β_{t-1}: 1% in (4), (5), 5% in (6)	
Post-event	(4), (5), (6)	Mixed		

Source : Table prepared by the author

Appendix 9

Table 15 : FDI results summary

Variable	Models	Impact	Significance levels	Research hypothesis confirmation
Hosting (developing countries)	(1), (2), (4), (5)	Positive	β_1: 10% in (4)	*Hypothesis 1* confirmed and significantly in (4)
Hosting (developed countries)	(2), (3), (4), (5), (6)	Positive	β_1: 10% in (4) β_1: 1% in (6)	*Hypothesis 1* confirmed *Hypothesis 2* confirmed but non-significantly
	(1)	Negative		
IC	(1), (2), (3), (4)	Positive	β_3: 1% in (1) β_3: 5% in (2)	*Hypothesis 3* confirmed
	(5), (6)	Negative	β_3: 1% in (6)	
Pre-event	(4), (5), (6)	Positive	β_{t-7}: 10% in (4) β_{t-6}: 1% in (6) β_{t-5}: 1% in (6) β_{t-4}: 1% in (6) β_{t-3}: 10% in (4), 1% in (6) β_{t-2}: 1% in (6) β_{t-1}: 1% in (6)	
Post-event	(4), (5), (6)	Positive	β_{t+1}: 5% in (4) β_{t+2}: 5% in (4) β_{t+3}: 10% in (4)	

Source : Table prepared by the author

Appendix 10

Table 17 : Trade results summary

Variable	Models	Impact	Significance levels	Research hypothesis confirmation
Hosting (developing countries)	(1), (2), (4) (5)	Positive Negative		*Hypothesis 1* confirmed but non-significantly
Hosting (developed countries)	(2), (3), (6) (1), (4), (5)	Positive Negative	β_1: 1% in (6)	*Hypothesis 1* confirmed *Hypothesis 2* confirmed but non-significantly in (1), (4) and (5)
IC	(1), (2), (3), (4), (5) (6)	Positive Negative	β_3: 1% in (1), 5% in (2), (4), 10% in (3) β_3: 1% in (6)	*Hypothesis 3* confirmed
Pre-event	(4), (6) (5)	Positive Negative	β_{t-7}: 1% in (4) β_{t-6}: 1% in (6) β_{t-5}: 1% in (6) β_{t-4}: 1% in (6) β_{t-3}: 1% in (6) β_{t-2}: 1% in (6) β_{t-1}: 1% in (6)	
Post-event	(4), (5), (6)	Positive	β_{t+1}: 1% in (4) β_{t+2}: 1% in (4) β_{t+3}: 5% in (4) β_{t+4}: 5% in (4) β_{t+5}: 5% in (4)	

Source : Table prepared by the author