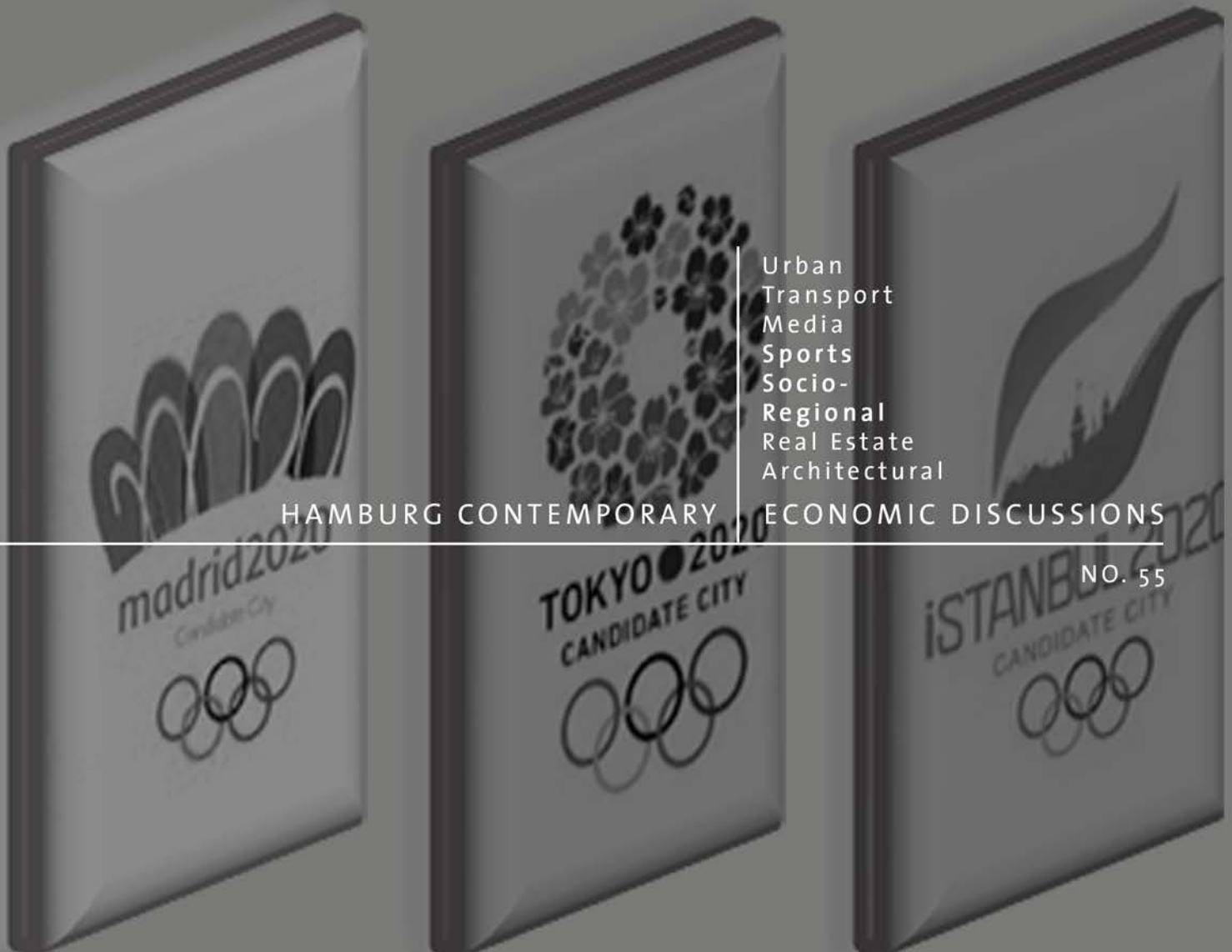


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WHICH COUNTRIES BID FOR THE OLYMPIC GAMES? ECONOMIC, POLITICAL, AND SOCIAL FACTORS AND CHANCES OF WINNING



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Which countries bid for the Olympic Games? Economic, political, and social factors and chances of winning

Abstract: This contribution analyzes 132 factors on their potential to discriminate countries bidding for hosting the Olympic Games from non-bidding countries. Our binary, clustered model using generalized estimating equations (GEE) shows that countries recording long-term economic growth and pursuing a liberalization and globalization policy will consider an Olympic bid. In addition, countries with an urban population above 10 million, with stable election results and an improvement in health standards as well as more attractive tourism destinations are more likely to bid for the Olympic Games. Finally, the bid decision is shaped by experience in hosting major sports events, a country and regional rotation, persistence and climatic conditions.

Keywords: Olympic Summer Games, mega events, bidding, host city election, IOC, decision-making

JEL Classification: R58, L83, Z28

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1 Introduction

The socio-economic impacts and legacies of hosting the Olympic Games have been widely analyzed with the vast majority of economists not able to confirm significant positive effects (Feddersen and Maennig 2013a, 2013b; Hotchkiss et al. 2003; Jasmand and Maennig 2008; Porter and Fletcher 2008). Recently though, Rose and Spiegel (RS 2011) and Brückner and Pappa (BP 2013) find significant positive economic effects such as growing exports and GDP per capita growth of the Olympic Games, and even of (unsuccessful) Olympic bids.

RS and BP regress, among other variables, Olympic dummy variables on economic variables like GDP and export, which implies a test “Olympic Games → competitiveness.” Nevertheless, they – possibly due to the background of the aforementioned literature, which almost unanimously does not find any significant Olympic impacts – interpret their results as a signal effect for a liberalization process in the bidding countries, which stimulated the local economy or may do so in the future.

Their interpretation implies a reverse hypothesis of “competitiveness → (bidding for) Olympic Games,” which should be based on tests that regress export performance and other determinants on (the probability of) bidding for the Olympic Games. We are not aware of any such direct tests on the determinants which lead countries to bid for the Olympic Games and contribute to closing this gap.

The economic, political, and social environment of countries (and cities) may well influence their decision to bid for the Games, although the direction of causality is a matter of debate. Hiller (2000) argues that more developed countries with less social issues might be more likely to make a bid, which is then not seen as a ‘misplaced priority.’ By contrast, Jakobsen et al. (2013) find that smaller or less-developed countries generate more noticeable effects from hosting. In addition, potential bids might be concerned with their prospects of success. Consequently, a substantial overlap with the key success factors for winning the host city election could be expected. Maennig and Vierhaus (2014) identify the city size, five-year GDP growth and the liberalization of political rights, experience in hosting world championships, years since the country last hosted the Olympics and the FIFA World Cup, number of stadia in the bid country, size of the urban population, and public support as determinants of the International Olympic Committee’s (IOC) decision.

This paper contributes to the identification of economic, political, social, touristic, infrastructural or Olympics and sports factors that discriminate bidding from non-bidding countries. We find that countries indeed consider their economic, political, and social conditions as well as their chances of winning when deciding upon an Olympic bid.

This knowledge may be used by the IOC to attract a larger, high-quality pool of applicants (Humphreys and van Egteren 2012).¹ The Olympic Agenda 2020, which includes an “invitation phase” for potential bidding countries, shows that the IOC is concerned with too few Olympic bids. In addition, potential bids may identify potential

¹ The example of Los Angeles shows the opposite case of just one city interested in hosting the 1984 Olympics, which was followed by a dramatic shift of power and revenues from the IOC to the host (Baade and Matheson (2002); Hill (1996)).

competitors in order to realistically estimate their own chances of winning the host city election.

The remainder of this article is structured as follows: Section two reviews the determinants that potentially shape a country's bid decision and describes the empirical strategy. Section three presents the model and discusses the relevant political, economic, social, and sports factors for a country's decision to place an Olympic bid. Section four concludes.

2 Data and empirical strategy

This empirical study employs the dataset introduced in Maennig and Vierhaus (2014), which focuses on the bidding success for eight Olympic Summer Games from 1992 to 2020. Their panel consists of all countries with national Olympic committees (NOCs) that were eligible to bid, making it a complete panel study with 1,477 cases and no missing subjects.² The dichotomous response variable *bid* separates countries with a bid city from countries without. During the period considered, 39 cities from 27 countries applied for hosting. Including double and triple attempts, the IOC received 59 applications: on average, 7.4 per Olympic Summer Games.

We organize the potential determinants of Olympic bids into five complementary groups, namely economic, socio-political, tourism, infrastructure, and Olympics and sports. We adopt the variables introduced in detail in Maennig and Vierhaus (2014) excluding the bid-specific factors.³ One dichotomous variable, checking if the country has *applied for the foregoing Winter Olympics*, is added. All data relates to 10 years prior

² During the period considered, substantial changes occurred as the IOC recognized many new NOCs, while others, like the USSR split. For the 1992 Olympics, 151 NOCs were eligible for bidding, which increased to 204 NOCs for the 2020 Olympic Games. The included NOCs are tabulated in the appendix.

³ Bid-specific factors include, for example, the average distance from the Olympic village to sports venues, the capacity of the Olympic villages or the public support of an Olympic bid. Due to a lack of data availability for all countries, we exclude them from this analysis and focus on the national decision to bid for the Olympics.

to the respective Olympics.⁴ Table 1 summarizes the mean, median, and coefficient of variation of the 132 explanatory variables for non-bidding and bidding countries.

Tab. 1 Descriptive statistics of the explanatory variables for Summer Olympic bids, 1992–2020

Explanatory Variables	Observations	Mean		Median		Coefficient of variation		
		No bid	Bid	No bid	Bid	All	No bid	Bid
Economic determinants								
Gross domestic product (GDP) [2010 US\$-bn]	1,358	176.27	1477.39	11.64	555.85	4.29	4.53	1.84
1-year real GDP growth [%]	1,333	3.36	3.26	3.70	3.23	1.74	1.73	1.99
5-year real GDP growth [%]	1,281	3.29	3.60	3.38	3.03	1.17	1.17	1.15
10-year real GDP growth [%]	1,208	3.32	3.73	3.34	2.89	0.92	0.92	0.93
GDP per capita [2010 US\$]	1,357	10160.94	19541.48	2874.23	18014.00	1.65	1.71	0.83
1-year real GDP per capita growth [%]	1,297	1.65	2.07	2.07	2.06	3.29	3.32	2.74
5-year real GDP per capita growth [%]	1,255	1.58	2.25	1.75	1.90	2.36	2.41	1.55
10-year real GDP per capita growth [%]	1,188	1.56	2.35	1.68	1.84	1.90	1.95	1.16
Inflation rate [%]	1,137	55.81	58.23	5.73	4.45	13.69	13.99	5.06
Exports [2010 US\$-bn]	1,276	49.33	255.06	4.56	149.07	2.80	3.00	1.22
1-year real export growth [%]	1,002	6.21	7.86	5.54	6.89	2.20	2.27	1.01
5-year real export growth [%]	933	5.42	6.81	5.01	5.81	1.25	1.28	0.73
10-year real export growth [%]	848	5.39	6.76	5.13	5.57	0.92	0.94	0.66
Exports as share of GDP [%]	1,275	39.27	27.20	33.53	21.95	0.74	0.73	0.72
1-year development of exports as a share of GDP [pp]	1,230	0.31	0.62	0.21	0.10	18.10	19.17	6.63
5-year development of exports as a share of GDP [pp]	1,177	1.21	2.55	0.87	0.97	8.91	9.50	3.03
10-year development of exports as a share of GDP [pp]	1,098	2.71	4.73	2.61	3.23	5.75	6.04	2.36
Trade as share of GDP [%]	1,258	84.18	53.82	73.95	47.97	0.60	0.59	0.62
1-year development of trade as a share of GDP [pp]	1,242	0.03	0.47	0.17	0.23	351.47	603.34	11.35
5-year development of trade as a share of GDP [pp]	1,195	1.44	2.82	1.51	1.93	15.42	16.41	4.29
10-year development of trade as a share of GDP [pp]	1,116	4.62	6.17	4.46	5.96	5.69	5.87	2.91
Inflow of foreign direct investments (FDI) [2010 US\$-bn]	1,294	3.65	21.54	0.18	5.11	4.46	4.74	2.13
1-year real FDI growth [%]	1,264	1737.07	91.59	3.84	2.45	33.93	33.25	5.10
5-year real FDI growth [%]	1,205	-15.14	7.03	7.64	8.92	-6.70	-6.35	6.67
10-year real FDI growth [%]	919	16.09	13.59	13.11	11.64	1.61	1.63	0.99
WTO / GATT membership status [0/1] (%)	1,477	63.47	88.14			0.74	0.76	0.37
OECD membership status [0/1] (%)	1,477	12.48	64.41			2.42	2.65	0.75
IMF membership status [0/1] (%)	1,477	88.01	89.83			0.37	0.37	0.34
Population in country [m]	1,449	28.41	103.73	5.72	55.82	3.78	3.95	2.08
Urban population in country [m]	1,440	12.57	59.81	2.63	33.89	3.08	3.31	1.32
Socio-political determinants								
Human development index (HDI) [%] ⁵	1,145	56.40	73.39	60.89	77.80	0.40	0.40	0.24
5-year development of HDI [pp]	957	3.44	3.96	2.32	2.54	2.72	2.74	2.45
10-year development of HDI [pp]	712	6.53	5.71	4.85	5.95	1.73	1.77	0.41
Life expectancy at birth [years]	1,305	65.25	74.55	68.47	75.99	0.16	0.16	0.07
1-year development of life expectancy [years]	1,296	0.26	0.24	0.25	0.23	1.49	1.50	1.05
5-year development of life expectancy [years]	1,269	1.36	1.24	1.30	1.13	1.28	1.30	0.71
10-year development of life expectancy [years]	1,225	2.77	2.65	2.63	2.23	1.11	1.13	0.58
Mortality rate, Under-5 [per 1,000]	1,347	64.20	18.61	36.70	10.50	1.03	1.01	0.94
1-year development of mortality rate [points]	1,339	-1.61	-0.87	-1.10	-0.40	-2.57	-2.57	-1.22
5-year development of mortality rate [points]	1,296	-9.19	-4.87	-6.10	-2.40	-1.28	-1.28	-1.16
10-year development of mortality rate [points]	1,236	-19.86	-11.23	-13.90	-5.55	-1.08	-1.07	-1.13
Infant mortality rate [per 1,000 live births]	1,347	43.46	15.42	30.05	9.00	0.89	0.87	0.93
1-year development of infant mortality rate [points]	1,339	-1.09	-0.71	-0.80	-0.40	-1.24	-1.23	-1.20
5-year development of infant mortality rate [points]	1,296	-5.88	-3.93	-4.50	-1.95	-1.03	-1.03	-1.12
10-year development of infant mortality rate [points]	1,236	-12.59	-8.81	-9.40	-4.75	-0.93	-0.93	-1.07
Freedom House (FH) status	1,363	1.90	1.53	2	1	0.44	0.43	0.51
Free (%)	553	39.51	64.91					
Partly free (%)	421	31.47	17.54					
Not free (%)	389	29.02	17.54					
FH imputed polity [0 = low, 10 = high]	1,376	5.81	7.54	6.67	9.17	0.58	0.59	0.43
1-year development of FH imputed polity [points]	1,374	0.09	0.10	0	0	7.89	8.06	3.65
5-year development of FH imputed polity [points]	1,340	0.37	0.12	0	0	4.25	4.19	6.27
10-year development of FH imputed polity [points]	1,287	0.70	0.35	0	0	3.04	3.01	4.14
FH civil liberties [1 = high, 7 = low]	1,376	3.71	2.86	4	2	0.52	0.52	0.66
1-year development of FH civil liberties [points]	1,374	-0.05	-0.11	0	0	-9.18	-9.64	-4.28
5-year development of FH civil liberties [points]	1,340	-0.17	-0.09	0	0	-5.53	-5.45	-9.13
10-year development of FH civil liberties [points]	1,287	-0.31	-0.18	0	0	-3.83	-3.78	-5.66
FH political rights [1 = high, 7 = low]	1,376	3.72	2.56	4	1	0.61	0.60	0.84
1-year development of FH political rights [points]	1,374	-0.04	-0.12	0	0	-12.38	-13.44	-4.37
5-year development of FH political rights [points]	1,340	-0.17	-0.05	0	0	-6.86	-6.74	-14.86
10-year development of FH political rights [points]	1,287	-0.30	-0.05	0	0	-5.12	-5.00	-18.64
Democracy [0/1]	1,173	48.62	75.00			1.00	1.03	0.58
Index of democratization [0 = low, 100 = high]	1,345	13.77	24.37	11.40	28.10	0.91	0.93	0.51
1-year development of demo. Index [points]	1,340	0.38	-0.33	0	0	9.16	8.39	-10.80
5-year development of demo. Index [points]	1,306	1.44	0.14	0	0	4.30	4.17	31.93
10-year development of demo. Index [points]	1,258	2.57	3.26	0.55	1	2.78	2.81	2.29
Political competition [0 = low, 100 = high]	1,345	33.68	47.70	39.45	55.90	0.71	0.72	0.46
1-year development of political competition [points]	1,336	0.84	-0.86	0	0	10.63	9.86	-4.74
5-year development of political competition [points]	1,301	3.35	-0.62	0	0	4.85	4.68	-11.20
10-year development of political competition [points]	1,253	6.23	4.26	0	0.50	3.06	3.05	3.30
Political participation [0 = low, 100 = high]	1,345	32.57	45.88	34.95	50.00	0.62	0.62	0.42
1-year development of political participation [points]	1,336	0.47	0.34	0	0	12.37	12.11	20.22
5-year development of political participation [points]	1,301	1.82	1.22	0	0.35	6.76	6.75	6.05
10-year development of political participation [points]	1,253	3.05	6.07	0.40	2.25	4.97	5.14	3.11

⁴ If not stated otherwise, all variables represent the country's amount or total in the respective year. All monetary values are adjusted to US dollars of the year 2010, the base year for the 2020 Olympics.

⁵ As the HDI was compiled only every 5 years from 1980 to 2005, we interpolated the missing years in-between. Consequently, the 1-year development of HDI was excluded.

Political terror scale (Scale 1–5)	1,276	2.50	2.20	2	2	0.47	0.47	0.57
Secure rule of law, no political imprisonment (%)	308	23.40	40.74					
Limited imprisonment for political activity (%)	369	29.21	22.22					
Extensive political imprisonment (%)	343	27.33	16.67					
Civil and political rights violations common (%)	181	14.08	16.67					
Terror expanded to the whole population (%)	75	5.97	3.70					
Index of globalization [0 = low, 100 = high]	1,293	48.44	67.24	45.83	68.11	0.36	0.36	0.20
1-year development of globalization Index [points]	1,288	0.55	0.76	0.32	0.38	2.90	2.90	2.75
5-year development of globalization Index [points]	1,255	3.10	4.83	2.34	4.10	1.18	1.20	0.84
10-year development of globalization Index [points]	1,207	6.17	9.43	5.30	9.04	0.85	0.86	0.55
Economic globalization [0 = low, 100 = high]	1,100	52.86	62.09	52.44	61.40	0.36	0.36	0.22
1-year development of economic global. [points]	1,091	0.66	0.36	0.37	0.27	3.86	3.80	5.77
5-year development of economic global. [points]	1,064	3.35	4.09	2.73	4.15	1.56	1.58	1.24
10-year development of economic global. [points]	1,028	6.55	8.84	5.58	8.72	1.10	1.13	0.68
Political globalization [0 = low, 100 = high]	1,354	54.89	83.68	52.78	88.37	0.41	0.41	0.17
1-year development of political global. [points]	1,344	0.56	0.65	0.26	0.22	6.33	6.33	6.28
5-year development of political global. [points]	1,311	3.94	4.35	2.66	2.56	2.00	2.01	1.78
10-year development of political global. [points]	1,263	8.10	9.07	5.80	4.39	1.21	1.22	1.07
Social globalization [0 = low, 100 = high]	1,309	41.51	61.31	38.79	64.62	0.52	0.52	0.30
1-year development of social global. [points]	1,299	0.42	1.36	0.14	0.37	4.15	4.26	2.64
5-year development of social global. [points]	1,266	2.31	6.01	1.06	3.68	1.82	1.88	1.02
10-year development of social global. [points]	1,218	4.58	10.31	2.60	9.42	1.36	1.41	0.68
Corruption perceptions index (0 = corrupt, 10 = clean) ⁶	669	4.50	5.88	3.60	6.10	0.52	0.53	0.38
CO2 emissions per capita [metric tons]	1,375	4.57	9.22	1.82	7.03	1.41	1.43	0.99
1-year growth of CO2 emissions per capita [%]	1,338	3.35	-0.54	0.35	-0.54	26.46	25.72	-10.42
5-year growth of CO2 emissions per capita [%]	1,305	0.75	0.38	0.72	0.30	9.50	9.48	7.05
10-year growth of CO2 emissions per capita [%]	1,272	0.97	0.80	0.84	0.61	5.34	5.39	3.10
CO2 emissions [kg per PPP\$ of GDP]	1,216	0.49	0.65	0.35	0.52	0.97	0.98	0.74
Ratification of the Kyoto Protocol [0/1] (%)	1,477	31.52	28.81			1.48	1.47	1.59
Tourism determinants								
Accommodation rooms in country [1,000]	1,309	67.19	583.17	8.63	293.83	3.76	4.02	1.50
International tourism arrivals (ITA) [m]	1,389	2.73	17.50	4.61	8.77	2.48	2.50	1.11
1-year development of ITA (%)	1,209	10.59	10.17	5.95	4.11	3.18	3.18	3.23
5-year development of ITA (%)	1,164	6.05	7.16	5.14	5.69	1.83	1.87	1.01
10-year development of ITA (%)	834	5.86	6.92	5.09	6.11	1.31	1.34	0.77
International tourism receipts (ITR) [2010 US\$-m]	1,328	2561.69	16980.84	334.14	6909.40	2.90	2.95	1.35
1-year development of ITR (%)	1,121	13.80	5.37	5.24	5.16	5.41	5.38	3.42
5-year development of ITR (%)	1,071	6.73	6.37	5.39	4.98	2.15	2.18	1.52
10-year development of ITR (%)	904	5.95	7.26	5.39	5.48	1.47	1.51	0.79
International tourism receipts as share of exports [%]	1,134	11.73	7.89	5.69	6.04	1.55	1.56	0.91
Infrastructure determinants								
Distance of road network in country [1,000 km]	1,470	115.11	811.57	20.80	362.66	3.88	4.11	1.70
Airports/airfields in country	1,445	199.72	1292.12	46	176	4.74	4.71	2.57
Plane departures in country [1,000]	1,160	96.96	739.09	14.80	300.05	5.14	5.41	2.42
Airline passengers carried [m]	1,159	7.51	56.85	0.79	21.52	4.91	5.15	2.31
Communications index [per 100 persons]	1,372	0.13	0.20	0.05	0.12	1.39	1.42	0.94
Stadia in country with capacity > 40,000	1,477	1.58	12.32	0	5	4.74	4.88	2.22
Olympics and sports determinants								
Application for the foregoing Winter Olympics [0/1] (%)	1,477	2.82	13.56			5.46	5.87	2.55
Did the region host the last Summer Olympics? [0/1] (%)	1,477	20.52	15.25			1.98	1.97	2.38
Years since country last hosted the Summer Olympics	1,477	3.14	22.10	0	12	3.86	4.41	1.24
Years since country last hosted the Olympics	1,477	3.49	19.42	0	12	3.62	4.03	1.27
Years since region last hosted the Summer Olympics	1,477	7.48	11.66	8	12	0.97	0.98	0.71
Years since region last hosted the Olympics	1,477	4.62	7.46	4	6	1.28	1.28	1.10
Years since country last hosted the FIFA World Cup	1,477	2.07	11.80	0	0	4.20	4.73	1.43
Failed bids in last 4 host city selections	1,477	0.06	0.81	0	1	4.46	5.37	1.22
Votes in last host city election for the Summer Olympics	1,477	0.28	3.14	0	0	8.07	10.18	2.29
World Championships hosted in country in last 10 years	1,477	1.06	8.29	0	7	2.55	2.79	0.73
IOC Sponsorship fees from country [2010 US\$-m]	1,477	2.21	22.50	0	0	10.08	11.65	3.71
IOC Sponsorship fees from region [2010 US\$-m]	1,477	126.16	145.26	37.48	136.11	1.34	1.35	1.16
IOC Broadcasting fees from region [2010 US\$-m]	1,477	165.79	389.05	38.68	268.92	1.55	1.56	1.06
Involved in dispute with IOC? [0/1] (%)	1,477	0.07	1.69			27.17	37.66	7.68
IOC president	1,477	0.35	5.08			13.56	16.82	4.36
IOC executive board members	1,477	0.06	0.24	0	0	3.87	4.14	1.81
IOC members	1,477	0.53	1.76	0	2	1.46	1.52	0.57
Years since the NOC was recognized by the IOC	1,477	48.88	81.63	44	92	0.55	0.55	0.38
Medals won in last Summer Olympics	1,477	3.39	24.32	0	14	3.33	3.53	1.38
Average temperature in August in bid city [°F]	1,477	73.80	71.32	76.10	73.80	0.13	0.13	0.14
Application for the foregoing Winter Olympics [0/1] (%)	1,477	2.82	13.56			5.46	5.87	2.55

N = Observations without missing data; Label in brackets “[]” represents the scale of the variable.

Dichotomous variables: ‘Mean’ columns report the average of the characteristic for cities in the category of the characteristic.

The dataset contains 199,395 values (dependent variable, cluster variable, time variable and 132 explanatory variables multiplied by 1,477 cases), of which 24,986 are missing (12.5%). Assuming that the data are missing at random (MAR) (Little and Rubin (2002)), we use multiple imputation (MI) (Rubin 1976, 1987)⁷ and draw on a dataset that includes

⁶ The Corruption Perceptions Index was only measured from 1995 onwards. We assume continuity in corruption perception by using the 1995 values as a proxy for the prior Olympic bids.

⁷ The MI approach creates multiply-imputed datasets based on the distribution of the observed data and random components (White et al. (2011)). After each imputation is analyzed independently, the results are combined to obtain overall estimates and standard errors (Schafer and Graham (2002)). Compared to the complete cases model, the MI approach yields superior inferences based on unbiased and efficient estimates (Schafer (1999)).

all (bidding and non-bidding) countries with national Olympic committees to create 88 imputations. While the final model includes non-linear terms with missing values, we follow the procedure proposed by White et al. (2011), which starts by performing the multiple imputation without any additional terms (Schafer 1999). On this basis, a preliminary analysis model determines the non-linear terms. These are then integrated in the final multiple imputation process.⁸

According to our objective of identifying factors that discriminate the dichotomous dependent variable Olympic *bid* and accounting for data correlated on countries, the average effect of a covariate is of major interest, while the intra-cluster variability is only of minor importance (Hardin and Hilbe 2013; Hosmer et al. 2013). Consequently, we employ the binary population average model (PA) using generalized estimating equations (GEE) for deriving estimates that are averaged over clusters and are therefore interpretable on the whole sample (Liang and Zeger 1986). The analysis model is obtained by minimizing the quasi-likelihood information criterion (QIC), which is averaged over all imputations (Hardin and Hilbe 2013; Shen and Chen 2013). The GEE model is set up with a first-order autoregressive correlation to reflect repeated measurements with an interval of four years. As recommended by Hosmer et al. (2013), we utilize the sandwich (robust) estimator. The model employs a complementary log-log link to reflect the asymmetrically distributed response *bid* with only 4% of all cases bidding for the Olympics (Hosmer et al. 2013).

The continuous covariates are examined through multivariable fractional polynomials (FP) analysis, which requires the transformation of nine variables (Royston and Sauerbrei 2008). The variables *trade as share of GDP* and *years since a country last hosted the Olympic Games* employ a two-term FP with powers (-2 -2). The covariate *CO2 emissions per capita* is transformed with power (.5). Two-term FP with powers (0 0)⁹ and powers (-2 1) are used for the *urban population in the country* and the *international tourism arrivals* respectively. The covariate *10-year development of political participation* is best met with power (3), while the *index of democratization* employs a two-term FP with

⁸ For the inclusion of non-linear terms the ‘improved passive approach,’ used as the ‘just another variable approach,’ is not suitable due to the MAR assumption and a complex initial imputation model (White et al. 2011).

⁹ Power (0) refers to $\ln(x)$ instead of $x^0 = 1$.

powers (3 3). Finally, the covariates *world championships hosted in the last 10 years* and *the number of failed bids in the last four bid city selections* are transformed using a one-term FP with power (-2). All other covariates are treated as linear. No meaningful and significant interaction could be found.

As a final step in the model building process, we assess the sensitivity of the correlation structure and the linking function in table 2. The complementary log-log function with the first-order autoregressive correlation yields the best QIC value.

Tab. 2 Sensitivity analysis of the correlation structure and linking function

QIC values	Linking function		
	logit	complementary log-log	probit
Independent	183.27	174.56	185.63
Exchangeable	183.02	174.71	185.61
Autoregressive 1 st order	182.59	173.99	184.79
- without non-linear terms	302.49	309.07	305.34
- empty model	501.30	501.30	501.27

3 Results

Based on eight bid cycles for the Olympics from 1992 until 2020, a country's bid decision is best described by the model in table 3. Of the 21 determinants, seven explain bids from an economic perspective, six from a political perspective, and three from a social perspective. Five of these determinants supposedly influence the chances of winning the Olympic host city election.

Tab.3 Factors for Olympic Games bids: in-sample and out-of-sample models

Determinants	Analysis model (1992–2020)	Out-of-sample prediction (1992–2016 → 2020)
Economic factors		
10-year real GDP growth [%]	0.4094***	0.3883***
Trade as share of GDP [%] FP1 / FP2	0.9282 / 0.4522***	0.8973 / 0.4365***
Inflow of foreign direct investments (FDI) [2010 US\$-bn]	-0.0076**	-0.0054
10-year development of economic globalization [points]	0.0893***	0.1031***
CO2 emissions per capita [metric tons] FP1	3.8719***	4.1221***
International tourism arrivals (ITA) [m] FP1 / FP2	-0.0104 / 0.5402***	-0.0118 / 0.5396***
Urban population [m] FP1 / FP2	-1.5413 / -0.3676***	-1.6755 / -0.4076***
Political factors		
Democracy [0/1]	-2.1493**	-2.1169**
10-year development of FH imputed polity [points]	-0.5796***	-0.6342***
1-year development of FH political rights [points]	-1.8568***	-1.9321***
1-year development of political competition [points]	-0.0869*	-0.0783*
10-year development of political participation [points] FP1	3.2876***	3.3094***
Index of democratization [0 = low, 100 = high] FP1 / FP2	0.5945 / -0.3995***	0.5961 / -0.4054***
Social factors		
10-year development of infant mortality rate [points]	-0.0881***	-0.0836**
1-year development of social globalization [points]	0.1714*	0.2310**
5-year development of social globalization [points]	0.0869*	0.0806*
Factors attributed to the chances of winning		
World Championships hosted in country in last 10 years FP1	-0.0806***	-0.0802***
Years since country last hosted the Olympics FP1 / FP2	-0.0743 / -0.0189***	-0.0775 / -0.0197***
Years since region last hosted the Summer Olympics	0.1069***	0.1088***
Failed bids in last 4 host city selections FP1	-1.1522**	-0.8352
Average temperature in August in bid city [°F]	0.0816***	0.0879***
Constant	-18.9051***	-19.6407***
Number of Olympic Games	8	7
Applications/NOCs	59 / 1475	54 / 1269
Model F-Test	3.51***	2.97***
QIC	173.99	174.49
Area under ROC	0.9897	0.9890

*** p < 0.01; ** p < 0.05; * p < 0.10; FP1 / FP2 = first and second term of fractional polynomial transformation. *Trade as share of GDP [%]* is transformed $(x/100)^{-2}$ and $(x/100)^{-2} * \ln(x/100)$; *CO2 emissions per capita [metric tons]* is transformed $((x+2.9802e-06)/10)^5$; *Urban population [m]* is transformed $\ln(x/100)$ and $\ln(x/100)^2$; *International tourism arrivals [m]* is transformed $(x/10)^{-2}$ and $(x/10)$; *10-Year development of political participation [points]* is transformed $((x+60.6999969)/100)^3$; *Index of democratization [0 = low, 100 = high]* is transformed $((x+0.099998474)/10)^3$ and $((x+0.099998474)/10)^3 * \ln((x+0.099998474)/10)$; *World championships hosted in country in last 10 years* is transformed $((x+1)/10)^{-2}$; *Years since country last hosted the Olympics* is transformed $((x+2/100)^{-2}$ and $((x+2/100)^{-2} * \ln((x+2/100))$; *Failed bids in last 4 host city selections* is transformed $(x+1)^{-2}$; the Freedom House scale of political rights ranges from 1 (most free) to 7 (least free).

Interpretation of economic factors

The country's *long-term economic growth* is positively correlated with bidding for the Olympic Games (top-left graph of figure 1). Stronger economies, particularly those with 10-year growth rates above 5% p.a., are ceteris paribus more likely to bid.¹⁰ In their regressions Olympic bids etc. → economic growth, Brückner and Pappa (2013) identify significantly higher GDP growth rates in bid countries nine to seven years prior to the event. They interpret their results as a signal effect for a liberalization process in the bidding countries, which stimulated the local economy. Our findings support the idea of

¹⁰ All data relates to 10 years prior to the Olympic Games. As an example, the 10-year GDP growth rate of the bids for the 2020 Olympics refers to the period 2001–2010.

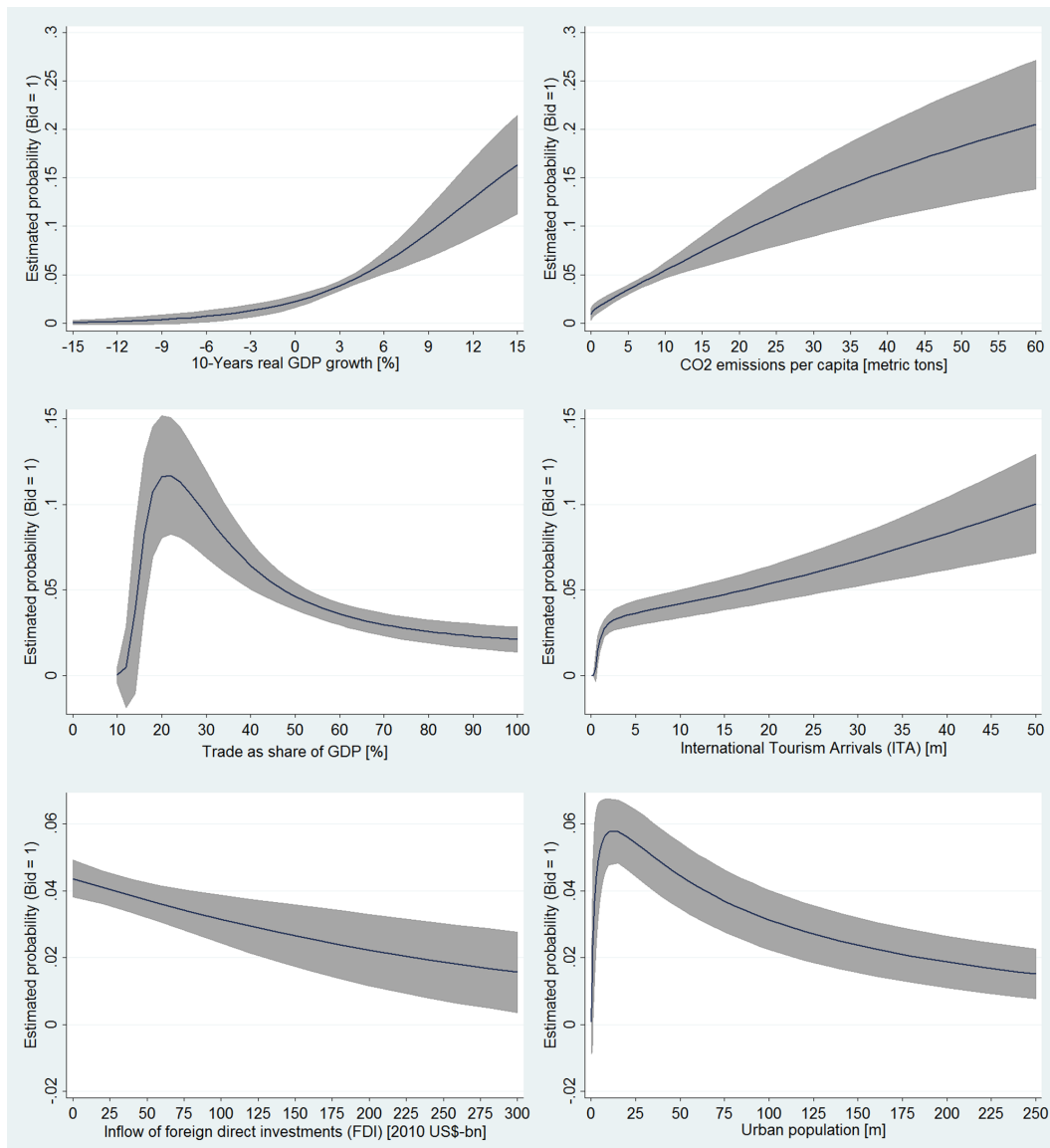
a causality running from economic prosperity to Olympic bids, but on the basis of an appropriate test of causality direction.

In a similar manner, Rose and Spiegel (2011) find that organizing the Games or even only bidding for them induces significant increases in exports. They also argue about a signal effect. Besides the finding that their results suffer from the fallacy of a selection bias (Maennig and Richter (2012), they draw their conclusion from a regression which tests the reverse causality. Our analysis supports the idea of a causality “exports (possibly as a proxy for openness or competitiveness) → Olympic bids” on the basis of a direct test but on a more differentiated basis: As visualized in the middle-left graph of figure 2, the probability of countries bidding for the Summer Olympics reaches its peak with an *overall trade as share of GDP* (trade openness) of between 17% and 30%. In addition, lower levels of *inflow of foreign direct investments*, indicating less financial liberalization, increase the chances of an Olympic bid (bottom-left graph of figure 1). Finally, a positive *10-year development in economic globalization* might indicate an Olympic bid. This variable condenses the development of actual trade flows and trade restrictions (Dreher 2006; Dreher et al. 2008).¹¹ In sum, countries with lower current levels of trade and financial openness, but with a positive long-term trend, are more likely to bid for the Olympic Games.

The transformed variable *CO2 emissions per capita* (top-right graph, figure 1) has a “positive” effect with diminishing returns on the probability to bid for the Olympics. The variable may be interpreted as a proxy for economic development (Raupach et al. 2007). Hosting the Olympics has become more accessible in recent years, once a country has entered the ‘developed world’ characterized by higher CO2 emissions. This hypothesis is supported by the fact that nine countries, which had never previously bid, have applied for the Summer Olympics since 1992 (Yugoslavia, China, Turkey, South Africa, Puerto Rico, Thailand, Malaysia, Azerbaijan, Qatar). (Low) *CO2 emissions per capita may also be interpreted* as an indicator of environmental awareness; a bid for the Olympics in some advanced nations was rejected, also for environmental reasons.

¹¹ Actual flows include trade (percent of GDP), foreign direct investment (percent of GDP), portfolio investment (percent of GDP), and income payments to foreign nationals (percent of GDP). Restrictions account for hidden import barriers, mean tariff rate, taxes on international trade (percent of current revenue), and capital account restrictions.

Fig. 1 Marginal effects of economic determinants with 95% confidence intervals (CI)



Many Olympic bids are reasoned by the goal of tourism promotion (Fourie and Santana-Gallego 2011; Song 2010). The chance of a country bidding for the Olympics increases with the country's level of tourism. The middle-right graph of figure 1 illustrates that countries with *international tourism arrivals* below 2.5 million visitors per year are unlikely to bid for the Olympic Games, while the probability above this threshold increases approximately linear by one percentage point per seven million additional tourist arrivals. We explain this effect with the importance of tourism for a country. If the country largely depends on tourism and competes with other multiple tourism destinations, the Olympic Games might be seen as an effective way to improve the country's tourism profile.

The *size of the urban population* has a mixed effect on bidding for the Olympic Games as illustrated in the bottom-right graph of figure 1. Chances increase dramatically above a size of 10 million inhabitants in urban areas, but decrease continuously above this threshold. However, the average marginal effect is not particularly strong. Ceteris paribus there exists a difference in probability of four percentage points between countries with an urban population of 10 million vs. 175 million. Therefore, we view this indicator as an adjustment for large Asian or African countries such as China, India, Indonesia, Pakistan, Nigeria, and Bangladesh, which have only bid twice in the past 30 years.

Interpretation of political factors

A country's political situation, especially in terms of regime status, policy changes, and election results, has a strong influence on the decision to bid for the Olympic Games. On the one hand, the binary variable *democracy status* shows that countries with a non-democratic regime are more likely to bid for the Olympic Games. In addition, we see that *long-term policy changes restricting political and civil rights* (variable *10-year development of Freedom House imputed policy index*) increase the chances of an Olympic bid. Long-term declines in this variable were recorded, for example, in China (bids for 2000, 2008) and Turkey (bids for 2004, 2008, 2012).

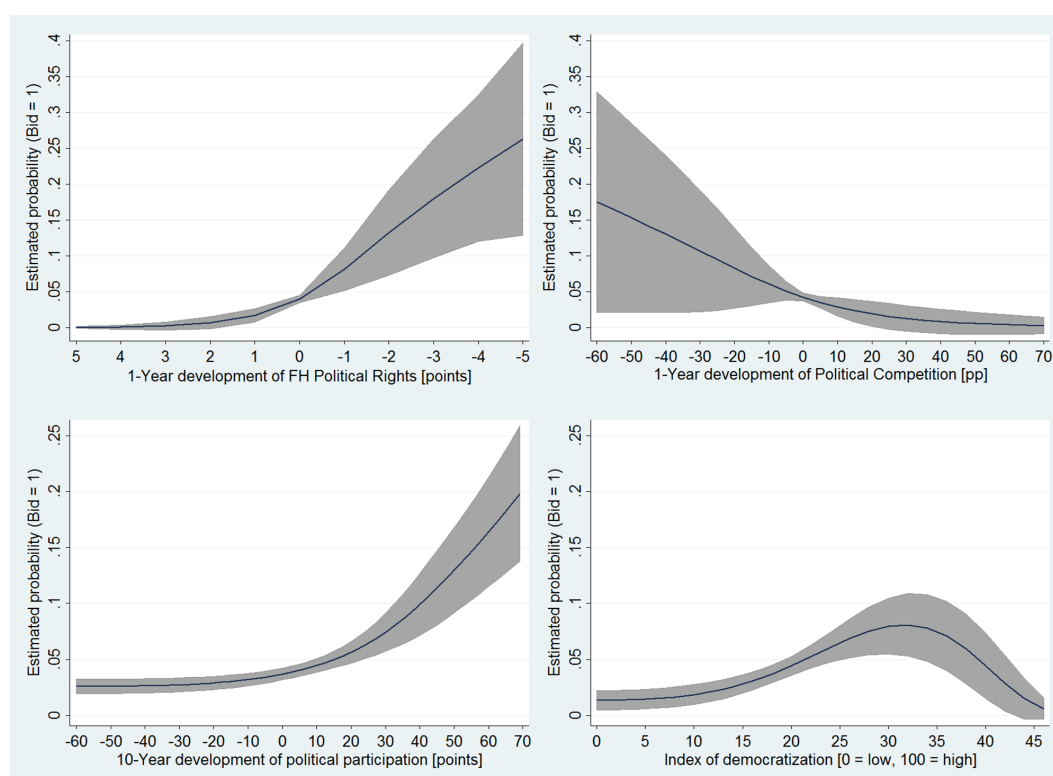
On the other hand, *short-term improvements in the political rights situation* are powerful indicators of an Olympic bid (variable *1-year development of FH political rights*,¹² top-left graph of figure 2). The bids of Spain for 1992 (transition to democracy in the late 1970s and early 1980s), Germany for 2000 (reunification in 1990 with an improvement of political rights in East Germany), and South Africa for 2004 (end of the Apartheid regime in 1994) come to mind.

The last national election results also play an important role in a country's decision to bid for the Olympics. If the leading party in a country extends its majority share by gaining more votes – i.e., if the *political competition* (top-right graph of figure 2) is

¹² Consider that the Freedom House scale of political rights ranges from 1 (most free) to 7 (least free), which is why the x-axis in the top-left graph of figure 2 is inverted.

reduced compared to the last election¹³ – it is more likely that the country will apply to host the Olympic Games. In addition, a *long-term increase in the political participation* (bottom-left graph of figure 2), i.e., more people voting in the previous election than 10 years ago, increases the chances of an Olympic bid. Finally, the *index of democratization* (bottom-right graph in figure 2), which is the political competition multiplied by the political participation, represents the democratic stability of a country. The graph shows the highest likeability around the value of 30 representing an election with a stable majority and solid turnout. In sum, if the country's leading party extended their share of votes in the previous national election, if more people voted in the last election than 10 years ago, and if the government has a stable majority of votes, it is likely that the government will strongly consider an Olympic bid.

Fig. 2 Marginal effects of political determinants with 95% CI



Interpretation of social factors

Although some Olympic bids, such as Toronto 2000 and Rome 2020, faced the allegation of ‘misplaced priorities’ (Hiller 2000), the majority of countries seem to have improved

¹³ Political competition is measured as a percentage of votes received by the non-winning parties (subtracting from 100 the percentage of votes won by the largest party), i.e., lower values indicate an extended majority.

the social conditions before bidding for the Olympic Games. Our model includes the positive development of health standards, measured by the *long-term improvement of the infant mortality rate*, which increases the probability to bid for the Olympics. In addition, Olympic bids are more likely to come from countries with stronger *short- and mid-term progress in social globalization*, which is defined as an increase in personal contacts (via communication and tourism), in information flows (e.g., internet users), and in cultural proximity (trade in books, number of Ikea warehouses per capita).

Interpretation of factors affecting the chances of winning

Of the 22 variables in our model, eight determinants are associated with the chances of winning the Olympic host city election. Three determinants discussed from an economic or political perspective overlap with the chances of winning (Maennig and Vierhaus 2014): A *long-term GDP growth* as well as a *short-term improvement of political rights* are important for the IOC members when voting for the Olympic host city. While the *urban population* has a mixed effect on the bid decision (see above), it is a factor that is positively correlated with votes in the IOC election.

Five additional determinants are supposed to influence the bid's odds of obtaining the hosting rights. Before countries bid for the Olympics, they usually obtain significant experience in *hosting world championships*. The average Olympic bid has hosted over eight world championships in the years prior to an Olympic bid. Successful hosting of such events signals to the IOC that the country could be capable of staging the Olympics (Maennig and Vierhaus 2014). In addition, we assume hosting world championships helps to establish valuable relationships with the respective international federations, which might support the Olympic bid.

It is a common belief among Olympic bids and the media that persistence in bidding for the Olympics pays off. Despite anecdotal evidence (Sydney 2000 after failed Australian bids in 1992 and 1996; Athens 2004 after failed bid in 1996; Beijing 2008 after failed bid in 2000; London 2012 after failed UK bids in 1992, 1996, and 2000; Rio 2016 after failed bid in 2012; Tokyo 2020 after failed bids in 2008 and 2016), there exists no statistical proof that failed bids lead to higher chances in the next election (Maennig and Vierhaus 2014). Nevertheless, the *number of failed Olympic bids* increases the bidding probability

(top-right graph of figure 3). Experience and knowledge from previous bids as well as encouragement from the IOC might be decisive factors to bid again.

A rotation among countries and regions for Olympic hosts is also often discussed. It has been shown that the IOC regards the *years since the country last hosted the Summer or Winter Olympics* (Maennig and Vierhaus 2014). The bottom-left graph of figure 3 shows that countries respect this procedure. All countries that have never hosted the Olympics are coded as 0 years (since last hosting), which results in a similar probability as if the country had not hosted the Olympic Games for 30 years. The probability of a host bidding again immediately after hosting is close to zero, but noticeably increases until 30 years after hosting and then gradually approaches the maximum. In addition, the indicator *years since the region last hosted the Summer Olympics* is included in this model for the country decision (bottom-right graph of figure 3). Countries are unlikely to bid for the Olympics if their continent hosts the foregoing Summer Olympics. The fact that the Olympics have never been hosted on the same continent twice in a row appears to be due more to a lack of supply than a lack of demand.

Model fit and predictive performance

The model fit is assessed from three angles. First, we note that all main effects are significant at the level of 0.10. Second, the classification accuracy can be regarded as outstanding with an area under the receiver operating curve (ROC) of 0.9897 (Hosmer et al. 2013). In other words, if we randomly select two cases from our dataset, the chance that a bid country has a higher probability than a non-bidding country is almost 99%.

Third, the model is validated with an out-of-sample model (column 2 of table 3). This reduced analysis model is based on 1,269 cases and 52 bids, ignoring the bids for the Olympic Games 2020. All but two coefficients remain significant at the traditional levels. Between the two models, the estimated coefficients vary, on average, by 8.1% indicating a stable analysis model. The out-of-sample model assigns three bids the highest probabilities for the 2020 Olympics (Qatar 100.00%, Azerbaijan 86.38%, Japan 83.25%), while Spain (29.03%) and Turkey (16.21%) are in the top 10 of all 204 potential Olympic bid countries. To sum up, the full model is well-suited to discriminating bidding from non-bidding countries and to explaining the conditions in which countries bid for the Olympic Games.

4 Summary and conclusions

The effects of bidding for and hosting the Olympics have been widely discussed. This article analyzes the reverse causality, that is, which effects and factors shape the country's decision to bid for the Olympic Games. Based on economic, socio-political, tourism, infrastructure, and Olympics and sports explanations, we derive and test 132 determinants that potentially discriminate bidding from non-bidding countries. The study examines 1,477 country cases resulting in 59 bids for the 1992 to 2020 Olympics.

Our findings support the idea that countries consider their economic, political, and social state as well as their chances of winning the host city election. From an economic perspective, Olympic bid countries can be characterized by long-term economic growth and a liberalization policy identified by lower current levels of trade and financial openness, but increasing long-term economic globalization. In addition, more developed countries with higher levels of international tourism and an urban population above 10 million inhabitants are more likely to bid. From a political perspective, it is either countries in process toward democracy and globalization or countries with a long-term history of autocracy that bid for the Olympics. From a social perspective, countries that have prioritized the development of health standards and social globalization contemplate Olympic bids.

Countries also – at least implicitly - assess their chances of winning the Olympic host city election. Factors such as long-term GDP growth, short-term improvement of political rights, experience in hosting world championships, and rotation among countries influence both the country's decision to bid and the IOC's decision regarding the host city. In addition, certain factors which are commonly seen as relevant, but are not statistically proven, play a role. Persistence demonstrated by the number of failed Olympic bids, a regional rotation, and the temperature are evaluated by countries before bidding.

One objective of the IOC is to encourage more countries to bid for the Olympic Games. Our model reveals three pillars for increasing the number of Olympic bids. First, most bidding countries likely seek a global stage for presenting their liberalization, globalization, and development. We recommend that the IOC provides this marketing

stage and constantly promotes Olympic bid countries and cities. Second, the IOC members could vary their host city selection criteria to convey the perception that they can win to more potential bids. For example, the IOC could refute the myth that an Olympic host cannot come from the same region as the previous host. Similarly, it could specifically invite and select smaller countries and cities to increase the group of potential hosts.

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Appendix 1: NOCs recognized by the IOC and eligible to host OG

NOCs			
Afghanistan	Dominica ²⁰⁰⁴⁻	Lesotho	Saint Vincent and the Grenadines ²⁰⁰⁰⁻
Albania	Dominican Republic	Liberia	Samoa ¹⁹⁹⁶⁻
Algeria	DR Congo	Libya	San Marino
American Samoa ²⁰⁰⁰⁻	Ecuador	Liechtenstein	São Tomé and Príncipe ²⁰⁰⁴⁻
Andorra	Egypt	Lithuania ²⁰⁰⁴⁻	Saudi Arabia
Angola	El Salvador	Luxembourg	Senegal
Antigua and Barbuda	Equatorial Guinea ¹⁹⁹⁶⁻	Macedonia ²⁰⁰⁴⁻	Serbia ²⁰¹⁶⁻
Argentina	Eritrea ²⁰¹²⁻	Madagascar	Serbia & Montenegro ²⁰⁰⁸⁻²⁰¹²
Armenia ²⁰⁰⁴⁻	Estonia ²⁰⁰⁴⁻	Malawi	Seychelles
Aruba ¹⁹⁹⁶⁻	Ethiopia	Malaysia	Sierra Leone
Australia	Federated States of Micronesia ²⁰⁰⁸⁻	Maldives ¹⁹⁹⁶⁻	Singapore
Austria	Fiji	Mali	Slovakia ²⁰⁰⁴⁻
Azerbaijan ²⁰⁰⁴⁻	Finland	Malta	Slovenia ²⁰⁰⁴⁻
Bahamas	France	Marshall Islands ²⁰¹⁶⁻	Solomon Islands ¹⁹⁹⁶⁻
Bahrain	Gabon	Mauritania	Somalia
Bangladesh	Gambia	Mauritius	South Africa ²⁰⁰⁴⁻
Barbados	Georgia ²⁰⁰⁴⁻	Mexico	South Korea
Belarus ²⁰⁰⁴⁻	Germany ²⁰⁰⁰⁻	Moldova ²⁰⁰⁴⁻	Soviet Union ²⁰⁰⁰
Belgium	East Germany ¹⁹⁹⁶	Monaco	Spain
Belize	West Germany ¹⁹⁹⁶	Mongolia	Sri Lanka
Benin	Ghana	Montenegro ²⁰²⁰⁻	Sudan
Bermuda	Great Britain	Morocco	Suriname
Bhutan ¹⁹⁹⁶⁻	Greece	Mozambique	Swaziland
Bolivia	Grenada ¹⁹⁹⁶⁻	Myanmar	Sweden
Bosnia and Herzegovina ²⁰⁰⁴⁻	Guam ¹⁹⁹⁶⁻	Namibia ²⁰⁰⁴⁻	Switzerland
Botswana	Guatemala	Nauru ²⁰⁰⁴⁻	Syria
Brazil	Guinea	Nepal	Tajikistan ²⁰⁰⁴⁻
British Virgin Islands	Guinea-Bissau ²⁰⁰⁸⁻	Netherlands	Tanzania
Brunei ¹⁹⁹⁶⁻	Guyana	Netherlands Antilles ²⁰¹⁶	Thailand
Bulgaria	Haiti	New Zealand	Timor-Leste ²⁰¹⁶⁻
Burkina Faso	Honduras	Nicaragua	Togo
Burundi ²⁰⁰⁴⁻	Hong Kong	Niger	Tonga ¹⁹⁹⁶⁻
Cambodia ²⁰⁰⁸⁻	Hungary	Nigeria	Trinidad and Tobago
Cameroon	Iceland	North Korea	Tunisia
Canada	India	Norway	Turkey
Cape Verde ²⁰⁰⁴⁻	Indonesia	Oman	Turkmenistan ²⁰⁰⁴⁻
Cayman Islands	Iran	Pakistan	Tuvalu ²⁰²⁰⁻
Central African Republic	Iraq	Palau ²⁰¹²⁻	Uganda
Chad	Ireland	Palestine ²⁰⁰⁸⁻	Ukraine ²⁰⁰⁴⁻
Chile	Israel	Panama	United Arab Emirates
China	Italy	Papua New Guinea	United States
Chinese Taipei	Ivory Coast	Paraguay	Uruguay
Colombia	Jamaica	Peru	Uzbekistan ²⁰⁰⁴⁻
Comoros ²⁰⁰⁴⁻	Japan	Philippines	Vanuatu ²⁰⁰⁰⁻
Congo	Jordan	Poland	Venezuela
Cook Islands ¹⁹⁹⁶⁻	Kazakhstan ²⁰⁰⁴⁻	Portugal	Vietnam
Costa Rica	Kenya	Puerto Rico	Virgin Islands
Croatia ²⁰⁰⁴⁻	Kiribati ²⁰¹⁶⁻	Qatar	Yemen ²⁰⁰⁰⁻
Cuba	Kuwait	Romania	North Yemen ¹⁹⁹⁶
Cyprus	Kyrgyzstan ²⁰⁰⁴⁻	Russia ²⁰⁰⁴⁻	South Yemen ¹⁹⁹⁶
Czech Republic ²⁰⁰⁴⁻	Laos	Rwanda ¹⁹⁹⁶⁻	Yugoslavia
Czechoslovakia ²⁰⁰⁰	Latvia ²⁰⁰⁴⁻	Saint Kitts and Nevis ²⁰⁰⁴⁻	Zambia
Denmark	Lebanon	Saint Lucia ²⁰⁰⁴⁻	Zimbabwe
Djibouti ¹⁹⁹⁶⁻			

Notes: ^{XXXX-} Eligible for bidding since the XXXX Olympics; ^{-YYYY} Eligible for bidding until the YYYY Olympics

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