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What Makes Mega-Events Profitable? Determinants of Revenues and Costs of the Olympic Games and the Football World Cup

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ABSTRACT

Mega-events like the Olympic Games and FIFA World Cups present significant financial and management risks for the public sector. This article investigates the key determinants of revenues, costs, and profitability for these events to better understand and anticipate these challenges. Through a longitudinal analysis of 43 events held between 1964 and 2018, the study reveals a positive correlation between a host country's gross domestic product (GDP) per capita and both the revenues and costs of these mega-events. While GDP is not correlated with profitability, higher levels of economic freedom are associated with greater profitability, indicating that countries with lower levels of government intervention tend to achieve better financial outcomes, regardless of their overall wealth. Stakeholders, ranging from event rights-holders and international federations to local organizers and policymakers, can benefit from these findings to make well-informed decisions in planning and executing future mega-events.

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1. Introduction

Hosting major sporting events, also known as mega-events, such as the Olympic Games and the FIFA World Cup, has consistently attracted the attention of policymakers and scholars from various disciplines. These events are often perceived as opportunities to generate substantial revenue and provide multiple economic benefits (Baade & Matheson, 2001; Gillett & Tennent, 2022; Tien et al., 2011). Tourists are expected to flock to host cities, new jobs are created, and global visibility increases (Drapkin et al., 2024). Furthermore, these events serve as platforms for local development, stimulating investment in infrastructure and public services (Essex & Chalkley, 2004), and are expected to have a long-term positive impact. The planning and management of these events often fall under the responsibility of public management, involving a complex interplay of governmental bodies at different levels,

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private entities, and civic organizations (Chappelet, 2023; Müller, 2015). Mega-events are among the riskiest undertakings of the public sector in terms of delivering on promises, creating benefits, and containing costs (Jennings, 2012; Priemus et al., 2008).

The role of public management is crucial (Gillett & Tennent, 2017), as poor planning and execution can lead to enormous upfront costs – such as building new facilities, upgrading infrastructure, and organizational expenses – that risk burdening local budgets for years or even decades (Flyvbjerg et al., 2021; but see Preuss & Weitzmann, 2023). After the events, host cities may face ongoing maintenance costs, unused facilities, and debt, creating issues of public governance and fiscal responsibility (Müller, 2015). This problem may raise questions about the economic viability of hosting these events and highlights the need for effective public management strategies to ensure that the anticipated economic and social benefits are realized while mitigating risks and costs.

While the hosting of the Olympic Games and the Football World Cup is often regarded as an opportunity for economic uplift (Szymanski, 2010), it is crucial to consider the full spectrum of financial implications, both positive and negative (Agha & Rascher, 2021; Baade et al., 2008b). This complex interplay between revenue generation and cost incurrence makes exploring the specific determinants that influence these economic outcomes a vital area of research. Current research into the economic impact of these events is extensive but has not looked into key drivers of revenue and costs. Too often, public administration lacks the data and the political support to properly predict revenues and costs and undertake a comprehensive economic cost-revenue calculation. This makes it challenging to evaluate mega-events as public policies and to anticipate their economic costs, benefits, and risks relative to other public investment projects.

This article addresses this critical gap by conducting a comprehensive empirical analysis of the macroeconomic determinants of revenue, expenses, and profitability in hosting mega-events. Our study focuses on three of the most prominent mega-events in the sporting world: the Olympic Summer Games, the Olympic Winter Games, and the FIFA Men's Football World Cup. Using a longitudinal dataset covering 43 events from 1964 to 2018, we examine three key macro-level economic determinants: (1) gross domestic product (GDP) per capita, which reflects the host country's overall wealth; (2) the Economic Freedom of the World (EFW) index, which measures the degree of market openness and government intervention in the economy; and (3) the Polity Score, which assesses the country's political system on a spectrum from autocracy to full democracy. Importantly, our unit of analysis is the financial performance of the mega-event itself, focusing on event-specific revenues, costs, and profitability rather than the broader economic conditions of the host country.

2. Literature Review

2.1. Mega-Projects and Public Management

Mega-events have become a strategic tool for national and regional development policies worldwide. Their appeal is partly driven by the rise of entrepreneurial

governance in public administration, where cities and states actively compete to attract investment, funding, and global visibility through hosting rights (Burbank et al., 2002; Swyngedouw et al., 2002). In this context, mega-events are often framed as catalysts for urban transformation, infrastructure development, and economic growth.

Beyond their economic and developmental role, mega-events have also been leveraged as instruments of soft power, particularly by emerging nations, such as China, Russia, Brazil, and Qatar. These countries have used high-profile sporting events to enhance their international standing, project political influence, and reshape global perceptions (Wolfe, 2020). However, despite their potential benefits, hosting mega-events presents significant governance challenges, requiring careful coordination between government bodies, private stakeholders, and international organizations to manage costs, logistics, and long-term legacies effectively.

Mega-events share several structural and financial characteristics with other large-scale public sector mega-projects, such as dams, airports, railways, road infrastructure, and flagship cultural buildings (Liu et al., 2010). These projects are characterized by high initial investment costs, complex funding structures, long planning horizons, and significant public-private interdependencies. Like traditional mega-projects, mega-events require coordinated decision-making across multiple public, private, and hybrid stakeholders, often leading to bureaucratic complexity, competing interests, and fragmented accountability (Gillett & Tennent, 2022; Pitsis et al., 2018).

A key governance challenge in managing mega-events arises from informational asymmetries, particularly in a principal-agent dynamic where public authorities act as the principal but have less knowledge and control over costs, risks, and potential benefits than the interest groups advocating for the event, such as bidding committees, corporate sponsors, and international governing bodies (Preuss et al., 2019). This imbalance heightens the risk of biased decision-making, where costs may be underestimated, and expected benefits exaggerated, ultimately leading to financial overruns and unmet economic expectations. Moreover, the fixed deadlines of mega-events impose additional pressures, reducing the flexibility available for budgetary adjustments and project modifications – an issue that often exacerbates financial inefficiencies and governance risks.

The regular controversies surrounding these projects – such as cost overruns, displacement of local communities, and environmental concerns – often necessitate significant adaptations of the original plan (Esposito et al., 2022; Kundu et al., 2023). For instance, the 2016 Rio Olympics faced criticism due to budget overruns and forced evictions in favelas, while the 2022 FIFA World Cup in Qatar was widely scrutinized for labor rights violations and environmental impact. Similarly, the 2004 Athens Olympics resulted in long-term public debt due to excessive infrastructure spending, much of which fell into disuse after the Games.

In addition, the extended planning and implementation period, frequently extending over more than 10 years, exposes mega-events to changing social, mediatic, economic, and political circumstances (Sakaki et al., 2022). Consequently, as with other mega-projects, public management of mega-events is subject to significant uncertainty and risk (Jennings, 2012; Priemus et al., 2008; Santamaria, 2013), often

resulting in cost overruns and benefit shortfalls (Catalão et al., 2022; Flyvbjerg et al., 2021).

However, mega-events pose additional challenges for public management compared with other mega-projects. First, a strict and immovable timeline for delivery is set many years in advance, which makes it impossible to reschedule commitments and trade off schedule overruns against budget overruns (Flyvbjerg et al., 2021). Second, a rigid hosting contract sets out the obligations of host countries and cities and makes the decision to host irreversible (De Nooij, 2014). Third, the governance structure of mega-events is heavily influenced by international actors, such as event rights-holders (IOC, FIFA), rule-setting organizations (international sports federations), global sponsors, and large contractors. These entities exert significant control over crucial financial and operational decisions, often limiting the autonomy of local public management actors (Müller et al., 2022b). For instance, the IOC and FIFA enforce strict contractual requirements that dictate revenue-sharing frameworks, sponsorship agreements, and infrastructure standards, frequently prioritizing the interests of governing bodies and commercial partners over those of host governments. This external influence constrains public authorities' ability to make independent financial and strategic decisions, complicating the management of costs and event logistics.

These factors compound the uncertainty surrounding the outcomes and costs of mega-event hosting, making it hard for public administrators to anticipate, mitigate, and manage these risks. For economic costs and benefits, public administration will be susceptible to estimates from interest groups such as bid committees, which often present a biased picture, underestimating costs, and overestimating benefits (Chappelet, 2019). A systematic analysis of the revenues and costs of past mega-events, along with their key financial drivers, is essential for public administrators to make more informed decisions regarding the actual costs and benefits of hosting. Although comprehensive financial accounts are not always publicly accessible, our study synthesizes existing data sources to uncover key economic patterns and determinants.

2.2. Economic Impact of Mega-Events

A significant challenge for public management in hosting mega-events lies in ensuring their economic viability and financial sustainability. Scholars across economics, urban planning, and public policy have extensively studied the economic impact of mega-events, analyzing how event-related spending influences host regions or countries. Various methodologies have been applied, each offering a different perspective on the economic implications of these events (Baade et al., 2008a; De Nooij, 2014; Kobierecki & Pierzgalski, 2022; Lertwachara & Cochran, 2007; Preuss, 2005; Taks et al., 2011).[1]

Multiplier analysis and input–output models assess how initial expenditures generate broader economic activity by tracking the flow of spending across different sectors. Linkage models examine inter-industry dependencies to measure economic spillovers. Econometric analysis identifies causal relationships between hosting mega-events and macroeconomic indicators such as GDP growth, employment, and tourism. Cost-benefit analysis (CBA) compares projected benefits against associated

costs to evaluate the financial justification for hosting. Finally, computable general equilibrium (CGE) models simulate the overall economic effects of mega-events by incorporating price adjustments, policy changes, and supply-demand shifts.

There is broad agreement in the literature that the initial economic projections presented during bidding processes typically overestimate revenues and underestimate costs associated with mega-events (Flyvbjerg et al., 2003; Müller et al., 2022b). Empirical evidence frequently shows that the realized economic benefits, such as GDP growth, employment creation, and sustained tourism increases, often fall short of expectations, raising questions about the overall financial justification of hosting these events (Baade & Matheson, 2016; Flyvbjerg et al., 2021; Müller et al., 2021; Porter & Fletcher, 2008; Zimbalist, 2015). This discrepancy between anticipated and actual economic outcomes underscores the need for more rigorous empirical analyses to inform public management decisions and enhance the economic sustainability of hosting mega-events.

Jago et al. (2010) and Li and Jago (2013) critically reviewed the methodologies used in economic assessments of major sporting events, concluding that evaluations frequently fall short of rigorous analytical standards. Over recent decades, research on mega-events has progressively evolved from narrowly examining immediate, short-term financial outcomes to adopting a more comprehensive perspective on the broader economic implications. This shift emphasizes the long-term impacts on GDP, employment, tourism, and regional development, reflecting a more holistic understanding of the economic legacy mega-events can leave for host countries.

2.3. Financial Analysis of Mega-Events

The second research area focuses on the financial aspects of mega-events, examining the revenues (such as broadcasting rights, sponsorship revenues, ticket sales, licensing fees, and merchandising income) and the expenses (including operational expenditures, venue construction costs, bidding expenditures, and legacy-related costs) incurred by the organizing bodies and host cities. While there is abundant research on the financial aspects of mega-events, most of these studies are case-specific, making it problematic to derive general conclusions. Longitudinal analysis comparing multiple events—such as the Summer Olympics, Winter Olympics, and the World Cup – is relatively scarce. Fett (2020) offers one of the first longitudinal and systematic studies of the Men's Football World Cup from 1950 to 2018, highlighting its evolution and detailing how these mega-events have become significant economic, social, and political events. Fett shows a marked increase in organizational and infrastructure costs. This escalation reflects a broader trend of increasing financial investment from the organizers and returns for FIFA, which poses challenges for future hosts regarding sustainability and economic impact.

Among the few longitudinal studies comparing multiple mega-events, Graeff and Knijnik (2021) offer valuable insights by analyzing both the Olympic Games and the FIFA World Cup. Their findings suggest that expenses consistently exceed revenues, and public expenditure on these events is also increasing. However, their sample is limited to five World Cups and three Summer Olympics, whereas our study encompasses 43 events from 1964 to 2018.

Other studies take a more specialized approach, examining specific aspects of revenues and costs. For instance, Preuss et al. (2019) scrutinize the budgets of organizing committees for both the Summer and Winter Olympics, concluding that revenues generally offset expenditures. Lertwachara et al. (2022) argue that hosting major sporting events (analyzing the Olympic Games, the FIFA Men's World Cup, the UEFA Men's Championship, and the Asian Games between 1960 and 2018) generally leads to an increase in foreign direct investment (FDI) for the host country, with variations based on the specific event and country characteristics. Flyvbjerg et al. (2021) provide the most systematic examination of cost overruns, revealing that every Olympic Games has experienced cost overruns, which, on average, are more extensive than other mega-projects. Overall, Müller et al. (2022b) present the most comprehensive study to date. They systematically compare the major costs and revenues of the Olympics and the World Cup by analyzing time-series data covering 1964 to 2018. They find that over 80% of these events did not generate sufficient revenues to cover all incurred costs.

In our study, we extend the current body of research, particularly building on the work and dataset by Müller et al. (2022a, 2022b). In response to their suggestion to apply regression analyses, we examine the key macroeconomic determinants affecting revenues, costs, and profitability of mega-events. To our knowledge, this is the first empirical analysis that systematically applies regression techniques to a longitudinal dataset of this scale, encompassing multiple editions of the Summer Olympics, Winter Olympics, and FIFA World Cup. By shifting from descriptive case analyses to an inferential approach, our analysis aims to uncover underlying economic and governance factors that significantly influence the financial outcomes of hosting mega-events.

3. Method

3.1. Data Collection

Our study focuses on three of the most prominent mega-events in the sporting world: the Olympic Summer Games, the Olympic Winter Games, and the FIFA Men's Football World Cup. Covering the period from 1964 to 2018, this longitudinal dataset enables us to track trends, fluctuations, and shifts in the determinants of revenues and costs over time. It also allows us to account for broader economic, social, and technological changes that have influenced the financial dynamics of hosting these events.

To ensure data reliability, consistency, and comprehensiveness, we systematically compiled and cross-referenced five categories of sources (for more detail, see Müller et al., 2022):

Official post-event reports: Issued by Organizing Committees and approved by the IOC or FIFA, these reports were our primary sources for structured data on ticketing, broadcasting, sponsorship revenues, and key cost components.

FIFA financial and activity reports/IOC marketing fact files: For the World Cups, we drew on FIFA's financial and technical reports to supplement and verify figures. For the Olympics, IOC marketing fact files provided standardized data, particularly

on global sponsorship and broadcasting revenue streams. For IOC global sponsorship revenues, which are reported per Olympic quadrennium rather than per individual Games, we allocated income using a 2:1 split between the Summer and Winter Olympics, based on relative event scale and audience reach.

Governmental reports and audits: When official event reports were unavailable or incomplete, we consulted national audit offices, ministerial reports, or government financial audits – especially in contexts with high public spending – to validate and supplement the data.

Academic studies: In cases of limited or missing financial documentation – particularly for older events – peer-reviewed publications provided independently verified estimates, especially for venue construction and organizational costs.

Media reports: Where no other reliable data were available, we cautiously used figures from reputable media outlets such as The Guardian, Associated Press, and Die Zeit.

By triangulating across these diverse sources, we minimized single-source bias and assembled a historically consistent and methodologically sound dataset covering over five decades of Olympic and World Cup financial data. The full dataset, along with methodological details and all sources explicitly reported, is publicly available in the Harvard Dataverse (Müller et al., 2022a).

To ensure comparability over time, we applied a two-step currency normalization process. First, all monetary values were converted into U.S. dollars using the World Bank's national currency unit rates. Then, values were adjusted for inflation to 2018 USD using the World Bank's Consumer Price Index. This approach, following Turner et al. (2019) and Essex and Chalkley (2004), allows for meaningful cross-temporal comparisons in real terms.

3.2. Sample

In our study, we selected three mega-events – the Summer Olympics, the Winter Olympics, and the FIFA World Cup – based on their global significance, which we determined using Sportcal's Global Sports Impact Events (GSIE) Index (SportCal, 2019). This index, developed by a recognized leader in event-industry analysis, ranks events according to a composite measure of their size, scale, and impact, including criteria such as attendance figures, economic contribution, media reach, and global audience engagement. Our event selection allows for comparative analysis across distinct event formats, contrasting the multi-sport, single-location format of the Olympic Games with the single-sport, multi-location structure of the FIFA World Cup. This comparative approach provides valuable insights into the varying dynamics of these event types.

Our dataset spans from 1964 to 2018, encompassing 14 Summer Olympic Games, 15 Winter Olympic Games, and 14 World Cups, totaling 43 events (see Table 1).

We begin our analysis in 1964, a turning point in the scale, visibility, and financial complexity of mega-events. The early 1960s marked a significant expansion in their global impact, driven by technological advances such as live satellite broadcasting and intensified urban development in host cities. These changes coincided with important shifts in how financial data were generated, recorded, and disclosed: First,

Table 1. Overview of analyzed mega-events.

	Year	Host city	Host country
Summer Olympics	1964	Tokyo	Japan
	1968	Mexico Citx	Mexico
	1972	Munich	West Germany
	1976	Montreal	Canada
	1980	Moscow	USSR
	1984	Los Angeles	USA
	1988	Seoul	South Korea
	1992	Barcelona	Spain
	1996	Atlanta	USA
	2000	Sydney	Australia
	2004	Athens	Greece
	2008	Beijing	China
	2012	London	UK
	2016	Rio de Janeiro	Brazil
Winter Olympics	1964	Innsbruck	Austria
	1968	Grenoble	France
	1972	Sapporo	Japan
	1976	Innsbruck	Austria
	1980	Lake Placid	USA
	1984	Sarajevo	Yugoslavia
	1988	Calgary	Canada
	1992	Albertville	France
	1994	Lillehammer	Norway
	1998	Nagano	Japan
	2000	Salt Lake City	USA
	2006	Turin	Italy
	2010	Vancouver	Canada
	2014	Sochi	Russia
	2018	Pyeong Chang	South Korea
Football World Cup	1966		England
	1970		Mexico
	1974		West Germany
	1978		Argentina
	1982		Spain
	1986		Mexico
	1990		Italy
	1994		USA
	1998		France
	2002		Japan and South Korea
	2006		Germany
	2010		South Africa
	2014		Brazil
	2018		Russia

prior to the 1960s, financial records were often incomplete, inconsistent, or inaccessible, making reliable cross-event comparisons difficult. From 1964 onward, the IOC, FIFA, and host governments increasingly implemented standardized accounting practices and formal post-event reporting, in response to growing public scrutiny and the increasing financial complexity of these events. Second, this period saw the emergence of new revenue streams – particularly broadcasting rights and global sponsorships – which required more formalized contracts and clearer financial reporting.

Together, these developments significantly improved the availability and structure of financial data. Starting the dataset in 1964 therefore provides an optimal balance between historical coverage and data reliability, minimizing missing values and supporting a robust longitudinal analysis.

3.3. Measures

3.3.1. Dependent Variables

Our regression analysis targets revenues, costs, and return on investment (ROI) as the primary dependent variables. Given the time-dependent nature of the data, it is crucial to incorporate the time component into our regression model, as revenues and costs of mega-events have shown a consistent growth trend over the years (Müller et al., 2022a). To account for this, we included the variable Year as a control.

The ROI is calculated by dividing an event's net profit (the difference between revenues and costs) by its total costs, measuring its financial efficiency. For revenue, we specifically consider three major components: revenue from broadcasting rights, sponsorship (domestic and international), and ticket sales. According to prior research, notably Baade and Matheson (2016), these three sources constitute over 90% of recent Olympic Games and World Cup revenues. This high proportion emphasizes their significance and justifies their use as a robust approximation of an event's total revenue. Such an approach ensures that our analysis is grounded in these large-scale sporting events' most impactful financial aspects.

In defining the cost parameters for our analysis, we align with the methodology of Flyvbjerg et al. (2021) and focus on two primary types of costs: operational expenses and sports venue capital costs. This approach is consistent with similar studies by Preuss et al. (2019) and others, and it allows for a clear identification of direct, event-specific expenditures. In our analysis, we exclude indirect event-related costs such as hotel capacity expansion, public transport, airport extensions, and power supply improvements, mainly due to the difficulty in accurately attributing these costs to the event itself and the potential ambiguity highlighted by Baade and Matheson (2016) and Kassens-Noor (2012) about whether such expenses would have occurred without the event. Costs for Olympic villages, media centers, and similar facilities are also omitted, as Preuss et al. (2019) note that they are not directly essential and vary widely. Additionally, we exclude bidding costs (De Nooij, 2014), which are typically small compared to other expenses and complex to document accurately, as well as in-kind costs and opportunity costs due to their variable accounting standards and challenging quantification.

By excluding these indirect and in-kind costs, our cost estimation leans toward being conservative. Consequently, we are likely underestimating the actual costs associated with hosting mega-events, which, in turn, may lead to an overestimation of any potential profitability. Finally, it is essential to note that revenues and costs often accrue to different organizations: while IOC and FIFA hold a significant share of the overall revenue, most major cost items are borne by the hosts. Our profitability calculations, therefore, refer to the hypothetical profitability of the event overall (as though all major costs and revenues accrued to the same organization) and not to the profitability of a specific organization.

3.3.2. Independent Variables

Our study employs several independent variables to characterize countries along multiple dimensions, including wealth, economic freedom, and political systems. We use the host country's GDP per capita to capture a country's wealth (Wunderlich

et al., 2021). We utilize the EFW Index by the Fraser Institute to measure economic freedom in a country.[2] This index, available from 1950, is a comprehensive evaluation of economic freedom across nations, encompassing several vital components such as the size of government, legal systems, property rights, access to sound money, freedom to trade internationally, and the regulation of credit, labor, and business. These components are further broken down into subcategories and scored numerically, with the total score ranging from 0 to 10. A higher score on the EFW Index indicates greater economic freedom, characterized by institutions and policies that support voluntary exchange, protect property rights, and limit government interference in financial decisions.

We use the Polity Score available through the Center for Systemic Peace to assess a country's political system.[3] This score, available for most countries from 1800, rates the level of democracy and autocracy in a country's political system. It ranges from −10 to +10, where −10 denotes a fully autocratic regime, +10 is a fully democratic system, and 0 is a balance between autocracy and democracy. The Polity Score considers factors like the competitiveness of political participation, the presence of checks and balances, the extent of political rights and civil liberties, and the transparency of the decision-making process. This comprehensive scoring system provides a detailed and nuanced view of a country's political landscape.

3.3.3. Control Variables

In our analysis, recognizing the distinct nature of the events under study, we incorporate a categorical variable to differentiate between the types of events. This variable is coded as follows: 0 for the Summer Olympic Games, 1 for the Winter Olympic Games, and 2 for the FIFA World Cup. This approach allows us to control for the inherent differences between these events, each with its unique characteristics and economic implications.

Additionally, we include 'Year' as another control variable in our model. The inclusion of Year is crucial as it accounts for temporal factors that might influence the financial aspects of these events, such as changes in global economic conditions, technological advances, evolving sports marketing trends, and other time-related variables that could impact revenues, costs, and overall profitability. We treat Year as a continuous variable to capture long-term trends without overburdening the model with year-specific dummy variables. This approach implies a constant marginal effect across time, which may not fully capture year-specific dynamics. Ideally, year-specific dummy variables would allow for greater flexibility in modeling such heterogeneity. However, our dataset comprises only 43 events, and introducing a dummy variable for each year would consume a substantial number of degrees of freedom, potentially leading to model overfitting and unstable estimates. As such, modeling Year continuously reflects a pragmatic trade-off to preserve statistical power while controlling for time.

Table 2 in our study presents the descriptive statistics for the variables under consideration. In this table, we display the unadjusted values for revenues and costs.

The data clearly illustrate the substantial variation in revenues and costs across different events and over time. This variation indicates the diverse nature of the events in our sample, encompassing various scales, geographies, and operational complexities.

Table 2. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROI	37	−0.38	0.52	−0.95	1.93
Total revenue ($M)	38	1791	1720	32	5840
Total costs ($M)	42	2976	3119	70	15,084
Ticketing revenue ($M)	42	213	237	6	1081
Broadcast revenue ($M)	43	856	918	7	3127
Sponsor revenue ($M)	38	595	644	1	2093
Cost of venues ($M)	42	1826	2482	8	12,616
Cost of organization ($M)	43	1125	990	24	3277
GDP per capita	41	29,898	17,830	4408	59,685
EFW	41	7.12	1.07	3.61	8.7
Polity	43	6.7	5.99	−9	10
Event type	43	1	0.82	0	2
Year	43	1991	16	1964	2018

3.4. Data Analysis

All statistical analyses were performed using the Stata 18.0 statistical analysis software package. We used ordinary least square (OLS) linear regression with robust standard errors to determine the factors influencing the revenues, costs, and profitability of the Olympics and the World Cup. First, we examined the factors affecting the three primary revenue streams (broadcasting rights, sponsorships, and ticket sales) and the two significant cost drivers (organizational expenses and sports venue capital costs). To address the non-normal distribution of the data and to increase the validity of our findings, we opted to use the logarithmic form of revenues and costs, as well as some of the explanatory variables, such as GDP. Second, we turned to a sub-sample that included only the Summer and Winter Olympic Games. This analysis aimed to assess whether the patterns and relationships observed in the whole sample persist specifically within the context of the Olympics. We check for multicollinearity by using the variance inflation factors on each variable. The results suggest that multicollinearity is not an issue within the different models we are estimating, as the highest value for any variable is 3.92, well within the threshold value of 10.

4. Results

4.1. Full Sample

In the first step, we examine the determinants of ROI, total revenues, and total costs. The regression results are displayed as Models 1–3 in Table 3.

The regression analysis reveals a positive and significant relationship between a host country's GDP per capita and the associated revenues and costs of hosting the Olympic Games and the FIFA World Cup. Specifically, a 1% increase in GDP corresponds to a 0.32% rise in adjusted total revenues, indicating that wealthier nations tend to generate higher revenues. In terms of costs, a 1% increase in GDP is associated with a 0.56% increase in total costs, reflecting that more affluent countries often incur greater expenses, likely due to higher standards in infrastructure and services as well as higher labor costs.

Table 3. Regression results.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	ROI	Log total revenues	Log total costs	Log broadcast revenues	Log sponsorship revenues	Log ticketing revenues	Log operational costs	Log venue costs
Log GDP per capita	0.00994	0.320***	0.564**	0.450**	0.581**	0.270*	−0.0675	0.437
	(0.127)	(0.102)	(0.248)	(0.202)	(0.246)	(0.148)	(0.224)	(0.338)
Polity	−0.0314	−0.0286*	−0.0331	−0.0319	−0.0108	−0.0387*	0.00370	0.00206
	(0.0190)	(0.0144)	(0.0313)	(0.0220)	(0.0434)	(0.0204)	(0.0322)	(0.0412)
EFW	0.264**	0.103	−0.257	0.00305	−0.0806	0.308**	0.263	−0.609*
	(0.104)	(0.0907)	(0.155)	(0.127)	(0.250)	(0.116)	(0.173)	(0.312)
Winter Olympics	−0.301	−0.976***	−1.136***	−0.997***	−0.886***	−1.456***	−0.813***	−1.370***
	(0.276)	(0.182)	(0.334)	(0.231)	(0.308)	(0.146)	(0.267)	(0.492)
World Cup	−0.190	−0.840***	−1.032***	−1.300***	−0.683**	−0.273	−1.546***	−1.103*
	(0.207)	(0.160)	(0.299)	(0.237)	(0.269)	(0.166)	(0.262)	(0.584)
Year	0.00825	0.0873***	0.0651***	0.0989***	0.116***	0.0494***	0.0701***	0.0694***
	(0.00496)	(0.00429)	(0.00822)	(0.00576)	(0.00880)	(0.00358)	(0.00689)	(0.0125)
Constant	−18.47*	−156.6***	−111.4***	−181.0***	−217.1***	−83.73***	−120.0***	−117.0***
	(9.057)	(8.378)	(15.44)	(11.06)	(17.82)	(6.605)	(13.22)	(22.77)
Observations	35	36	40	41	36	40	41	40
R-squared	0.286	0.945	0.778	0.922	0.910	0.918	0.859	0.554

Notes: The unit of observation is an event. Coefficients are estimated by OLS regression models. Robust standard errors are in parentheses. The dependent variables for Models 1–3 are ROI, total revenues, and total costs. For models 4–6, the dependent variables are the three revenue streams (broadcast, sponsorship, and ticketing), and for Models 7 and 8, the dependent variables are the two cost types (operational and venue costs).
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

However, the impact of GDP on ROI is statistically insignificant, suggesting a differential sensitivity of revenues and costs to economic scale, where their proportional increase does not necessarily translate into enhanced efficiency or profitability as measured by ROI. This result implies that a higher GDP per capita does not automatically increase these events' profitability. The lack of a significant correlation between GDP and ROI suggests that while wealthier countries can afford to host more elaborate and extensive events, the financial returns on these investments do not necessarily scale in proportion to their economic size. This finding highlights a critical aspect of event hosting: the ability of the host country and international bodies such as the IOC and FIFA to successfully manage and balance the economic aspects of such large-scale events to achieve a favorable ROI.[4]

Regarding the Polity score, the analysis reveals a subtle yet intriguing relationship with total revenue. Specifically, the negative but marginally significant relationship suggests that a more democratic political structure, denoted by a higher Polity score, is weakly associated with slightly lower revenues from hosting the Olympic Games and the World Cup. More autocratic states might have more means to coerce additional revenues, such as sponsoring from state-owned businesses, as was typical for the mega-events in China and Russia. These sponsorships are frequently seen as a way of projecting soft power (Chadwick et al., 2022).

Moreover, the significant positive impact of EFW indicates that countries with greater economic freedom tend to achieve superior financial outcomes from such events. This finding suggests that market-friendly environments, characterized by fewer government restrictions and greater economic openness, enable more efficient management and maximization of financial returns.

The coefficients for the Winter Olympics and World Cup variables suggest that these events, while globally significant, tend to be smaller in scale in terms of revenue generation and costs compared to the Summer Olympics. The Year variable highlights a clear trend of increasing revenue and expenses over time, reflecting the growth trend of hosting large-scale international sporting events (Müller et al., 2023), with implications for future planning and budgeting.

In the next step, we split the total revenue into three components: broadcast, sponsorship, and ticketing revenues, and examine their determinants (see Models 4–6 in Table 3). Similarly, we split total costs into operational and venue costs (see Models 7 and 8 in Table 3). The strong and positive association of GDP with all revenue streams underscores the pivotal role of a host country's economic size in generating revenue across all three categories. The significant coefficients for broadcast, sponsorship, and ticketing revenues indicate that wealthier nations, with their larger economies, are better positioned to capitalize on these revenue sources. A higher GDP often aligns with enhanced broadcasting infrastructure and larger media markets, suggesting wealthier nations possess more advanced media sectors and a more comprehensive international presence. This, in turn, renders them more appealing to global broadcasters. The positive correlation with sponsorship revenue reflects the greater market exposure and consumer spending power in larger economies. Sponsors are often drawn to events in wealthier countries due to the enhanced visibility and potential for greater investment returns. Though weaker, the relationship between GDP and ticketing revenue is still significant. This finding could be attributed to the greater spending capacity of residents in wealthier countries and these countries' ability to attract international visitors who can afford higher ticket prices.

In the final step, we examine the determinants of different types of costs. The results show that GDP does not have a statistically significant effect on operational expenses or venue costs, suggesting that a country's economic size does not consistently predict these specific types of event costs. That GDP shows a significant correlation with total costs but not with its sub-components can be attributed to several factors: First, when costs are aggregated into a single total, the individual variances and unique factors influencing each cost component can be overshadowed. This aggregation can sometimes reveal trends that are not apparent when examining components individually. Second, there could be interaction effects between GDP and other variables that influence total costs but are not as pronounced when looking at operational and venue costs separately. Third, the relationship between GDP and expenses might be non-linear or have threshold effects. This means that GDP's impact on costs could change at different GDP levels, which might be more detectable in the aggregate (total costs) than in the individual components.

Polity shows no significant impact on both types of costs, indicating that the level of democracy or autocracy in a host country does not markedly influence operational expenses or venue construction and preparation. However, EFW shows a mixed influence: it's positively associated with the operating costs (though not significantly) and negatively associated with venue costs, which is significant at the 10% level. This result suggests that venue costs might be managed more efficiently in countries with higher economic freedom, potentially due to more market-oriented

approaches and less regulatory burden. In contrast, the impact on operational costs is less clear.

The high R^2 values observed in our models reflect the strong temporal trend in mega-event revenues, driven by factors such as inflation, globalization, and the growing commercialization of these events (e.g. we obtain $R^2 = 0.855$ in Model 2 when using only Year as a predictor). This highlights the importance of time as a dominant explanatory factor while emphasizing that additional variables provide further insights into the underlying drivers beyond this baseline trend.

4.2. Sub-Sample – Olympics Only

Now, we turn to our sub-sample, which exclusively includes the Summer and Winter Olympic Games, to assess whether the patterns and relationships observed in the entire sample persist specifically within the context of the Olympics.[5] Models 1–3 in Table 4 explore the determinants influencing the Olympic Games' total revenues, costs, and profitability.

In our analysis specific to the Olympics, many patterns seen in the entire sample are maintained. However, a key difference emerges in the relationship between GDP and total costs. Unlike in the whole sample, in the Olympics-only sample, the correlation between a country's economic size (GDP) and the total costs of hosting the event is not statistically significant. This finding indicates a unique aspect of the Olympics, where the economic size of the host country does not consistently predict the total costs associated with the event.

The determinants of revenues for the different revenue streams (Models 4–6) and cost types (Models 7 and 8) for the Olympics-only sample are shown in Table 4 above. In our analysis specific to the Olympic Games, GDP significantly influences

Table 4. Regression results – Olympics only.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	ROI	Log total revenues	Log total costs	Log broadcast revenues	Log sponsorship revenues	Log ticketing revenues	Log operational costs	Log venue costs
Log GDP per capita	0.102	0.457**	0.483	1.049***	0.110	0.0514	0.627*	0.0531
	(0.279)	(0.209)	(0.404)	(0.277)	(0.295)	(0.162)	(0.315)	(0.601)
Polity	−0.0399	−0.0650***	−0.0555	−0.0900***	−0.0891***	−0.0121	−0.0886***	0.00177
	(0.0418)	(0.0159)	(0.0375)	(0.0212)	(0.0269)	(0.0220)	(0.0297)	(0.0550)
EFW	0.326*	0.190	−0.0995	−0.149	0.550**	0.568***	−0.0431	−0.108
	(0.164)	(0.169)	(0.226)	(0.218)	(0.194)	(0.0996)	(0.228)	(0.322)
Winter Olympics	−0.355	−1.014***	−1.071***	−1.131***	−0.695**	−1.442***	−0.879***	−1.280**
	(0.314)	(0.208)	(0.367)	(0.226)	(0.272)	(0.143)	(0.248)	(0.548)
Year	0.00580	0.0800***	0.0558***	0.0826***	0.108***	0.0491***	0.0527***	0.0615***
	(0.00936)	(0.00663)	(0.0111)	(0.00573)	(0.00904)	(0.00551)	(0.00547)	(0.0180)
Constant	−14.89	−143.9***	−92.97***	−153.0***	−199.9***	−83.13***	−89.16***	−101.2***
	(16.64)	(12.88)	(19.99)	(10.91)	(17.60)	(10.18)	(10.82)	(31.60)
Observations	23	23	27	27	23	26	27	27
R-squared	0.297	0.946	0.751	0.939	0.937	0.951	0.839	0.591

Notes: The unit of observation is an event. Coefficients are estimated by OLS regression models. Robust standard errors are in parentheses. The dependent variables for Models 1–3 are ROI, total revenues, and total costs. For Models 4–6, the dependent variables are the three revenue streams (broadcast, sponsorship, and ticketing), and for models 7 and 8, the dependent variables are the two cost types (operational and venue costs).

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

broadcast revenues alone, exhibiting a positive and notable impact. However, this effect of GDP is not observed in the case of sponsorship and ticketing revenues, where its influence is no longer statistically significant. The absence of a significant correlation in these areas indicates that factors other than the host country's economic size might drive sponsorship and ticketing revenues during the Olympics. Factors such as stadium capacities, location, the strength of local sports culture, and the potential disruption from single events like protests or virus outbreaks (such as the Zika outbreak's negative impact on ticket sales in Brazil) can all significantly influence ticket sales (Kassam, 2016; Marques, 2014; Müller et al., 2023).

The role of Polity in the Olympics-specific context reveals a nuanced pattern. Its significant negative impact on both broadcast and sponsorship revenues suggests that democratic governance structures, which often come with more stringent regulations and a focus on equitable practices, might constrain certain revenue-generating activities. This result could reflect how democratic norms and practices shape broadcast rights negotiations and sponsorships, possibly prioritizing broader societal considerations over maximum revenue generation. However, the lack of a significant impact on ticketing revenue in the Olympics context contrasts with the broader sample, implying that the host country's political structure might influence ticket pricing and sales to a lesser degree in the Olympics.

Intriguingly, EFW not only maintains its significant and positive influence on ticketing revenue but also emerges as a significant factor for sponsorship revenue. This expanded impact in the Olympics context highlights the role of economic freedom in facilitating efficient, market-driven strategies not only in ticket sales but also in attracting and managing sponsorships. The increased significance of EFW in these areas suggests that in the Olympics, economic freedom might enable a more conducive environment for commercial activities, offering more flexibility and opportunity for revenue generation in these domains.

In the specific context of the Olympic Games, Table 4 reveals distinct patterns regarding the determinants of operational and venue costs. These findings contrast with the broader sample. In the Olympics-only sample, GDP shows a significant association with operational costs, indicating a direct correlation between the economic size of the host country and the organizational expenses incurred for the Olympics. This significant relationship likely stems from elevated expenditures for labor and various inputs integral to the event's organization.

Regarding the Polity score, its significant negative association with operational costs in the context of the Olympics presents a notable shift from the broader sample. This finding suggests that more democratically governed countries, characterized by transparent and accountable decision-making processes, might be more adept at managing operational costs efficiently. Specifically, a one-point increase in the Polity score is associated with an approximate 8.48% reduction in operational costs for hosting the Olympic Games.[6] The emphasis on democratic principles could lead to more informed and cost-effective approaches to organizing such large-scale events.

EFW does not significantly impact the operational or venue costs in the Olympics-specific analysis. This lack of significant influence contrasts with the broader sample, where EFW was statistically significant and negative for venue-related

costs. This variation suggests that the unique, standardized requirements of the Olympic Games might diminish the role economic freedom typically plays in cost management in other mega-events. The standardized nature of the Olympics could mean that the efficiencies typically gained through economic freedom are less applicable or evident in this particular context.

5. Discussion and Conclusion

5.1. Summary of Main Results

For the first time, this study has investigated the determinants of costs and revenues for the Olympic Games and the World Cup, shifting from dominant descriptive analyses to a more inferential approach. This approach offers valuable perspectives on the financial dynamics of these two largest mega-events.

Our results indicate a positive correlation between a mega-event host country's GDP per capita and the associated revenue and costs of hosting mega-events. However, this increased capacity for generating revenue and incurring costs in wealthier nations does not directly translate to enhanced profitability (ROI). It suggests that while wealthier countries can organize larger events, the ROI from these events is not necessarily proportional to the size of the country's economy. GDP might have a proportionately different impact on revenues and costs. If the rate at which costs increase with GDP is greater than the rate at which revenues increase, this could lead to a negligible or non-significant effect on ROI. In other words, wealthier countries generate more revenue and incur proportionally higher costs, which could offset any positive impact on ROI.

Interestingly, our data reveal that the overall political regime type (i.e., the level of democracy and autocracy within a country's political system), particularly a more democratic political structure, is loosely associated with slightly lower revenues from hosting mega-events. This finding may hint at various underlying dynamics. For instance, democratic nations, often characterized by higher transparency, accountability, and public scrutiny (Grix, 2013), might prioritize sustainable and responsible event management over maximizing revenue. This approach could manifest in more prudent financial planning, stricter regulatory compliances, and possibly less aggressive commercialization strategies, which, while ethically sound, might not yield the highest possible financial returns (Preuss, 2004).

Additionally, democratic countries might allocate resources with a broader range of public interests in mind, balancing the needs and concerns of different stakeholders. This approach could include investing in legacy projects with long-term community benefits that do not necessarily translate into immediate revenue generation. In contrast, less democratic nations might have fewer checks and balances, allowing for more aggressive revenue-maximizing strategies, albeit possibly at the expense of broader social or ethical considerations (Maennig & Zimbalist, 2012). Additionally, less democratic governments can often coerce state-owned companies into funding the event, for example, through sponsorship, thus resulting in higher sponsorship revenues (Chadwick et al., 2022).

Furthermore, the bidding and hosting processes in democratic countries are often subject to extensive public debate and democratic decision-making, which can lead to more cautious and balanced event budgets, which could result in more conservative financial projections and potentially less risk-taking in revenue generation strategies (Baade & Matheson, 2002; Booth, 2011; Rowe, 2012). In democratic settings, public opposition and environmental concerns may result in more restrained and sustainable event planning, limiting potential revenue opportunities (Makarychev & Yatsyk, 2016). In summary, while democratic governance promotes efficiencies and upholds ethical standards in managing large-scale events, these structures can introduce constraints and considerations that may slightly temper the pursuit of maximum revenue generation.

Moreover, host countries with higher levels of economic freedom tend to achieve greater profitability from mega-events. This result likely stems from several key factors associated with economic freedom. First, greater economic freedom is often linked to more efficient resource allocation and utilization. In markets where government intervention is minimal, resources such as labor, capital, and materials can be deployed more effectively (Hall & Lawson, 2014). This efficiency is particularly critical in the context of large-scale events, where optimal resource allocation plays a significant role in enhancing cost-effectiveness and overall profitability.

Second, countries with higher economic freedom typically boast a more business-friendly environment, translating into easier processes for setting up and operating businesses, including those involved in event hosting, like hospitality, tourism, and retail (Coyne & Moberg, 2015). Such an environment can foster a vibrant ecosystem of service providers and vendors, contributing to a more prosperous and profitable event.

Additionally, higher economic freedom often comes with less bureaucratic red tape, which can expedite various processes related to event hosting, from construction and infrastructure development to the procurement of goods and services (Rauch & Evans, 2000). This streamlined approach can reduce delays and cost overruns, positively impacting ROI.

Interestingly, the lack of a significant correlation between EFW and total revenue or total costs suggests that while economic freedom enhances the efficiency of hosting events, it does not necessarily scale up revenue or drive down costs directly. This finding could imply that the benefits of economic freedom are more about 'doing things better' rather than 'doing more things.' In other words, countries with higher economic freedom might not necessarily host larger events or generate higher gross revenues, but they manage their events in a way that yields better returns on the costs incurred. This insight highlights the importance of not just the size or grandeur of an event but also how effectively and efficiently it is managed. It underscores that economic freedom, perhaps by fostering more efficient operations and a conducive business environment, can be crucial in enhancing major international sporting events' financial viability and success.

When focusing solely on the Olympics, we find that most of the relationships observed in the whole sample hold, with a notable exception being the relationship between GDP and total costs. The correlation between GDP and total costs loses statistical significance in the Olympics-only sample. This deviation suggests that a

country's economic size does not necessarily correlate with higher total costs in the context of the Olympics. Unlike the broader sample, where wealthier countries tend to incur higher costs, this pattern does not clearly manifest in the Olympics-specific analysis. This result could imply that with their more standardized format and requirements (Essex & Chalkley, 1998), the Olympics might have a more uniform cost structure across different host countries, regardless of their economic size. Such a finding underscores the unique nature of the Olympics, where factors other than GDP might play a more pivotal role in influencing the total costs of hosting the event.

The study contributes to the literature by alleviating the lack of longitudinal studies (Wond & Macaulay, 2011) and enhancing our understanding of the crucial factors that influence revenues and costs of mega-events over time. Given the substantial financial uncertainties surrounding mega-events, which often lead to excessive risk-taking by the public sector (Flyvbjerg et al., 2021; Jennings, 2012), our regression models offer valuable insights into the determinants of economic outcomes and help mitigate this uncertainty. Unlike previous studies that primarily rely on descriptive case analyses, our research leverages a unique longitudinal dataset covering 43 events, including the Summer Olympics, Winter Olympics, and FIFA World Cup, allowing for comparative and inferential analysis across multiple editions of these mega-events. To our knowledge, this is the first paper to systematically investigate the determinants of revenues and costs for the two largest mega-events, shifting from descriptive to inferential approaches and identifying the macroeconomic and governance factors that shape financial outcomes. This methodological innovation lays a foundation for further exploration through both statistical and interpretive methods.

5.2. Practical Implications

Stakeholders, ranging from event rights-holders and international federations to local organizers and public management policymakers, can leverage these findings to make more informed decisions when planning and managing future mega-events. Rightsholders such as the IOC and FIFA, who control event allocations, may prioritize host countries with higher political freedoms, as our findings suggest that such environments are associated with reduced financial deficits.

For public administrators, our model provides a valuable tool for assessing the key determinants of revenues and costs, helping to mitigate the uncertainty that often surrounds the financial aspects of these events. This evidence-based approach helps to minimize reliance on potentially biased studies from interest groups and allows for more accurate financial forecasting. However, it is essential to acknowledge that deriving the determinants of venue costs remains challenging, as these expenses are highly contingent on the existing conditions of venues in different host locations – variables not fully accounted for in our analysis.

Our research also underscores the financial dynamics of different mega-events, enabling public administrators to make data-driven decisions when considering which event to bid for based on their fiscal capacities. This knowledge is crucial for authorities aiming to conduct a realistic CBA before committing to hosting a mega-event. Nevertheless, even with meticulous planning and financial prudence,

achieving profitability remains a significant challenge, as the financial structure of these events often favors the rights-owning organizations (Baade & Matheson, 2016; Müller et al., 2022b).

In response to these growing challenges and the declining number of potential Olympic host cities, the IOC introduced the Olympic Agenda 2020, a reform package designed to encourage cost-effective measures such as risk-sharing, flexible venue requirements, and expanded use of existing infrastructure (Schnitzer & Haizinger, 2019). These initiatives illustrate how governing bodies are adapting to financial realities and seeking to reduce the mounting burdens on host cities. By promoting more sustainable bidding and organizational practices, Olympic Agenda 2020 aligns with our findings that highlight the importance of economic governance in determining event profitability.

A relevant example of the evolving financial landscape in mega-events is the liberalization of IOC Rule 40, which previously imposed strict restrictions on individual athletes' ability to secure personal sponsorships during the Olympic Games. Recent amendments have delegated regulatory authority to National Olympic Committees (NOCs), allowing for greater commercial opportunities for athletes and their sponsors. While our dataset does not directly account for individual endorsements, this regulatory shift reflects a broader trend of commercial liberalization in the Olympic ecosystem, which could contribute to increased sponsorship revenue and a more dynamic economic environment for host countries (McKelvey et al., 2021).

5.3. Limitations and Suggestions for Future Research

Our study, while comprehensive, needs to acknowledge certain limitations in its research design. First, our analysis includes major cost and revenue items. Still, it is not exhaustive, as events generate other costs, although it is not always possible to establish a direct link between them or access this information. Hence, our financial estimations should be viewed as approximations based on the data available. Second, the issue of how to account for investments in sports venues poses a challenge. These costs can be amortized over an extended period, suggesting they should not be entirely attributed to the event that necessitated them. However, as Alm et al. (2016) note, venues built for mega-events often become ongoing financial liabilities for host cities, indicating that the actual costs might exceed initial construction expenses. Third, our focus is on direct revenues and expenditures. We acknowledge that including indirect revenues and expenses may yield different outcomes; however, such measures are beyond the scope of this analysis.

Finally, and perhaps most critically, our study faces limitations related to the scope of predictors and the sample size. Due to the limited number of mega-events, such as the Olympics and the FIFA World Cup, the availability of data restricts the range of variables that can be included in our analysis. Furthermore, the small sample size constrains the statistical power of our models, which could potentially affect the reliability and generalizability of the results. The relatively small number of observations necessitates prudence in interpreting these outcomes. The risk of overfitting and the limited ability to generalize these findings to other contexts underscores the need for caution.

One specific modeling choice constrained by the small sample size is our treatment of the Year variable. Rather than including year fixed effects – which would have consumed a large number of degrees of freedom – we opted to model Year as a continuous variable to capture long-term temporal trends without over specifying the regression. While this approach is commonly used in small-N longitudinal analyses, it assumes a linear time trend and may not fully capture non-linear or event-specific shifts. Future research with larger datasets could adopt more flexible modeling strategies, such as year dummies or spline-based trends, to better address temporal heterogeneity.

Despite these constraints, our findings provide important insights into the financial dynamics of hosting mega-events. Nevertheless, further research based on larger and more diverse datasets is needed to validate and refine our results. Future studies should also aim to explore non-linear and interaction effects, as well as include a wider array of indirect costs and revenues to provide a more comprehensive understanding of the true financial impacts of these large-scale events.

Moreover, a deeper exploration of indirect costs and benefits is essential despite the difficulties in their precise measurement. There is also a significant need to further examine the non-economic costs and benefits, especially since they are often cited as justifications for hosting large-scale events. It would be valuable to delve deeper into these additional factors to develop a more comprehensive model for capturing and understanding the financial complexities of hosting the Olympic Games.

Additionally, future research could expand this analysis by incorporating the Women's FIFA World Cup, which has experienced significant growth in popularity and revenue generation, particularly following the success of the 2023 Australia/New Zealand edition. Investigating how its financial dynamics compare to those of the Men's World Cup and other mega-events could provide valuable insights into the evolving economics of global sports. Given the increasing commercial viability of women's sports, analyzing revenue structures, sponsorship trends, and long-term economic impacts of hosting Women's World Cups would help broaden our understanding of gendered financial disparities in mega-events.

Last, expanding our study to include a broader spectrum of events is advisable because the exceptional scale of the Olympic Games and FIFA World Cup may position them as outliers rather than standard benchmarks. This could lead to identifying other aspects that significantly impact the costs of hosting mega-events that have not yet been explored.

Notes

1. See Scandizzo and Pierleoni (2018) for a comprehensive survey; see Vierhaus (2019) for an overview of international tourism effects.
2. The EFW index is widely used in the academic literature. For a literature review, see Hall and Lawson (2014). A comprehensive overview of the methodology employed to compute the EFW index is available here: https://www.fraserinstitute.org/sites/default/files/uploaded/2022/economic-freedom-of-the-world-2022-appendix.pdf.
3. The Polity Score is also widely used in academic literature, see, e.g. Jaggers and Gurr (1995). A detailed explanation of the methods used to calculate the Polity score is available here: https://www.systemicpeace.org/inscr/p5manualv2018.pdf.

4. The relationship between GDP and ROI might be non-linear or influenced by interaction effects with other variables. Such complexities may not be captured in a standard linear regression model. For instance, the impact of GDP on ROI could depend on factors such as the type of event, economic freedom, or political environment.
5. A separate regression analysis for the FIFA World Cup was not conducted due to the limited sample size (14 editions), which would result in low statistical reliability. In contrast, the Olympic Games dataset includes both Summer and Winter editions, allowing for a more robust subsample analysis.
6. In a log-linear regression model, the coefficient can be interpreted as the expected change in the logarithm of the dependent variable (in this case, operational costs) for a one-unit change in the independent variable (Polity score). To convert this change into a percentage, we use the formula $(e^{\beta}-1) \times 100\%$, where β is the coefficient. Substituting $\beta = -0.0886$ yields an approximate 8.48% reduction in operational costs for a one-point increase in the Polity score.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the author(s) used ChatGPT in order to improve readability and language. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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References

Agha, N., & Rascher, D. (2021). Economic development effects of major and minor league teams and stadiums. *Journal of Sports Economics*, *22*(3), 274–294. https://doi.org/10.1177/1527002520975847

Alm, J., Solberg, H. A., Storm, R. K., & Jakobsen, T. G. (2016). Hosting major sports events: The challenge of taming white elephants. *Leisure Studies*, *35*(5), 564–582. https://doi.org/10.1080/02614367.2014.994550

Baade, R. A., Baumann, R., & Matheson, V. A. (2008a). Selling the game: Estimating the economic impact of professional sports through taxable sales. *Southern Economic Journal*, *74*(3), 794–810. https://doi.org/10.1002/j.2325-8012.2008.tb00864.x

Baade, R. A., Baumann, R. W., & Matheson, V. A. (2008b). Assessing the economic impact of college football games on local economies. *Journal of Sports Economics*, *9*(6), 628–643. https://doi.org/10.1177/1527002508318363

Baade, R. A., & Matheson, V. (2002). Bidding for the Olympics: Fool's gold. *Transatlantic sport: The comparative economics of North American and European sports* (Vol. 54, p. 127). Edward Elgar Publishing.

Baade, R. A., & Matheson, V. A. (2001). Home run or wild pitch? Assessing the economic impact of Major League Baseball's All-Star Game. *Journal of Sports Economics*, *2*(4), 307–327. https://doi.org/10.1177/152700250100200401

Baade, R. A., & Matheson, V. A. (2016). Going for the gold: The economics of the Olympics. *Journal of Economic Perspectives*, *30*(2), 201–218. https://doi.org/10.1257/jep.30.2.201

Booth, D. (2011). Olympic city bidding: An exegesis of power. *International Review for the Sociology of Sport*, *46*(4), 367–386. https://doi.org/10.1177/1012690211408844

Burbank, M., Andranovich, G., & Heying, C. H. (2002). Mega-events, urban development and public policy. *Review of Policy Research*, *19*(3), 179–202. https://doi.org/10.1111/j.1541-1338.2002.tb00301.x

Catalão, F. P., Cruz, C. O., & Sarmento, J. M. (2022). Public management and cost overruns in public projects. *International Public Management Journal*, *25*(5), 677–703. https://doi.org/10.1080/10967494.2020.1804498

Chadwick, S., Widdop, P., & Burton, N. (2022). Soft power sports sponsorship – A social network analysis of a new sponsorship form. *Journal of Political Marketing*, *21*(2), 196–217. https://doi.org/10.1080/15377857.2020.1723781

Chappelet, J.-L. (2019). Beyond legacy: Assessing olympic games performance. *Journal of Global Sport Management*, *4*(3), 236–256. https://doi.org/10.1080/24704067.2018.1537681

Chappelet, J.-L. (2023). The governance of the Olympic system: From one to many stakeholders. *Journal of Global Sport Management*, *8*(4), 783–800. https://doi.org/10.1080/24704067.2021.1899767

Coyne, C. J., & Moberg, L. (2015). The political economy of state-provided targeted benefits. *The Review of Austrian Economics*, *28*(3), 337–356. https://doi.org/10.1007/s11138-014-0274-8

De Nooij, M. (2014). Mega sport events: A probabilistic social cost–benefit analysis of bidding for the games. *Journal of Sports Economics*, *15*(4), 410–419. https://doi.org/10.1177/1527002512461798

Drapkin, I., Ivan, S., & Ilya, Z. (2024). Revisiting the effect of hosting large-scale sport events on international tourist inflows. *Journal of Sports Economics*, *25*(1), 98–125. https://doi.org/10.1177/15270025231206393

Esposito, G., Terlizzi, A., & Crutzen, N. (2022). Policy narratives and megaprojects: The case of the Lyon-Turin high-speed railway. *Public Management Review*, *24*(1), 55–79. https://doi.org/10.1080/14719037.2020.1795230

Essex, S., & Chalkley, B. (1998). Olympic Games: Catalyst of urban change. *Leisure Studies*, *17*(3), 187–206. https://doi.org/10.1080/026143698375123

Essex, S., & Chalkley, B. (2004). Mega-sporting events in urban and regional policy: A history of the Winter Olympics. *Planning Perspectives*, *19*(2), 201–204. https://doi.org/10.1080/0266543042000192475

Fett, M. (2020). The game has changed–a systematic approach to classify FIFA World Cups. *International Journal of Sport Policy and Politics*, *12*(3), 455–470. https://doi.org/10.1080/19406940.2020.1784978

Flyvbjerg, B., Bruzelius, N., & Rothengatter, W. (2003). *Megaprojects and risk: An anatomy of ambition* (10th ed.). Cambridge University Press.

Flyvbjerg, B., Budzier, A., & Lunn, D. (2021). Regression to the tail: Why the Olympics blow up. *Environment and Planning A: Economy and Space*, *53*(2), 233–260. https://doi.org/10.1177/0308518X20958724

Gillett, A. G., & Tennent, K. D. (2017). Dynamic sublimes, changing plans, and the legacy of a megaproject: The case of the 1966 Soccer World Cup. *Project Management Journal*, *48*(6), 93–116. https://doi.org/10.1177/875697281704800608

Gillett, A. G., & Tennent, K. D. (2022). Hybrid goals: Institutional complexity and 'legacy'in a global sporting mega-event. *Public Management Review*, *24*(3), 372–397. https://doi.org/10.1080/14719037.2020.1833609

Graeff, B., & Knijnik, J. (2021). If things go South: The renewed policy of sport mega events allocation and its implications for future research. *International Review for the Sociology of Sport*, *56*(8), 1243–1260. https://doi.org/10.1177/1012690220981342

Grix, J. (2013). Sport politics and the Olympics. *Political Studies Review*, *11*(1), 15–25. https://doi.org/10.1111/1478-9302.12001

Hall, J. C., & Lawson, R. A. (2014). Economic freedom of the world: An accounting of the literature. *Contemporary Economic Policy*, *32*(1), 1–19. https://doi.org/10.1111/coep.12010

Jaggers, K., & Gurr, T. R. (1995). Tracking democracy's third wave with the Polity III data. *Journal of Peace Research*, *32*(4), 469–482. https://doi.org/10.1177/0022343395032004007

Jago, L., Dwyer, L., Lipman, G., van Lill, D., & Vorster, S. (2010). Optimising the potential of mega-events: An overview. *International Journal of Event and Festival Management*, *1*(3), 220–237. https://doi.org/10.1108/17852951011078023

Jennings, W. (2012). *Olympic risks*. Palgrave Macmillan.

Kassam, A. (2016). *Zika virus makes Rio Olympics a threat in Brazil and abroad, health expert says*. The Guardian. https://www.theguardian.com/world/2016/may/12/rio-olympics-zika-amir-attaran-public-health-threat

Kassens-Noor, E. (2012). *Planning Olympic legacies: Transport dreams and urban realities*. Routledge.

Kobierecki, M. M., & Pierzgalski, M. (2022). Sports mega-events and economic growth: A synthetic control approach. *Journal of Sports Economics*, *23*(5), 567–597. https://doi.org/10.1177/15270025211071029

Kundu, O., James, A. D., & Rigby, J. (2023). Public opinion on megaprojects over time: Findings from four megaprojects in the UK. *Public Management Review*, *25*(6), 1015–1038. https://doi.org/10.1080/14719037.2021.2003107

Lertwachara, K., & Cochran, J. J. (2007). An event study of the economic impact of professional sport franchises on local US economies. *Journal of Sports Economics*, *8*(3), 244–254. https://doi.org/10.1177/1527002506286774

Lertwachara, K., Tongurai, J., & Boonchoo, P. (2022). Mega sporting events and inward foreign direct investment: An investigation of the differences among the types of sporting events and host countries. *Journal of Sport Management*, *36*(1), 9–24. https://doi.org/10.1123/jsm.2020-0256

Li, S., & Jago, L. (2013). Evaluating economic impacts of major sports events – a meta analysis of the key trends. *Current Issues in Tourism*, *16*(6), 591–611. https://doi.org/10.1080/13683500.2012.736482

Liu, Y. W., Zhao, G. F., & Wang, S. Q. (2010). Many hands, much politics, multiple risks – the case of the 2008 Beijing Olympics Stadium. *Australian Journal of Public Administration*, *69*(s1), S85–S98. https://doi.org/10.1111/j.1467-8500.2009.00661.x

Maennig, W., & Zimbalist, A. S. (2012). *International handbook on the economics of mega sporting events*. Edward Elgar Publishing.

Makarychev, A., & Yatsyk, A. (Eds.) (2016). *Mega events in post-soviet Eurasia: Shifting borderlines of inclusion and exclusion* (1st ed.). Palgrave Macmillan.

Marques, S. (2014). *Brazil: Bills rushed through congress in bid to suppress World Cup protests*. http://www.indexoncensorship.org/2014/02/brazil-bills-world-up-protest

McKelvey, S., Grady, J., & Moorman, A. M. (2021). Ambush marketing and Rule 40 for Tokyo 2020: A shifting landscape for Olympic athletes and their sponsors. *Journal of Legal Aspects of Sport*, *31*(1), 94–122. https://doi.org/10.18060/24921

Müller, M. (2015). The mega-event syndrome: Why so much goes wrong in mega-event planning and what to do about it. *Journal of the American Planning Association*, *81*(1), 6–17. https://doi.org/10.1080/01944363.2015.1038292

Müller, M., Gogishvili, D., & Wolfe, S. D. (2022a). *Dataset: Revenues and costs of the olympic games and the football world cups, 1960s to late 2010s (Version 2) [Dataset]*. Harvard Dataverse. https://doi.org/10.7910/DVN/CPQEHN

Müller, M., Gogishvili, D., & Wolfe, S. D. (2022b). The structural deficit of the Olympics and the World Cup: Comparing costs against revenues over time. *Environment & Planning A*, *54*(6), 1200–1218. https://doi.org/10.1177/0308518X221098741

Müller, M., Gogishvili, D., Wolfe, S. D., Gaffney, C., Hug, M., & Leick, A. (2023). Peak event: The rise, crisis and potential decline of the Olympic Games and the World Cup. *Tourism Management*, *95*, 104657. https://doi.org/10.1016/j.tourman.2022.104657

Müller, M., Wolfe, S. D., Gaffney, C., Gogishvili, D., Hug, M., & Leick, A. (2021). An evaluation of the sustainability of the Olympic Games. *Nature Sustainability*, *4*(4), 340–348. https://doi.org/10.1038/s41893-021-00696-5

Müller, M., Wolfe, S. D., Gogishvili, D., Gaffney, C., Hug, M., & Leick, A. (2022). The mega-events database: Systematising the evidence on mega-event outcomes. *Leisure Studies*, *41*(3), 437–445. https://doi.org/10.1080/02614367.2021.1998835

Pitsis, A., Clegg, S., Freeder, D., Sankaran, S., & Burdon, S. (2018). Megaprojects redefined – complexity vs cost and social imperatives. *International Journal of Managing Projects in Business*, *11*(1), 7–34. https://doi.org/10.1108/IJMPB-07-2017-0080

Porter, P. K., & Fletcher, D. (2008). The economic impact of the Olympic Games: Ex ante predictions and ex poste reality. *Journal of Sport Management*, *22*(4), 470–486. https://doi.org/10.1123/jsm.22.4.470

Preuss, H. (2004). *The economics of staging the Olympics: A comparison of the Games, 1972–2008*. Edward Elgar Publishing.

Preuss, H. (2005). The economic impact of visitors at major multi-sport events. *European Sport Management Quarterly*, *5*(3), 281–301. https://doi.org/10.1080/16184740500190710

Preuss, H., Andreff, W., & Weitzmann, M. (2019). *Cost and revenue overruns of the olympic games 2000–2018*. Springer Fachmedien. https://doi.org/10.1007/978-3-658-24996-0

Preuss, H., & Weitzmann, M. (2023). Changes of costs, expenditures, and revenues between bidding and staging the olympic games from sydney 2000 to Tokyo 2020. *Event Management*, *27*(3), 455–476. https://doi.org/10.3727/152599522X16419948695297

Priemus, H., Flyvbjerg, B., & van Wee, B. (Eds.) (2008). Decision-making on mega-projects: Cost–benefit analysis, planning and innovation. *Decision-making on mega-projects*. Edward Elgar Publishing. https://www.elgaronline.com/display/9781845427375.xml

Rauch, J. E., & Evans, P. B. (2000). Bureaucratic structure and bureaucratic performance in less developed countries. *Journal of Public Economics*, *75*(1), 49–71. https://doi.org/10.1016/S0047-2727(99)00044-4

Rowe, D. (2012). The bid, the lead-up, the event and the legacy: Global cultural politics and hosting the Olympics. *The British Journal of Sociology*, *63*(2), 285–305. https://doi.org/10.1111/j.1468-4446.2012.01410.x

Sakaki, T., Kobayashi, T., Yoshida, M., & Toriumi, F. (2022). Do media events still unite the host nation's citizens? The case of the Tokyo 2020 Olympic Games. *PLoS One*, *17*(12), e0278911. https://doi.org/10.1371/journal.pone.0278911

Santamaria, G. D C. (2013). *Urban megaprojects: A worldwide view*. Emerald Publishing.

Scandizzo, P. L., & Pierleoni, M. R. (2018). Assessing the olympic games: The economic impact and beyond. *Journal of Economic Surveys*, *32*(3), 649–682. https://doi.org/10.1111/joes.12213

Schnitzer, M., & Haizinger, L. (2019). Does the Olympic Agenda 2020 have the power to create a new Olympic heritage? An analysis for the 2026 Winter Olympic Games bid. *Sustainability*, *11*(2), 442. https://doi.org/10.3390/su11020442

SportCal. (2019). *The global sports impact report 2019: A review of 2018*. Sportcal Global Communications.

Swyngedouw, E., Moulaert, F., & Rodriguez, A. (2002). Neoliberal urbanization in Europe: Large-scale urban development projects and the new urban policy. *Antipode*, *34*(3), 542–577. https://doi.org/10.1111/1467-8330.00254

Szymanski, S. (2010). The economic impact of the World Cup. *Football economics and policy* (pp. 226–235). Palgrave Macmillan UK.

Taks, M., Kesenne, S., Chalip, L., & Green, C. B. (2011). Economic impact analysis versus cost benefit analysis: The case of a medium-sized sport event. *International Journal of Sport Finance*, *6*(3), 187.

Tien, C., Lo, H.-C., & Lin, H.-W. (2011). The economic benefits of mega events: A myth or a reality? A longitudinal study on the olympic games. *Journal of Sport Management*, *25*(1), 11–23. https://doi.org/10.1123/jsm.25.1.11

Turner, H. C., Lauer, J. A., Tran, B. X., Teerawattananon, Y., & Jit, M. (2019). Adjusting for inflation and currency changes within health economic studies. *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*, *22*(9), 1026–1032. https://doi.org/10.1016/j.jval.2019.03.021

Vierhaus, C. (2019). The international tourism effect of hosting the Olympic Games and the FIFA World Cup. *Tourism Economics*, *25*(7), 1009–1028. https://doi.org/10.1177/1354816618814329

Wolfe, S. D. (2020). 'For the benefit of our nation': Unstable soft power in the 2018 men's World Cup in Russia. *International Journal of Sport Policy and Politics*, *12*(4), 545–561. https://doi.org/10.1080/19406940.2020.1839532

Wond, T., & Macaulay, M. (2011). Extending time – extended benefits. *Public Management Review*, *13*(2), 309–320. https://doi.org/10.1080/14719037.2010.536059

Wunderlich, A. C., Follert, F., & Daumann, F. (2021). Specialization in sports: A theoretical approach. *PLoS One*, *16*(5), e0250722. https://doi.org/10.1371/journal.pone.0250722

Zimbalist, A. (2015). The illusory economic gains from hosting the Olympics World Cup. *World Economics*, *16*(1), 35–42.